



Administration Guide | PUBLIC

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Administration and Operation Guide

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1 Welcome

Giving you the best user experience is our priority. Therefore, we do our best to provide you with the clearest and the most complete documentation possible.

For this purpose, feel free to leave additional feedbacks by using the dedicated feature on the Help Portal. Please write some details about your suggestion. Based on SAP user feedbacks, we improve your documentation and deliver Frequently Asked Questions (FAQs) about all aspects of working with SAP Convergent Charging efficiently. We complete these solutions with our best time-saving and task-completion tips and tricks.

You can also visit our page [Community Questions and Answers for SAP Convergent Charging](#).

2 Before You Start

→ Remember

This guide does not replace the daily operations handbooks that SAP recommends clients create for their specific production operations.

[About This Document \[page 9\]](#)

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2.1 About This Document

This **Administration and Operation Guide** documentation provides a starting point to optimally maintain and run your SAP Convergent Charging software, referred to as SAP CC in this document. Designing, implementing, and running your SAP CC 2023 systems at peak performance, around the clock, has never been more vital for your business success than now.

This technical guide provides a starting point for managing your SAP CC 2023 software applications and maintaining and running them optimally. It contains specific information for various tasks and lists the tools that you can use to perform them.

You use this guide during the Production Operation Phase but also during the Project Implementation Phase for administering and monitoring the SAP CC system landscapes.

This guide also provides references to the documentation required for these tasks, so you will sometimes also need other documents such as the [Getting Started with SAP Convergent Charging 2023](#) and [SAP CC 2023 Application Help](#).

The Administration and Operation Guide contains the following main sections:

- [Technical System Landscape \[page 19\]](#)
This section lists the software components of SAP CC 2023 and introduces the other software applications recommended for monitoring and maintaining the landscape.
- [Configuring SAP Convergent Charging \[page 22\]](#)
This section gives some hints on main configuration parameters for business and technical functions, and also on settings to optimize this configuration.
- [Monitoring of SAP CC \[page 322\]](#)
This section details the monitoring and tools used for SAP CC 2023. Some installation recommendations are provided. The trace and log files produced by the systems are also detailed in this section.

- [Management of SAP CC \[page 361\]](#)
This section describes the start and stop sequences, the configuration and administration of the SAP CC 2023 system landscape. It explains how to operate backup and restore activities, archiving activities, how to manage load balancing and high availability for the landscape.
- [High Availability Operations \[page 414\]](#)
This section describes how to optimize your systems by controlling the growth of redundant data and by implementing suitable logic to control redundant systems.
- [Purging and Archiving \[page 426\]](#)
This section details the operations to perform to:
 - Transfer out-of-date data from the back-end database system to a file system, to later move this data in another consistent and secure storage system
 - Definitively delete this source data, to decrease the global database size and increase the performance of the system
- [Troubleshooting of SAP CC \[page 445\]](#)
This section describes a problem determination method for root cause analysis and provides some troubleshooting cases.

Caution

This documentation does not provide any guidance for the installation, the upgrade or the update of SAP CC or its components. This information is available in the [SAP CC 2023 Installation and Maintenance Guide](#) documentation.

2.2 Target Audience

This guide is intended for the following audience:

- Solution and Technology Consultants
- Application and System Administrators
- Support Specialist (SAP SE, Local Support Team)
- Operations Team Expert
- IT Consultant/Implementer

2.3 What's New in This Document

What's New in SAP CC 2023 FPS 1?

As of SAP CC 2023 FPS 1, SAP Convergent Charging provides you with the following modifications of this SAP product documentation:

- Modification of the [Configuration Settings for Cockpit \[page 239\]](#) topic: consideration of the SAP Passport support in Cockpit.
 - **Required Users:** Changes for the database users (as service users) of the Core Database systems that are required by the installations of the SAP CC Cockpit web applications: These particular database users (or database accounts) of an SAP CC Core Database must be granted a read access to the database views pointing on the OBJECT_ACCESS_RULE database table.
See [Database Users/Accounts](#) in section [Users for Third Parties](#).
- Modification of the [Creating User Accounts for SAP CC Users \[page 227\]](#) topic: consideration of the permissions to create if required by your business.
- New topic about the configuration of right-based permissions. See [Creating Permissions on Tables for SAP CC Users \[page 228\]](#).
- Modification and enhancement of the [Users Management via External Systems \[page 229\]](#) topic to consider the new role **Pricing Specialist for Price Data** for Cockpit users

What's New in SAP CC 2023 (in FPS 0)?

SAP Convergent Charging 2023 is a new major release of your SAP software product.

As of release 2023, SAP Convergent Charging provides you with the following modifications of this SAP product documentation:

- Following the upgrade of the JVM, modification of the sections below:
 - [JVM Recommendations](#)
 - [Configuration Options \[page 140\]](#)
 - [Log Files of the Java Garbage Collection \(GC\) \[page 349\]](#)
 - [Software Component Matrix \[page 19\]](#)
 - [Detailed Periodic Tasks \[page 392\]](#)
 - [Required Manual Periodic Tasks \[page 385\]](#)
- Support of multiple authentication protocols to sign in to Cockpit: modification of the [Configuration Settings for Cockpit \[page 239\]](#) section.
- Disablement of password-based authentication of technical users for the Web Services interface: modification of the [Separating Service and Individual Users \[page 221\]](#) section.
- The software correction related to UDP is reflected in this SAP product document and user assistance. The section "*Enabling the UDP Discovery Mechanism*" disappears, and sections [Communications Channels \[page 57\]](#) and [Configuration Options \[page 30\]](#) are modified accordingly.

See Also

- [What's New in This Document](#) in the [SAP CC 2023 Installation and Maintenance Guide](#)
- [What's New in This Document](#) in the [SAP CC 2023 Security Guide](#)

Related Information

[What's New in Feature Package Stack 1](#)

2.4 Additional Information

For more information about specific topics, see the quick links as shown in the table below:

Content	Quick Link
SAP CC documentation	help.sap.com/cc2023

Note

SAP CC is part of the SAP solution SAP Billing based on SAP Business Suite or SAP S/4HANA. Consult the central solution information at the following address: <https://cx.sap.com/fr/products/billing>.

Content	Quick Link																																
Related SAP notes	support.sap.com/notes																																
	<table border="1"> <thead> <tr> <th>SAP Note</th> <th>Description</th> </tr> </thead> <tbody> <tr> <td>797147</td> <td>This SAP Note is the central note of CA Introscope (IS) for SAP, a specialized component of SAP Solution Manager</td> </tr> <tr> <td>1579474</td> <td>This SAP Note deals with Management Modules for Introscope delivered by SAP</td> </tr> <tr> <td>1453216</td> <td>Implementation of CA Introscope for SAP</td> </tr> <tr> <td>2138309</td> <td>Introscope 9.7 Release Notes</td> </tr> <tr> <td>2071100</td> <td>Introscope 9.5 Release Notes</td> </tr> <tr> <td>1565954</td> <td>Introscope 9 Release Notes</td> </tr> <tr> <td>1280961</td> <td>SAP Extended Diagnostics by CA Wily contains a full reseller version of CA Introscope</td> </tr> <tr> <td>1875021</td> <td>System Monitoring Setup for SAP Convergent Charging</td> </tr> <tr> <td>1367871</td> <td>Timezone updates for SAP JVM¹</td> </tr> <tr> <td>1027146</td> <td>Database administration and monitoring using the DBA² Cockpit</td> </tr> <tr> <td>1265134</td> <td>DBA Cockpit: Connecting a remote database (Oracle)</td> </tr> <tr> <td>1388700</td> <td>DBA Cockpit: Setup in Solution Manager for MS SQL³ Server</td> </tr> <tr> <td>1664432</td> <td>DBA Cockpit: SAP HANA database as remote database</td> </tr> <tr> <td>1532253</td> <td>SYB: Remote DB Monitoring for SAP Sybase ASE</td> </tr> <tr> <td>1267189</td> <td>DBA Cockpit: IBM DB2 as Remote Database</td> </tr> </tbody> </table>	SAP Note	Description	797147	This SAP Note is the central note of CA Introscope (IS) for SAP, a specialized component of SAP Solution Manager	1579474	This SAP Note deals with Management Modules for Introscope delivered by SAP	1453216	Implementation of CA Introscope for SAP	2138309	Introscope 9.7 Release Notes	2071100	Introscope 9.5 Release Notes	1565954	Introscope 9 Release Notes	1280961	SAP Extended Diagnostics by CA Wily contains a full reseller version of CA Introscope	1875021	System Monitoring Setup for SAP Convergent Charging	1367871	Timezone updates for SAP JVM ¹	1027146	Database administration and monitoring using the DBA ² Cockpit	1265134	DBA Cockpit: Connecting a remote database (Oracle)	1388700	DBA Cockpit: Setup in Solution Manager for MS SQL ³ Server	1664432	DBA Cockpit: SAP HANA database as remote database	1532253	SYB: Remote DB Monitoring for SAP Sybase ASE	1267189	DBA Cockpit: IBM DB2 as Remote Database
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Related release notes	https://support.sap.com/en/my-support/knowledge-base.html																																
SAP Solution Manager	SAP Solution Manager for SAP CC																																
CA Introscope	CA Introscope for SAP CC																																

2.5 Document Abbreviations

Abbreviation	Meaning
AAA	Authentication, Authorization, and Accounting
APM	Application Performance and Monitoring

¹ Java Virtual Machine

² DataBase Administrator

³ Structured Query Language

Abbreviation	Meaning
BART	Batch Acquisition and Rating Toolset
CA	Computer Associates
CAT	Connector Administration Tool
CDR	Call Detail Record (Telecommunications industry), or more generally Consumption Detail Record
CEA	Capabilities-Exchanging-Answer
CEN	Central Monitoring System
CER	Capabilities-Exchanging-Request
CI	Chargeable Item
CIF	Charging output Integration Framework
CMA	Customer Management Area
CPU	Central Processing Unit
CRM	Customer Relationship Management
DBA	DataBase Administrator
DWA	Device-Watchdog-Answer
DWR	Device-Watchdog-Request
GUI	Graphical User Interface
HA	High Availability
HCI	HTTP Communication Interface
HTTP	HyperText Transfer Protocol
HTTPS	HyperText Transfer Protocol Secured
IEC	Import/Export Connector
JDBC	Java Database Connectivity
JRE	Java Runtime Environment
JVM	Java Virtual Machine
MC	SAP Management Console
MDC	Multiple Data Container
MMC	SAP Microsoft Management Console
MSCC	Multiple-Services Credit Control
NUMA	Non-Uniform Memory Access
NFS	Network File system
PAM	SAP Product Availability Matrix
PKCS	Public-Key Cryptography Standards
PSE	Personal Security Environment
RAC	Real Application Cluster

Abbreviation	Meaning
RDBMS	Relational Database Management System
RIF	Rerating Integration Framework
SAPS	SAP Application Performance Standard
SAPSID	SAP System Identifier
SAP MC	SAP Management Console
SAP MMC	SAP Microsoft Management Console
SAR	SAP Archive
SID	SAP System Identifier
SLD	System Landscape Directory
SNC	Secure Network Communications
SPOF	Single Point of Failure
SSD	Solid-State Drive
TIF	Transaction Integration Framework
URL	Uniform Resource Locator
VAT	Value Added Tax
XML	eXtended Markup Language

2.6 Document Definitions

2.6.1 Availability

The availability of a system represents the probability that this system will work as expected during a processing time, that thus characterizes its reliability. This probability is expressed using “nines” terms:


- **One-nine**, which means that the system is available 90% of the time, and can be unavailable 36,5 days/year
- **Two-nines**, which means that the system is available 99% of the time, and can be unavailable 3,65 days/year
- **Three-nines**, which means that the system is available 99,9% of the time, and can be unavailable 8,76 hours/year
- **Four-nines**, which means that the system is available 99,99% of the time, and can be unavailable 52,5 mins/year
- **Five-nines**, which means that the system is available 99,999% of the time, and can be unavailable 31,5 sec/year

2.6.2 Bandwidth

Bandwidth represents a measurement of bit-rate related to available or consumed digital resources, expressed in bits (or multiple of bits) per second (bit/s, kbit/s, Mbit/s, Gbit/s, and so on).

2.6.3 Benchmarking

Sizing information can be determined using SAP Standard Application Benchmarks. Released for technology partners, benchmarks provide basic sizing recommendations to customers by injecting a substantial load upon a system during the testing of new hardware, system software components or RDBMS⁴. All performance data relevant to the system, user, and business applications are monitored during a benchmark run and can be used to compare the benchmarked platforms.

For more information, refer to the following location: <http://www.sap.com/benchmark>.

2.6.4 Business Scenario

From a microeconomic perspective, a business scenario is a cycle, which consists of several different interconnected logical processes in time. Typically, a business scenario includes several company departments and involves with other business partners.

From a technical point of view, a business scenario needs at least one SAP application (SAP ERP, SAP SCM, or others) for each cycle and possibly other third-party systems.

A business scenario is a unit that can be implemented separately and reflects the customer's prospective course of business.

2.6.5 Component

A component is the smallest individual unit considered within the Solution Development Lifecycle. Components are separately produced, delivered, installed and maintained.

2.6.6 Configuring

Configuring a system consists in determining the relevant behavior for each element that is part of this system, in order to provide technical or business functionalities and thus fit specific requirements.

⁴ Relational Database Management System

2.6.7 Throughput

Taking part of a system productivity evaluation, the throughput represents the maximum rate of digital resources that a system can process in a given time, that can be measured via benchmarking operations.

2.6.8 Latency

Taking part of a system productivity evaluation, the latency represents the time interval experienced by a system between the incoming request and the provided response, that:

- Characterizes the velocity of this system, and by extension its usability
- Limits the throughput

2.6.9 Response Time

Taking part of a system productivity evaluation, the response time represents the total amount of time that is taken to respond to an incoming request. This total amount is the sum of the following elements:

- **Service time**, that represents the time taken by the system to work on the request, whose value varies according to the workload
- **Wait time**, that represents the time the incoming request had to wait in a queue before being taken into account by the system for working purpose
- **Transmission time**, that represents the travelling time used to transfer the incoming request between the different concerned elements

2.6.10 SAP Application

An SAP application is an SAP software solution that serves a specific business area like ERP, CRM, PLM, SRM, SCM, CC.

2.6.11 SAPS

The SAP Application Performance Standard (SAPS) is a hardware-independent unit that describes the performance of a system configuration in an SAP environment. It is derived from the Sales and Distribution (SD) Benchmark, where 100 SAPS is defined as the computing power to handle 2,000 fully business processed order line items per hour.

For more information, refer to the following location: <http://www.sap.com/benchmark> → Measuring in SAPS.

2.6.12 Scalability

Scalability represents the ability of an element (system, network, process, and so on) to handle an increasing workload or the ability of this element to be enlarged in order to handle that increasing workload. 2 different categories of scalability exist, that can also be combined together:

- **Horizontal** scalability, that consists in adding new systems to distribute the workload
- **Vertical** scalability, that consists in modifying the resources (CPU⁵, memory, storage capacities, networking capacities, and so on) of the available systems

2.6.13 Sizing

Sizing a system consists in determining the hardware requirements for this system, such as:

- Network bandwidth
- Physical memory
- CPU⁶ processing power
- I/O capacities

The size of both hardware and database is influenced by business and technological aspects, which means that the number of users and the related workload they generate must be taken into account.

2.6.14 Tuning

Tuning an application consists in optimizing the configuration of this application to ensure its scalability and performance when responding to an increasing workload.

⁵ Central Processing Unit

⁶ Central Processing Unit

3 Technical System Landscape

A system landscape consists of a number of hardware and software components that depend on each other with regard to installation, software update, and demands on interfaces.

The system landscape contains all the SAP Systems that you have installed. It can consist of several system groups, whose SAP CC systems are linked by transport routes. These groups include the development systems (DEV), quality assurance systems (QAS), and the production systems (PRD).

A separate and dedicated system landscape can be the production landscape.

[Software Component Matrix \[page 19\]](#)

3.1 Software Component Matrix

SAP Convergent Charging 2023 is a Java-based software. It includes several mandatory and optional components.

The Java components of your SAP CC 2023 software include several server systems and graphical user interfaces.

3.1.1 Server Systems

SAP CC 2023 Component	Description	GUI ⁷	Real Time (Online Charging)	Batch Mode (Off-line Charging)
Core Server (multi-instance) <ul style="list-style-type: none">• Server system• Admin. utilities	Rating and Charging Engine	■	■	■

⁷

Graphical User Interface

SAP CC 2023 Component	Description	GUI ⁷	Real Time (Online Charging)	Batch Mode (Offline Charging)
Diameter Server <ul style="list-style-type: none"> • Server system 	Online Mediation and Credit Control		<input type="checkbox"/>	
<div style="border: 1px solid #ccc; padding: 5px; background-color: #f9f9f9;"> <p>⚠ Caution</p> <p>From SAP Convergent Charging 5.0 SP 4, there is no further planned enhancements to the Diameter Server component. For further information, refer to SAP Note 2792189.</p> </div>				
BART Server <ul style="list-style-type: none"> • Server system • Admin. utilities 	Offline Mediation	<input type="checkbox"/>		<input type="checkbox"/>

■ Available Available but optional

3.1.2 Graphical User Interfaces

SAP CC 2023 Component - Programs	Related Server System
Core Tool <ul style="list-style-type: none"> • Core Tool • Admin+ 	Core Server
Cockpit <ul style="list-style-type: none"> • Manage SAP CC System Parameters 	Core Server
BART Tool <ul style="list-style-type: none"> • BART Tool • BART+ 	BART Server
CAT Tool	Import/Export Connector Application (not a server system) Optional: Remote IEC (for monitoring purpose)

These graphical user interfaces are fat client programs based on Java swing technology.

ⓘ Note

Some console or command-line user interfaces are available for administering the server systems. They are included in the relevant components.

3.1.3 Other Applications

SAP CC 2023 Component	Description	Related Server Systems
Import/Export Connector	Offline Mediation Acquisition and Preparation	<ul style="list-style-type: none">• Core Server• BART Server• Other (depending on implementation)

3.1.4 JSEE and JVM

For technical reasons, both SapMachine 32-bit and SapMachine 64-bit are installed on Microsoft Windows Intel 64-bit hosts by the SAP installer of SAP CC 2023.

For US installations with the US Telecommunication Taxes, note that SAP CC Core Server (taxer instance type) has also a particular installation.

⚠ Caution

Do not change these installations. Consult the [SAP CC 2023 Installation and Maintenance Guide](#) for details about the installation of JSEE⁸ on your platform.

⁸ Java platform, Standard Edition

4 Configuring SAP Convergent Charging

[Configuring the Core Server System \[page 22\]](#)

[Configuring the SAP CC User Interfaces \[page 237\]](#)

[Configuring the BART Server System \[page 269\]](#)

[Configuring the Diameter Server System \[page 303\]](#)

[Configuring the Import/Export Connector System \[page 318\]](#)

4.1 Configuring the Core Server System

⚠ Caution

In case of an integrated *SAP Solution* scenario based on SAP S/4HANA Cloud Public Edition, all master data related to prepaid accounts are no longer available within SAP Convergent Charging (SAP CC).

In such a situation, some of the procedures described afterwards and dealing with such master data might be adapted.

As described in the [SAP CC 2023 Application Help](#) documentation, the Core Server system provides you with business features and technical mechanisms of which behavior can be configured to fit your specific business/technical requirements.

The behavior of these business features and technical mechanisms relies on system parameters and can be modified using different user interfaces. According to your needs, you may need to perform:

- **Immediate** (only for a predefined subset of system parameters) or **deferred** modifications (a restart of the instances is necessary)
- **Unitary** (a single parameter) or **mass** modifications (several parameters at the same time)

The following table summarizes the different possibilities in terms of modifications that can be performed on these business features and technical mechanisms:

Tool	Type	Description	Immediate		Deferred	
			Uni- tary	Mass	Uni- tary	Mass
Manage SAP CC System Parameters (in SAP Convergent Charging Cockpit)	Web Application	The app Manage SAP CC System Parameters gives the possibility to search for and view one or multiple system parameter values for a targeted Core Server system. This performing web application allows you to inspect and change both persistent and runtime values quickly and efficiently.	■	■	■	■
Admin+	Console Application	Admin+ is a console application that gives the possibility to connect to local or remote instances of the Core Server system and modify their configuration parameters. This console application runs in interactive mode via commands/arguments and gives you results or prompts for new options.	■		■	
Config Tool	Command-Line User Interface	Config Tool is a command-line user interface that gives the possibility to modify some configuration parameters directly in the Core Database. This user interface provides you import and export commands to manage the configuration of the Core Server system.			■	■

→ Tip

Using Setup Tool

The Setup Tool is a command-line user interface (CLI) that gives the possibility to setup the Core Server system by directly modifying its back-end database (Core Database). This user interface provides you different commands to manage the business features and technical mechanisms of the Core Server system. You can also use Setup Tool to import or export configuration files containing system parameters.

[Immediate Modifications \[page 24\]](#)

When needed, some modifications can be immediate in the system and do not require a restart of an instance, a group of instances, or the complete system. Some features, functions, and mechanisms provide you with the immediate change capability.

[Deferred Modifications \[page 26\]](#)

[Allowance Management \[page 28\]](#)

[Boot Configuration File \[page 29\]](#)

[Business Data Management \[page 34\]](#)

[Catalog Transport \[page 47\]](#)

[Chargeable Items Charging Process \[page 50\]](#)

[Chargeable Items Recharging Process \[page 54\]](#)

[Communications Channels \[page 57\]](#)

[Data Cache Management \[page 59\]](#)

[Data Files Generation \(Item Files\) \[page 76\]](#)

[Data Purging \[page 131\]](#)
[Databases Management \[page 137\]](#)
[Java Virtual Machine \[page 139\]](#)
[JCo Destinations \[page 143\]](#)
[Logging and Tracing \[page 148\]](#)
[Master Data Management \[page 159\]](#)
[Notifications \[page 187\]](#)
[Partition Distribution Using the Smart Mode \[page 201\]](#)
[Startup Configuration Files \[page 208\]](#)
[Schedulers \[page 211\]](#)
[System and Data Auditing \[page 211\]](#)
[Thread Dump Files Generation \[page 216\]](#)
[Third-Party Integration \[page 218\]](#)
[Users and User Management \[page 220\]](#)
[WS Destinations \[page 234\]](#)

4.1.1 Immediate Modifications

When needed, some modifications can be immediate in the system and do not require a restart of an instance, a group of instances, or the complete system. Some features, functions, and mechanisms provide you with the immediate change capability.

Immediate changes are immediately taken into account.

Depending on the modified setting, some delay may be necessary before the change is effective.

Only few settings are candidate for immediate modifications.

Immediate modifications are temporary. As soon as an SAP CC system instance restarts, it automatically uses the persistent value that is defined for the instances of the same type. If you want to apply permanent modification, then mix immediate modifications and deferred modifications. See [Deferred Modifications \[page 26\]](#).

→ Remember

When you want to change a few settings and when one of the settings cannot be modified without a restart, then consider a procedure based on deferred modifications. See [Deferred Modifications \[page 26\]](#).

→ Tip

Consult the SAP CC documentation to see if your given modification can be immediate or requires a partial or complete restart of the instances composing your SAP system.

Example

A typical use is to change the log or trace generation settings for an instance in the system.

[Immediate Modification with Cockpit and Its Dedicated App \[page 25\]](#)

[Immediate Modification with Admin+ \[page 25\]](#)

4.1.1.1 Immediate Modification with Cockpit and Its Dedicated App

To perform an immediate modification of a given setting (a system parameter) related to a business or technical feature and a given function or mechanism, complete the following procedure:

1. [Launch](#) the [SAP Convergent Charging Cockpit user interface](#) and log on to the distant Core Server system as the system administrator.
2. You know the system parameter or subset of parameters to change. You know the target instances of the modification.
3. Open the app Manage SAP CC System Parameters.
4. Modify the runtime values of the system parameter using the app.
See [Configuring System Parameter Values](#).
5. Check your system changes.
Various methods are possible. It depends on the changed function or mechanism.

Related Information

[Cockpit](#)

[Manage SAP CC System Parameters](#)

4.1.1.2 Immediate Modification with Admin+

Note

Sometimes, you must apply a predefined sequence of changes. For example, if you want to modify the logging and tracing policy. See [Immediate Modifications Using Admin+ \[page 154\]](#).

To perform an immediate modification of a given setting (a system parameter) related to a business or technical feature and a given function or mechanism, complete the following procedure:

1. [Launch](#) the [Admin+ user interface](#) and log on to the distant Core Server system as the system administrator.
2. You know the system parameter or subset of parameters to change. You know the target instances of the modification.

3. Modify the runtime values of the system parameter using the `set` command with the `memory` scope.

Example

See [a few examples \[page 154\]](#) in this documentation.

4. Check your system changes.
Various methods are possible. It depends on the changed function or mechanism.

Related Information

[Admin+](#)

4.1.2 Deferred Modifications

In the environment of SAP Convergent Charging, you configure or reconfigure your running SAP system (Core Server). Several methods are possible.

[Deferred Modification with Cockpit and Its Dedicated App \[page 26\]](#)

[Deferred Modification with Admin+ \[page 27\]](#)

[Deferred Modification with Config Tool \[page 27\]](#)

[Deferred Modification with Setup Tool \[page 28\]](#)

[Deferred Modification Using the Startup Configuration Files \[page 28\]](#)

4.1.2.1 Deferred Modification with Cockpit and Its Dedicated App

To perform a deferred modification of a given setting (a system parameter) related to a business or technical feature and a given function or mechanism, complete the following procedure:

1. [Launch the SAP Convergent Charging Cockpit user interface](#) and log on to the distant Core Server system as the system administrator.
2. You know the system parameter or subset of parameters to change. You know the target instances of the modification. In case of a deferred modification, you need to change the persistent value of a system parameter. This change applies to all instances of the same type.
3. Open the app Manage SAP CC System Parameters.
4. Modify the persistent value of the system parameter using the app.
See [Configuring System Parameter Values](#).
5. Depending on your changes, restart the instances that are impacted by the modifications.
6. Check your system changes.
Various methods are possible. It depends on the changed function or mechanism.

Related Information

[Cockpit](#)
[Manage SAP CC System Parameters](#)

4.1.2.2 Deferred Modification with Admin+

To perform a deferred modification of a given setting (a system parameter) related to a business or technical feature and a given function or mechanism, complete the following procedure:

1. [Launch](#) the [Admin+ user interface](#) and log on to the distant Core Server system as the system administrator.
2. You know the system parameter or subset of parameters to change. You know the target instances of the modification.
- 3.
4. Depending on your changes, restart the instances that are impacted by the modifications.
5. Check your system changes.
Various methods are possible. It depends on the changed function or mechanism.

Related Information

[Admin+](#)

4.1.2.3 Deferred Modification with Config Tool

Config Tool is a command-line interface (CLI).

To perform a deferred modification of a given setting (a system parameter) related to a business or technical feature and a given function or mechanism, complete the following procedure:

For more information, refer to the Config Tool documentation or in-app help.

Related Information

[Config Tool](#)

4.1.2.4 Deferred Modification with Setup Tool

To perform a deferred modification of a given setting (a configuration set or data) related to a business or technical feature and a given function or mechanism, complete the following procedure:

For more information, refer to the Setup Tool documentation or in-app help.

Related Information

[Setup Tool](#)

4.1.2.5 Deferred Modification Using the Startup Configuration Files

To perform a deferred modification of a given setting (JVM options for example) related to a business or technical feature and a given function or mechanism, complete the following procedure:

See [Modifying a Startup Configuration File \[page 210\]](#).

Related Information

[Configuration Options \[page 209\]](#)

4.1.3 Allowance Management

[Keywords \[page 28\]](#)

[Preliminary Notes \[page 29\]](#)

[Description \[page 29\]](#)

[Allowances Management with SAP CRM \[page 29\]](#)

4.1.3.1 Keywords

Allowance, SAP CRM, integration

4.1.3.2 Preliminary Notes

For further information, refer to the [Allowance Management](#) feature description of the [SAP CC 2023 Application Help](#) documentation.

4.1.3.3 Description

As described in the [SAP CC 2023 Application Help](#) documentation, SAP CC gives the possibility to manage service add-ons for your charge plans and refill plans by modeling:

- The master data that define the allowances
- The interaction between allowances and charging or refilling logic, which define the usage of allowances

In addition to the allowances management capabilities provided by the Core Tool user interface, you can use the following procedure to configure allowances when SAP CC is integrated with SAP CRM.

4.1.3.4 Allowances Management with SAP CRM

If your landscape is integrated with SAP CRM, allowances can be created on demand or automatically by SAP CRM each time a provider contract is activated or modified.

To activate such functionality, you must configure SAP CC as described in the [Integration Guide for Offer-to-Cash Based on BRIM Using SAP ERP](#) [🔗](#).

For further information, refer to the “Allowances” section of this dedicated documentation available within the BRIM solution: help.sap.com/brim.

4.1.4 Boot Configuration File

[Keywords \[page 30\]](#)

[Preliminary Notes \[page 30\]](#)

[Description \[page 30\]](#)

[Configuration Options \[page 30\]](#)

[Modifying the Boot Configuration File of an Instance \[page 32\]](#)

4.1.4.1 Keywords

`boot.config`, SAP Profile Folder, database connection

4.1.4.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [SAP Central Repository](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#)
- [Choosing System IDs](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#)

4.1.4.3 Description

For each instance of the Core Server system, a boot configuration file is defined in the SAP Profile Folder of the [SAP Central Repository](#). Copied within the `config` folder of each deployed instance of the Core Server system during the instance startup phase, this `boot.config` file contains some parameters that are used to connect to the back-end database.

4.1.4.4 Configuration Options

The following table contains the list of parameters that you can change, grouped upon the following categories:

- Core Database communication settings
- Core Server communication settings

Parameter	Values	Type
Core Database Communication Settings		

Parameter	Values	Type
SQLHELPER_JDBC_URI	<p>JDBC URI of the Core database instance.</p> <p>For SAP HANA, the URI format is:</p> <pre>jdbc:sap://<primary_server>:<port>[;<secondary_server>:<port>] [/?databaseName=<tenant_name>]</pre> <p>For Sybase ASE, the URI format is:</p> <pre>jdbc:sybase:Tds:<server>:<port>/<database_name>? <prop1>=<value1>&<prop2>=<value2></pre> <p>For Oracle with "thin" driver, the URI format is:</p> <ul style="list-style-type: none"> - jdbc:oracle:thin:@//<server>:<port>/<ServiceName> - jdbc:oracle:thin:@<server>:<port>:<SID> <p>For MS SQL Server (IPv4), the URI format is:</p> <pre>jdbc:sqlserver:// <server>:<port>;DatabaseName=<database_name>;sendStringParametersAsUnicode=true[;IntegratedSecurity=true]</pre> <p>For MS SQL Server (IPv4 or IPv6), the URI format is:</p> <pre>jdbc:sqlserver://;serverName=<server>;port=<port>;DatabaseName= <database_name>;sendStringParametersAsUnicode=true[;IntegratedSecurity=true]</pre> <p>For IBM DB2, the URI format is:</p> <pre>jdbc:db2://<server>:<port>/ <database_name>:<prop1>=<value1>;<prop2>=<value2></pre>	■
SQLHELPER_LOGIN	Login used for authenticating on the Core Database, that must correspond to an already defined user.	■
SQLHELPER_PASSWORD	Password of the previously specified login, used for authenticating on the Core Database.	■
Core Server Communication Settings		
SYSTEM_ID	<p>SID of the Core Server system.</p> <p>You must set a value that corresponds to the system identifier used to at installation time. For further information, refer to the dedicated Choosing System IDs section available in the SAP CC 2023 Installation and Maintenance Guide documentation.</p>	■
BOOT_DISPATCHER_LIST	CSV ⁹ list of IP addresses (or hostnames) that correspond to dispatcher instances that can be contacted in case of discovery failure.	□

■ Mandatory □ Optional

⁹ Comma Separated Value

4.1.4.5 Modifying the Boot Configuration File of an Instance

To modify the boot configuration file, execute the following procedure:

1. Edit the `boot.config` file, that is located in the SAP Profile Folder of the [SAP Central Repository](#)
2. Modify the relevant settings according to your needs
3. Save your modifications
4. To apply your modifications, restart the concerned instance of the Core Server system. During the startup phase, the modified `boot.config` file will be copied from the SAP Profile Folder to the **local config** folder of the instance (overwriting the existing `boot.config` file)

Note

SAP SE recommends that you check the content of the `boot.config` file located in the **local config** folder of the instance, to ensure that your modifications have correctly been reflected.

Caution

- If a property is defined more than once in the file, only the last value is considered
- If the imported file contains several definitions for a same property, only the last one is kept

4.1.4.5.1 Modifying the Login and Password for the Database

For development or test purpose, you can change the login and password of the back-end database after installing SAP CC 2023. The SAP CC system handles this information in:

- The central boot configuration file
- The local boot configuration files
- Some system parameters stored in the back-end database

In a production system landscape, you must avoid using this procedure.

Caution

Before doing the changes, you must stop all the instances of the Core Server system of SAP Convergent Charging.

Prerequisites

- The SAP CC Core Server system must be down when resetting the database login and password
- The new login and password are set in the database system

Procedure

1. Stop all the instances of the SAP CC Core Server system
2. Identify the installation folder of the primary dispatcher instance
3. Edit its local `boot.config` file in:
 - `<DRIVE>:\usr\sap\<SID>\CCD<SAP_INST_NB>\config\boot.config` (Microsoft Windows)
 - `/usr/sap/<SID>/CCD<SAP_INST_NB>/config/boot.config` (Linux operating systems)
4. Change the entries related to the database credentials (`SQLHELPER_LOGIN`, `SQLHELPER_PASSWORD`) to the new login and password. The database password is not cyphered
5. Save and close the file
6. Use the [Config Tool](#) user interface to export all the system parameters to a temporary text file
7. Edit the exported file and change all the values of the parameters `SQLHELPER_LOGIN` and `SQLHELPER_PASSWORD` to the new database credentials. Set up the values with the plain text password
8. Import the file with [Config Tool](#). This import operation cyphers both the values of the `SQLHELPER_PASSWORD` parameters and the value of the `SQLHELPER_PASSWORD` entry in the local boot configuration file
9. Delete the parameter export file after importing it
10. Open again the local `boot.config` file previously modified
11. Copy the password `SQLHELPER_PASSWORD` that is now cyphered
12. Edit and modify the reference `boot.config` file in the [SAP Central Repository](#) located in `/usr/sap/<SID>/SYS/profile/boot/`
13. Change the values to the new database login and new cyphered database password (see the `SQLHELPER_LOGIN` and `SQLHELPER_PASSWORD` entries)
14. Restart the instances of the Core Server system

Each instance of the Core Server system is started and establishes its permanent connection to the back-end database using the new database credentials (login and password). All the local boot configuration files are updated.

4.1.4.5.2 Modifying the Ports of the Core Server System

For development or test purpose, you can change the communication ports of the SAP CC Core Server system after installation.

Procedure

The Core Server instance map needs to be modified:

1. Stop all the instances of the SAP CC Core Server system
2. Export the Core Server system instance map, which path is:
 - `<DRIVE>:\usr\sap\<CORE_SYSTEM_ID>\CCD<SAP_INST_NB>\script\` (Microsoft Windows)
 - `/usr/sap/<CORE_SYSTEM_ID>/CCD<SAP_INST_NB>/script/` (Linux operating systems)

where `<SAP_INST_NB>` is the number assigned to the dispatcher, by executing the following [Setup Tool](#) command:

```
setup instancemap export <pathToFile>
```

3. In this exported file, modify the ports with values in the range of port numbers from 1024 to 49151 and save and close the file.

Note

Refer to the SAP Note [1673818](#).

4. Import this newly created file by executing the following [Setup Tool](#) command:

```
setup instancemap import <pathToModifiedFile> -clean
```

5. Restart the instances of the Core Server system

4.1.5 Business Data Management

[Keywords \[page 34\]](#)

[Preliminary Notes \[page 34\]](#)

[Description \[page 35\]](#)

[Managing Public Holidays \[page 35\]](#)

[Managing the Currencies Framework \[page 39\]](#)

[Managing Customer Management Areas \[page 41\]](#)

[Managing the Taxation Framework \[page 42\]](#)

4.1.5.1 Keywords

Public holidays, currency, currencies, tax, taxation, EZTax, VAT¹⁰, rate, rule

4.1.5.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [Public Holidays](#) section of the Core Tool online help available in the [SAP CC 2023 Primary Help for Core Tool](#) documentation
- [Tax Calculation](#) feature description available in the [SAP CC 2023 Application Help](#) documentation

¹⁰ Value Added Tax

- [Tax Calculation Process](#) section of the [SAP CC 2023 Application Help](#) documentation
- [Installing and Launching Core Tool](#), [Installing and Executing Setup Tool](#) and [Installing and Launching Admin+](#) sections of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation

4.1.5.3 Description

In addition to master data, your business also relies on business data that need to be configured. You can use the following procedure to manage the relevant business data and thus fit your specific needs:

- [Managing Public Holidays \[page 35\]](#)

As described in the [SAP CC 2023 Application Help](#) documentation, charging and refilling operations create transactions that need to be enriched with taxation information computed by SAP CC in accordance with the defined taxation settings.

You can use the following procedures to configure the settings related to currencies and taxation and thus fit your specific business needs:

- [Managing the Currencies Framework \[page 39\]](#), including:
 - [Modifying ISO Currencies \[page 39\]](#)
 - [Synchronizing SAP Currencies \[page 40\]](#)
 - [Replicating SAP Currencies \[page 41\]](#)
 - [Reforming Currencies \[page 41\]](#)
- [Managing the Taxation Framework \[page 42\]](#), including:
 - [Enabling the VAT Framework \[page 43\]](#)
 - [Enabling the Avalara AvaTax for Communications \(AFC\) Framework \[page 43\]](#)
 - [Modifying VAT Rates \[page 44\]](#)
 - [Modifying VAT Rules \[page 44\]](#)
 - [Customizing VAT Rules \[page 45\]](#)

4.1.5.4 Managing Public Holidays

Public holidays represent business data that :

- Can be used within the [Public Holidays Splitter](#) and [Public Holidays Comparator](#) logic components
- Are part of the catalog cache (also called "offer-level" cache) handled by raters and updaters
- Are used at runtime by raters and updaters during charging and refilling operations, when processing the pricing logic configured in [price plans](#), [charging plans](#) or [refill logic](#)
- Are defined within a dedicated file using an XML format defined in the following table:

Element	Sub element	Attribute	Description
holiday	description	code	Attribute used to identify the public holiday, that must be unique among the defined holidays
		lang	Language used for the description
		label	Description of the holiday in the specified language
	group	code	Name of the group of public holidays the currently defined holiday belongs to
fixedDay	month		Name of the month. Possible values are: "January", "February", "March", "April", "May", "June", "July", "August", "September", "October", "November" or "December".
		day	Number of the day in the specified month. Possible values are integer values from 1 to 28, 29, 30 or 31 according to the concerned month.
	relativeDay	month	Name of the month. Possible values are: "January", "February", "March", "April", "May", "June", "July", "August", "September", "October", "November" or "December".
	weekday		Day of the week. Possible values are: "Monday", "Tuesday", "Wednesday", "Thursday", "Friday", "Saturday" or "Sunday".
		position	Position of the weekday in the specified month. Possible values are: "First", "Second", "Third", "Fourth" or "Fifth".
	easterRelative	offset	Integer value use to define when the holiday occurs, relatively to Easter Sunday (which is used as the reference date).
	enumeratedDay		List of specified dates. Refer below in this table for further information about each enumerated date.
enumeratedDay	date	value	Concerned date, using the YYYY-MM-DD format, where: <ul style="list-style-type: none"> • YYYY corresponds to the year of the date • MM corresponds to the month of the date (from 1 to 12) • DD corresponds to the day of the date (from 1 to 31)

❖ Example

Fixed Day

The following XML file defines the New Year's Day holiday. This public holiday:

- Is named "New Year's Day" in English, and "Nouvel An" in French
- Is available in 2 groups named "US" (United States) and "FR" (France)
- Occurs on the first day of January

```
<?xml version="1.0" encoding="UTF-8"?>
<holiday code="NewYearsDay">
```

```

<description lang="en" label="New Year's Day" />
<description lang="fr" label="Nouvel An" />
<group code="US" />
<group code="FR" />
<fixedDay month="January" day="1" />
</holiday>

```

❖ Example

Relative Day

The following XML file defines the Thanksgiving holiday. This public holiday:

- Is named "Thanksgiving" in both English and French
- Is only available in the "US" (United States) group
- Occurs on the fourth Thursday of November in the United States

```

<?xml version="1.0" encoding="UTF-8"?>
<holiday code="Thanksgiving">
  <description lang="en" label="Thanksgiving" />
  <description lang="fr" label="Thanksgiving" />
  <group code="US" />
  <relativeDay month="November" weekday="Thursday" position="fourth" />
</holiday>

```

❖ Example

Easter-Relative Day

The following XML file defines the Easter Monday holiday. This public holiday:

- Is named "Easter Monday" in English, and "Lundi de Pâques" in French
- Is available in 2 groups named "US" (United States) and "FR" (France)
- Occurs one day after Easter Sunday

```

<?xml version="1.0" encoding="UTF-8"?>
<holiday code="EasterMonday">
  <description lang="en" label="Easter Monday" />
  <description lang="fr" label="Lundi de Pâques" />
  <group code="US" />
  <group code="FR" />
  <easterRelativeDay offset="1" />
</holiday>

```

❖ Example

Easter-Relative Day

The following XML file defines the Good Friday holiday. This public holiday:

- Is named "Good Friday" in English, "Vendredi Saint" in French, and "Karfreitag" in German
- Is available in 3 groups named "BE" (Belgium), "FR" (France) and "DE" (Germany)
- Occurs 2 days before Easter Sunday

```

<?xml version="1.0" encoding="UTF-8"?>
<holiday code="GoodFriday">
  <description lang="en" label="GoodFriday" />
  <description lang="fr" label="Vendredi Saint" />

```

```

<description lang="de" label="Karfreitag" />
<group code="BE" />
<group code="FR" />
<group code="DE" />
<easterRelativeDay offset="-2" />
</holiday>

```

❖ Example

Enumerated Day

The following XML file defines the chinese New Year's Day holiday. This public holiday:

- Is named "Chinese New Year" in English and "Nouvel An Chinois" in French
- Occurs at a different date each year

```



<?xml version="1.0" encoding="UTF-8"?>
<holiday code="GoodFriday">
  <description lang="en" label="Chinese New Year" />
  <description lang="fr" label="Nouvel An Chinois" />
  <enumeratedDay>
    <date value="2015-02-19" />
    <date value="2016-02-08" />
    <date value="2017-01-28" />
    <date value="2018-02-16" />
    <date value="2019-02-05" />
    <date value="2020-01-25" />
  </enumeratedDay>
</holiday>

```

📌 Note

By default, a list of predefined public holidays is embedded by SAP Convergent Charging. The XML file containing this default list of holidays is named `public_holidays.xml`, and is located in the `config` folder of the Core Tool user interface.

In case you need to modify the list of public holidays, execute the following procedure:

1. Launch the [Core Tool](#) user interface and log in with an individual user granted the "Marketing" role
2. Export the list of defined public holidays:
 1. From the menu bar in the main window, select **Tools > Public Holidays > Export** 
 2. The [Save](#) dialog box opens
 3. Select a directory to which to export the list of public holidays
 4. In the [File name](#) field, type the name of the file
 5. Click [Save](#)
3. Modify the content of the created file using the previously provided description
4. Save your modifications
5. Import the list of modified public holidays:
 1. From the menu bar in the main window, select **Tools > Public Holidays > Import** 
 2. The [Open](#) dialog box opens
 3. Open the directory in which the public holidays file is saved and select this file
 4. Click [Open](#). A confirmation dialog box opens
 5. Click [Yes](#)

⚠ Caution

Be careful when importing a new list of public holidays. After you import a new list, the old public holidays are replaced by the new ones, excepted those already used in the charges that were set up before importing the new list. In addition, the old public holidays that were already used appear dimmed (unavailable) in the new list, because:

- They are no longer recognized by the SAP CC Core Server system
- They are no longer active in the concerned charges

4.1.5.5 Managing the Currencies Framework

SAP Convergent Charging manages the following types of currencies:

- ISO¹¹ currencies, of which up-to-date list is provided at installation time
- SAP currencies, that are used in an integrated scenario with the SAP ERP/FI-CA component

These currencies are set up in master data that relate to both service provider and customers, within elements such as [charges](#), [charge plans](#), [refill plans](#), [refill logic](#), [offers](#) and [subscriber accounts](#). You can use the following procedures to manage currencies within your landscape.

📘 Note

- You can set up reusable charges and refill logic using the multicurrency option. In this case, the final currency is then set up in the charge plans or offers. A unique charge can then be modeled and used in different charge plans with different currencies
- In charge plans, you can set up the currency information for each charge customized in the plan. A specific currency parameter is automatically added by the Core Tool user interface, that gives you the possibility to:
 - Redefine this parameter with a new default value
 - Link this parameter with an internal parameter defined in the charge plan
 - Link this parameter with a parameter defined in the charge plan, that will be set up for each provider contract (in a CRM¹² application or external provisioning system)
- As far as refill plans are concerned, you cannot set up any currency in a refill plan. The final currency that will be used corresponds to the currency of the prepaid account to be refilled

4.1.5.5.1 Modifying ISO Currencies

📘 Note

A default list of ISO¹³ currencies is provided at installation time.

¹¹ International Standards Organization

¹² Customer Relationship Management

In case you need to modify the list of ISO currencies, execute the following procedure:

1. Launch the Core Tool user interface and log in with an individual user granted the “Marketing” role
2. Export the list of defined currencies:
 1. From the menu bar in the main window, select **Tools > Currencies > Export**
 2. The *Save* dialog box opens
 3. Select a directory where to export the list of currencies
 4. In the *File name* field, type the name of the file
 5. Click *Save*
3. Modify the content of the created file
4. Save your modifications
5. Import the list of modified currencies:
 1. From the menu bar in the main window, select **Tools > Currencies > Import**
 2. Open the directory containing the modified file and select this file
 3. Click *Open*. A confirmation dialog box opens
 4. Click *Yes*

Note

For further information about currencies import and export commands, refer to the [Currencies](#) section of the [SAP CC 2023 Primary Help for Core Tool](#) documentation.

4.1.5.5.2 Synchronizing SAP Currencies

SAP currencies correspond to currencies defined within the SAP ERP/FI-CA component of the SAP Business Suite. In an installation scenario integrated with SAP Convergent Invoicing, this list of currencies must be manually synchronized in SAP CC.

To synchronize the list of SAP currencies, execute the following procedure:

1. Launch the Core Tool user interface and log in with an individual user granted the “Marketing” role
2. From the menu bar of the main window, select **Tools > Currencies > Synchronize**

Note

- When the synchronization of currencies succeeds, an information dialog box opens and displays the number of synchronized currencies
- When the synchronization of currencies fails, an information dialog box opens and displays the reason of failure
- For further information about the currencies synchronization command, refer to the [Currencies](#) section of the [SAP CC 2023 Primary Help for Core Tool](#) documentation

¹³ International Standards Organization

4.1.5.5.3 Replicating SAP Currencies

In an integrated *SAP Solution* scenario with SAP S/4HANA Cloud Public Edition, the list of SAP currencies defined in SAP Convergent Invoicing must be manually replicated in SAP Convergent Charging.

To replicate the list of SAP currencies in SAP CC, refer to the integration guides for BRIM.

4.1.5.5.4 Reforming Currencies

Reforming currencies consists in changing some characteristics of an existing, or replacing an existing currency by another one. The computed prices must then be converted by applying a given exchange rate.

SAP Convergent Charging gives the possibility to manage multiple currencies simultaneously, when the concerned currencies are used in different price plans and charged on different accounts. To switch from one currency to another without modifying the pricing implementation, no native mechanism is available. As a consequence, currencies reforming operations must be executed:

- During the initial implementation phase of SAP CC, when master data are configured. SAP SE recommends that you design your pricing logic independently from currencies, by:
 - Designing multicurrencies charges, offers and charge plans
 - Using reusable elements such as translation tables or pricing macros, that give the possibility to design 2 charges that use the same pricing logic, but that compute amounts with 2 different currencies
- During the maintenance phase of SAP CC, in accordance with other possible systems in case of an integrated scenario, in particular with third-party invoicing systems regarding:
 - Dates or slots for the currency switching time (for example to align invoices creation)
 - External accounts, whose information can be modified because of the currency switch
 - The impact of the currency switch operation, that may modify the switching policy (batch migration Vs on-the-fly migration)

4.1.5.6 Managing Customer Management Areas

- [Editing the Customer Management Areas](#)
- [Deleting a Customer Management Area](#)

See also:

- [Creating JCo Destinations \[page 147\]](#)
- [Creating WS Destinations \[page 236\]](#)

4.1.5.6.1 Creating Customer Management Areas

To create a Customer Management Area in the Core Server system, complete the following procedure:

1. Open your Core Tool user interface and log on.
2. View the area definitions:
From the menu bar in the main window, select **Tools > Customer Management Areas > Edit**.
The *Customer Management Areas* window opens.
3. In the configuration table, add the necessary rows.
4. Restart the dispatcher and the bulkloader instances in the Core Server system.
5. Verify if you must restart the rater instances in your Core Server system.

If the system parameter `JCO_CONNECTION_COUNT` is set to 1 or more, then do restart all these rater instances.

4.1.5.7 Managing the Taxation Framework

SAP Convergent Charging (SAP CC) manages the following tax systems:

- The **Value Added Tax (VAT) system**, with or without VAT rules.
- The **Flat Tax system**, which consists of a constant marginal rate.
- The **Avalara AvaTax for Communications (AFC) tax system**, which is used to calculate taxes related to the US telecommunications taxes.

In the environment of SAP CC, this tax system was known as: *BillSoft EZTax* or *EZtax*.

Tax information is used in master data that relates to both service provider and end customers, within elements such as charges (in a pricing catalog) and subscriber accounts (in customer master data). You can use the following procedures to manage taxes in your SAP system landscapes.

⚠ Caution

- It is only possible to add a new tax system to the tax system configured at installation time.
- Never remove a tax system if a master data of the service provider or of the customers is configured to use this tax system.

[Enabling the VAT Framework \[page 43\]](#)

[Enabling the Avalara AvaTax for Communications \(AFC\) Framework \[page 43\]](#)

[Modifying VAT Rates \[page 44\]](#)

[Modifying VAT Rules \[page 44\]](#)

[Customizing VAT Rules \[page 45\]](#)

4.1.5.7.1 Enabling the VAT Framework

In case you did not select the VAT¹⁴ tax system at installation time, you can use the following procedure to enable it:

1. Modify if necessary the VAT rates or VAT rules using the following dedicated procedures:
 - [Modifying VAT Rates \[page 44\]](#)
 - [Modifying VAT Rules \[page 44\]](#)
 - [Customizing VAT Rules \[page 45\]](#)
2. Using the [Setup Tool](#) user interface, execute the `vatax importCountryTaxPolicies` command, specifying the absolute path of the file containing the country tax policies to import
3. For the rater and updater instances of the Core Server system, modify the value of the `TAX_FRAMEWORK` system parameters to "VAT" or "VAT;EZTAX", using [Manage SAP CC System Parameters, Config Tool](#) or [Admin+](#)
4. Restart all rater and updater instances of the Core Server system

4.1.5.7.2 Enabling the Avalara AvaTax for Communications (AFC) Framework

In case you did not select the Avalara AvaTax for Communications (AFC) tax system at installation time, you can use the following procedure to enable it:

1. Ensure that the **CC_EZTAX central repository** exists in your SAP CC system landscape. It has been created at the installation time by the SAP installer of SAP CC.
2. Using the [Setup Tool user interface](#), execute the `eztax importTSTypes` command, specifying the absolute path of the file containing the official descriptions for the Avalara AvaTax for Communications (AFC) transaction/service types (aka EZtax transaction/service types). It uploads this application data into the SAP CC Core Database.
3. Edit the `default.fpl` file, that is located in the SAP Profile Folder of the [SAP Central Repository](#), and:
 - Set up the `tax.ezTax` parameter to "true".
 - Add the following parameter: `tax.eztaxRootFolder = <EZTAX_ROOT_FOLDER>`, where `<EZTAX_ROOT_FOLDER>` corresponds to the root folder where EZtax is installed.
4. For the rater and updater instances of your running Core Server system, modify the value of the `TAX_FRAMEWORK` system parameters to "EZTAX" or "VAT;EZTAX", using your user interfaces: [Manage SAP CC System Parameters, Config Tool](#), or [Admin+](#)
5. Restart all rater and updater instances of the Core Server system.
6. Install taxer instances in your SAP system landscape using the [Adding Core Server Instances in a Multi-Hosts Landscape](#) procedure available in the [SAP CC 2023 Installation and Maintenance Guide](#) documentation.

→ Remember

Monthly update your installations. See [Avalara AvaTax for Communications \(AFC\) Technology Monthly Maintenance \[page 394\]](#).

¹⁴ Value Added Tax

4.1.5.7.3 Modifying VAT Rates

A list of VAT¹⁵ rates is deployed by SAP installer at installation time when the VAT tax system is selected. You can use the following procedure to modify this default list:

1. Using the [Setup Tool user interface](#), execute the `vatax exportVATRate` command to export the VAT rates from the Core Database, specifying the absolute path of the file that will contain the exported VAT rates
2. Modify the content of the created file
3. Save your modifications
4. Using the [Setup Tool user interface](#), execute the `vatax importVATRate` command to import the modified VAT rates into the Core Database, specifying the absolute path of the file containing the modified VAT rates
5. Use the Admin+ `refresh_tax_cache` command to trigger the update of the tax data caches dedicated to VAT rates of all the rater and updater instances of the Core Server system

Note

A default list of VAT rates is deployed at installation time in the `vat_rate.txt` file that is available in the `exe/uc/<OS>/CC_CORE_SERVER/tax/` subfolder of the [SAP Central Repository](#), where `<OS>` corresponds to the operating system of the host.

To import this default list, execute the step 4 of this procedure using this `vat_rate.txt` file.

4.1.5.7.4 Modifying VAT Rules

A list of VAT¹⁶ rules is deployed by SAP installer at installation time when the VAT tax system is selected. You can use the following procedure to modify this default list:

1. Using the [Setup Tool user interface](#), execute the `vatax exportVATRules` command to export the VAT rules from the Core Database, specifying the absolute path of the file that will contain the exported VAT rules
2. Modify the content of the created file

Caution

You can modify EU VAT rules, but it is only possible to add customized VAT rules. For further information about VAT rule customization, refer to the [Customizing VAT Rules \[page 45\]](#) procedure afterwards.

3. Save your modifications
4. Using the [Setup Tool user interface](#), execute the `vatax importVATRules` command to import the modified VAT rules into the Core Database, specifying the absolute path of the file containing the modified VAT rules
5. Use the Admin+ `refresh_vat_rules_cache` command to trigger the update of the tax data caches dedicated to VAT rules of all the rater and updater instances of the Core Server system

¹⁵ Value Added Tax

¹⁶ Value Added Tax

Note

A default list of VAT rules is deployed at installation time in the `vat_rules.txt` file that is available in the `exe/uc/<OS>/CC_CORE_SERVER/tax/` subfolder of the [SAP Central Repository](#), where `<OS>` corresponds to the operating system of the host.

To import this default list, execute the step 4 of this procedure using this `vat_rules.txt` file.

4.1.5.7.5 Customizing VAT Rules

When the VAT¹⁷ tax system is enabled within your landscape, a list of VAT rules for EU VAT 2010 and EU VAT 2015 is deployed at installation time. In case you need to add specific VAT rules, you can use the following procedures to:

- Model your own VAT rules
- Create the modeled VAT rule

To model a specific VAT rule, consider the following guidelines:

- Determine the supplier zone, that corresponds to the reference for the service provider whose consumptions taxes must be calculated by SAP CC
- Determine the business categories (B2B or B2C) that are relevant for your VAT rule
- For each business category, determine the origin of the place of taxation that can be:
 - The supplier's place of establishment
 - The customer's place of establishment (B2B)
 - The customer's place of residence (B2C)
- For certain business requirements, the place of taxation depends on particular conditions that are not basically the places of establishment or residence. In this case, the adequate place must be dynamically determined at runtime by SAP CC according to the configuration of the pricing logic (see charges customized in [charge plans](#) or [offers](#)). You must then:
 - Configure the pricing logic in order to configure this place determination
 - Set up a [price plan](#) that defines a parameter or that computes a property containing at runtime the appropriate values, or you must ensure that the chargeable items received from the mediation system will contain this taxation place information
- Determine the default sources for the B2B and B2C places of taxation. The VAT 2010 directive defines the following places according to the business categories:
 - B2B services: Customer's place of establishment (the holder of the charged account in the subscriber account)
 - B2C services: Service provider's place of establishment

Example

You want to create a customized VAT rule to model the article 59b of the EU VAT 2010 directive that says: "Radio and television broadcasting services and telecommunications services, supplied by suppliers established in a third country to non-taxable customers in the EU, are taxable at the place where the

¹⁷ Value Added Tax

private customer effectively consumes the service. Other general rules apply otherwise". To model this rule, consider the following configuration:

- **Reference Supplier Zone:** *Third Country*
- **Source for the B2B place of taxation:** *None*
- **Source for the B2C place of taxation:** *Place dynamically set by SAP Convergent Charging at runtime.* It must correspond to the effective place (country) of consumption of the customer service. The price plan must compute an appropriate property or the mediation system must provide this information in the chargeable items related to the service consumption
- **Default source for the B2B place of taxation:** *Customer's place of establishment* (the holder of the charged account in the subscriber account)
- **Default source for the for the B2C place of taxation:** *Service provider's place of establishment*

❁ Example

You want to create a customized VAT rule that gives you the possibility to finely configure the determination of the places of taxation within the pricing logic (in the price plans). To model this rule, consider the following configuration:

- **Reference Supplier Zone:** *Any Country*
- **Source for the B2B place of taxation:** *Place dynamically set by SAP Convergent Charging at runtime* (according to the configuration of the charges customized in charge plans or offers)
- **Source for the B2C place of taxation:** *Place dynamically set by SAP Convergent Charging at runtime* (according to the configuration of the charges customized in charge plans or offers)
- **Default source for the B2B place of taxation:** *Customer's place of establishment* (the holder of the charged account in the subscriber account)
- **Default source for the for the B2C place of taxation:** *Service provider's place of establishment*

Once your VAT rule has been modeled, use the following table to create the rule, that consists of a dedicated row:

- That must be inserted in the file containing VAT rules
- That respects the following syntax:

```
<RL_NAME>;<RL_DESCR>;<REF_SUPPLIER_ZONE>;<B2B_PLACE_OF_TAXATION_ORIG>;<B2C_PLACE_OF_TAXATION_ORIG>;<DEFAULT_B2B_PLACE_OF_TAXATION>;<DEFAULT_B2C_PLACE_OF_TAXATION>
```

Property	Type	Description
RL_NAME	■	This property corresponds to the name of the VAT rule, used as a unique identifier of the VAT rule. This name is visible in the Core Tool when the power user configures the tax settings for each charge customized in a charge plan (or in an offer).
RL_DESCR	■	This property corresponds to the description of the VAT rule. This description is visible in the Core Tool when the power user configures the tax settings for each charge customized in a charge plan (or in an offer).

Property	Type	Description
REF_SUPPLIER_ZONE	■	This property corresponds to the zone of the service provider. Possible values are: <ul style="list-style-type: none"> 0: EU (European Union) 1: TC (Third Country) 2: AC (Any Country)
B2B_PLACE_OF_TAXATION_ORIG	□	This property corresponds to the source for the place of taxation. Possible values are: <ul style="list-style-type: none"> 0: Supplier's place of establishment (the service provider supplying the customer service to charge) 1: Customer's place of establishment (the holder of the prepaid or external account that is charged by SAP CC) 2: Place dynamically determined by SAP CC according to the configuration of the pricing catalog (see charges customized in charge plans or offers)
B2C_PLACE_OF_TAXATION_ORIG		
DEFAULT_B2B_PLACE_OF_TAXATION	■	This property corresponds to the default source for the place of taxation. Possible values correspond to the above listed values.
DEFAULT_B2C_PLACE_OF_TAXATION		

■ Mandatory □ Optional

🔗 Example

Considering the previously modeled VAT rules, the following rows must be created:

- **Example 1:** ART59b;Rule description;1;;2;1;0
- **Example 2:** CustomRule; Rule description;2;2;2;1;0

4.1.6 Catalog Transport

[Keywords \[page 47\]](#)

[Preliminary Notes \[page 48\]](#)

[Description \[page 48\]](#)

[Managing Transport Destinations \[page 48\]](#)

[Scheduling Transport Requests Operations \[page 49\]](#)

4.1.6.1 Keywords

Catalog transport, transport destination, change list, scheduler

4.1.6.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [Catalog Transport](#) section of the [SAP CC 2023 Application Help](#) documentation
- [Installing and Executing Setup Tool](#), [Installing and Launching Admin+](#) and [Securing Communications with the Core Server System](#) sections of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation
- `transportdestination importList`, `transportdestination exportList` and `certentry import` commands of the SAP CC [Setup Tool](#) User Interface documentation

4.1.6.3 Description

As described in the [SAP CC 2023 Application Help](#) documentation, SAP Convergent Charging gives the possibility to transport data of a given catalog from an SAP CC system to one or several other SAP CC system(s), using the [Catalog Transport](#) feature. This feature is based on change lists that can be transported to transport destinations that are defined within the Core Server system. You can use the following procedures to configure the Catalog Transport feature and thus fit your specific needs:

- [Managing Transport Destinations \[page 48\]](#)
- [Scheduling Transport Requests Operations \[page 49\]](#)

⚠ Caution

If the Catalog Transport feature is used to transport change lists to secured SAP CC systems, please note that these remote SAP CC systems must respect the following constraints:

- The external communications (relying on the XML over HTTP¹⁸ or SOAP¹⁹ over HTTP communication channels) of the dispatcher and updater instances must be configured with the "off" or "oneway" secure mode. **The "dual" authentication mode is not supported**
- The certificates associated to the remote SAP CC systems must be valid for all the external communications

4.1.6.4 Managing Transport Destinations

By default, no transport destination is defined at installation time. In case you (or an SAP CC pricing specialist) want to transport change lists (and included master data) between SAP CC systems, it is thus necessary to configure transport destinations, each transport destination representing a target SAP CC system to which objects can be transported.

¹⁸ HyperText Transfer Protocol

¹⁹ Simple Object Access Protocol

Configure the List of Transport Destinations

To configure a list of transport destinations on a given SAP CC system, execute the following procedure:

1. Using the [Setup Tool user interface](#), execute the `transportdestination exportList` command, to export the list of transport destinations from the database to an XML file.

Note

In case the targeted transport destinations correspond to a secured landscape, you need to import the certificates of the secured SAP CC system, using the `certentry import` dedicated command. For further information, refer to the [Securing Communications with the Core Server System](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation.

2. Edit this newly created file and modify its content to add, modify, or remove transport destinations. For further information about the structure of transport destination files, refer to the dedicated XML schema accessible from the documentation of the `transportdestination importList` command.

Note

In case of secured transport destination, specify the alias of the adequate certificate within the `trustedCertificateEntryAlias` parameter. When this alias is not specified, the certificates defined for the "ws" communication channel of the updaters will be used by default.

3. Save your modified XML file.
4. Using the [Setup Tool user interface](#), execute the `transportdestination importList` command, to import the modified list of transport destinations from the XML file to the database.

Note

No restart of the updaters is required to take the new destinations into account.

4.1.6.5 Scheduling Transport Requests Operations

Change lists can be transported to the defined transport destinations:

- Manually via the Core Tool user interface
- Automatically by a dedicated scheduler in the Core Server system

To configure the behavior of the dedicated scheduler, [modify the value of the following system parameters \[page 22\]](#) for the updater instances of the Core Server system:

- `TRANSPORT_SCHEDULER_ENABLED`, which gives the possibility to enable or disable the scheduler
- `TRANSPORT_SCHEDULER_RECURRENCE`, which defines the recurrence period of the scheduler

For further information about these system parameters, refer to their dedicated documentation available in the [SAP CC 2023 System Parameter Reference](#) documentation.

Related Information

[Managing the Transport Requests](#)

4.1.7 Chargeable Items Charging Process

[Keywords \[page 50\]](#)

[Preliminary Notes \[page 50\]](#)

[Description \[page 50\]](#)

[Enabling the Session Database \[page 51\]](#)

[Limiting the Number of Charging Sessions \[page 52\]](#)

[Limiting the Period of Charging Operations \[page 52\]](#)

[Enabling the Billable Items Immediate Loading \[page 52\]](#)

4.1.7.1 Keywords

Charging, Session Database, session-based

4.1.7.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [Chargeable Items Charging Process](#) description of the [SAP CC 2023 Application Help](#) documentation
- [Installing and Launching Admin+](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation
- “Process: Charging and Rating” and “Process: Session-Based Charging” groups in the [SAP CC 2023 System Parameter Reference](#) documentation

4.1.7.3 Description

As described in the [SAP CC 2023 Application Help](#) documentation, SAP CC gives the possibility to charge incoming events using different execution modes that suit multiple businesses. These charging operations can concern both external or internal events, and lead to the generation of output data handled by external systems such as SAP Convergent Invoicing.

You can use the following procedures to manage the charging capabilities of SAP Convergent Invoicing:

- [Enabling the Session Database \[page 51\]](#), that is only relevant for landscapes implementing the Dual Database feature
- [Limiting the Number of Charging Sessions \[page 52\]](#), that can be used to limit the creation of an unexpected high number of charging sessions

4.1.7.4 Enabling the Session Database

In case your business implements the Dual Database feature, it is necessary to enable the Session Database once it has been installed within your landscape. To enable the use of the Session Database, execute the following procedure:

1. Stop the Core Server system
2. [Modify the value of the following system parameters \[page 22\]](#) of the rater instances of the Core Server system:
 - [RATING_SESSION_SQLHELPER_CONNECTION_COUNT](#), which gives the possibility to specify a number of connections to open on an instance of the Session Database
 - [RATING_SESSION_SQLHELPER_DB_INSTANCE_COUNT](#), specifying a positive number of Session Database instances that will be used by the raters
 - [RATING_SESSION_SQLHELPER_JDBC_URI_DBI5](#) (where "5" corresponds to an example number of 5 RAC²⁰ nodes that are available for the Session Database), which defines the JDBC²¹ URIs²² for connecting to the Session Database
 - [RATING_SESSION_SQLHELPER_LOGIN](#) and [RATING_SESSION_SQLHELPER_PASSWORD](#), which corresponds to the credentials used to authenticate on the Session Database
 - [RATING_SESSION_UPDATE_POOL_SIZE](#), which defines the size of the pool containing the modifications queries performed on the Session Database
 - [RATING_SESSION_UPDATE_MAX_BATCH_SIZE](#), which defines the maximum number of queries that can be handled by a given thread of the pool dedicated to modification queries performed on the Session Database
 - [RATING_SESSION_SELECT_POOL_SIZE](#), which defines the size of the pool containing all the search queries performed on the Session Database
3. For each `RATING_SESSION_<X>` table that exists in the Core Database, execute the following command to remove the old data that are related to the session-based charging operations, considering that:
 - `<COREDB_USER>` corresponds to the name of the Core Database administrator
 - `<COREDB_PASSWORD>` corresponds to the password of the Core Database administrator

```
sqlplus <COREDB_USER>/<COREDB_PASSWORD>
truncate table RATING_SESSION_<X>
```

4. Restart the Core Server system

²⁰ Real Application Cluster

²¹ Java Database Connectivity

²² Uniform Resource Identifier

4.1.7.5 Limiting the Number of Charging Sessions

In case your business relies on charging operations performed using the session-based execution mode, you may want to prevent the creation of an unexpected high number of charging sessions.

To limit the number of charging sessions that can be started per subscriber account, [modify the value of the following system parameter \[page 22\]](#) of the rater instances of the Core Server system:

- [RATING_SESSION_PER_SUBSCRIBER_ACCOUNT_LIMIT](#), which gives the possibility to specify the maximum number of charging sessions that can be started in parallel for each subscriber account

For further information about this system parameter, refer to its dedicated documentation available in the [SAP CC 2023 System Parameter Reference](#).

4.1.7.6 Limiting the Period of Charging Operations

In case your business requires to plan the charging and the activation operations in the future, you can use the dedicated control function.

To enable this function, [modify the value of the following system parameter \[page 22\]](#) of the dispatcher instances of the Core Server system:

- [PERIOD_LIMIT_ACTIVATION](#), which gives the possibility to specify a period (number of days), after the current system date, within which the charging and the activation operations will occur.

Note

By default, this control function is disabled in SAP CC

For further information about this system parameter, refer to its dedicated documentation available in the [SAP CC 2023 System Parameter Reference](#).

4.1.7.7 Enabling the Billable Items Immediate Loading

In an integrated *SAP Solution* scenario with SAP Convergent Invoicing in its SAP system, your business scenario may require the *Billable Items Immediate Loading* feature in SAP Convergent Charging (as of SAP CC 2020 FPS 2) for manual charging operations.

Caution

The use of billable items immediate loading has a significant impact on rating performance. This feature should only be implemented if required for immediate billing purposes and as a complement but not as replacement of the standard bulk loading of billable items.

Prerequisites

- Customer management areas (CMAs) are defined in the integrated SAP system landscape and are configured in the SAP CC systems.
- Necessary JCo destinations are configured. See [Creating JCo Destinations \[page 147\]](#).
- Your integrated *SAP Solution* scenario is not based on SAP S/4HANA Cloud Public Edition with Convergent Invoicing.
- The feature is implemented in your SAP system landscape.
 - SAP Convergent Invoicing is ready to receive the raw billable items and corresponding consumption items in real time. Consult the integration guides and the SAP Note [3048461](#).
 - The client application or SAP Convergent Invoicing is able to trigger the immediate loading of billable items by sending single charging (or bundle charging) operation requests that include the `itemImmediatelyLoaded` XML element.
The feature is dedicated to manual operations and for a low volume of operations. Mass use of such operations has a significant impact on global rating performance.

Procedure

As an SAP CC system administrator:

1. Log on to your administration tool.
2. Change the `JCO_CONNECTION_COUNT` system parameter for all the rater instances in the SAP CC Core Server system.
3. Restart these rater instances.
4. Check the log messages recorded by these instances. Verify that the log message [com.sap.SCC.core_server.000734](#) is in the logs.

If `com.sap.SCC.core_server.000735` is recorded, then verify the system settings (`JCO_CONNECTION_COUNT` system parameter, JCo destinations, and customer management areas).

→ Tip

In the deployed Cockpit web applications, you can enable the feature in the apps *Process a Chargeable Item*. See [Enabling the Billable Items Immediate Loading Feature in the App Process a Chargeable Item \[page 261\]](#).

Related Information

[JCO_CONNECTION_COUNT](#)

[Enabling the Billable Items Immediate Loading Feature in the App Process a Chargeable Item \[page 261\]](#)

Log Messages

[com.sap.SCC.core_server.000734](#)

[com.sap.SCC.core_server.000735](#)

4.1.8 Chargeable Items Recharging Process

[Keywords \[page 54\]](#)

[Preliminary Notes \[page 54\]](#)

[Description \[page 54\]](#)

[Configuring the Retention Period for Counter Snapshots \[page 55\]](#)

During the project implementation phase, the integration team defines the valid value and resize the platforms.

[Deactivating the Recharging Feature Based on Counter Snapshots \[page 55\]](#)

[Using SAP CI instead of BART Server for Recharging Operations \[page 56\]](#)

4.1.8.1 Keywords

Recharging, rerating, counter snapshot, rerate file processor, retention period

4.1.8.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [Chargeable Items Rerating](#) description of the [SAP CC 2023 Application Help](#) documentation
- [Installing and Executing Setup Tool](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation
- "Process: Rerating" groups in the [SAP CC 2023 System Parameter Reference](#) documentation
- `deactivateRecharging` command of the [SAP CC 2023 Setup Tool](#) documentation

4.1.8.3 Description

As described in the [SAP CC 2023 Application Help](#) documentation, SAP CC gives the possibility to correct errors by executing recharging operations that cancel previous charging operations and perform new ones on identified sets of chargeable items. These recharging operations:

- Are executed by default in conjunction with the BART Server system
- Can be handled by SAP Convergent Invoicing in case your landscape is integrated with this SAP system

You can use the following procedures to manage the recharging capabilities of SAP CC:

- [Configuring the Retention Period for Counter Snapshots \[page 55\]](#)
- [Deactivating the Recharging Feature Based on Counter Snapshots \[page 55\]](#)
- [Using SAP CI instead of BART Server for Recharging Operations \[page 56\]](#)

4.1.8.4 Configuring the Retention Period for Counter Snapshots

During the project implementation phase, the integration team defines the valid value and resize the platforms.

By default, SAP Convergent Charging (SAP CC) gives the possibility to store counter snapshots during 40 days. For business, legal, or technical reason, you can change this retention period.

This retention feature of snapshots of the counters stored in provider contracts (in customer master data) is crucial. The same applies for snapshots of the counters stored in subscriptions.

To modify the retention period for counter snapshots in your SAP CC system landscape, execute the following procedure:

1. For the updater instances of the Core Server system, [modify the value \[page 22\]](#) of the `COUNTER_SNAPSHOT_COUNT` system parameter.
2. Restart the updater instances of the Core Server system.

⚠ Caution

- SAP SE recommends that you do not change this retention period in a production landscape.
- The retention period for counter snapshots must be lower than or equal to the retention period used for expired allowances.
For further information, refer to the [Configuring the Allowances Purge Mechanism and Its Scheduler \[page 132\]](#) section.

Related Information

[migration increaseCounterSnapshotCount](#)

4.1.8.5 Deactivating the Recharging Feature Based on Counter Snapshots

When the counter snapshot mechanism is enabled, counters are backed up regularly within counter snapshots that are used during recharging operations. In case you do not plan to perform recharging operations, you can deactivate the recharging feature (based on counter snapshots) and thus increase the reactivity of the Core Server system by optimizing your data storage.

⚠ Caution

This procedure definitively deactivates the recharging capabilities (based on counter snapshots) of SAP Convergent Charging, and cannot be activated again. When performed, it will not be possible to execute any chargeable items recharging operation.

To deactivate the chargeable items recharging feature within your SAP CC landscape, execute the following procedure:

1. Using [SAP CC 2023 Setup Tool](#), execute the `migration deactivateRecharging` command to disable the Counter Snapshots mechanism, and thus definitely deactivate the Chargeable Items Recharging feature
2. Restart the rater instances of the Core Server system
3. Restart the updater instances of the Core Server system
4. Once this command has ended, you can verify the following elements to ensure that the feature has been successfully deactivated:
 - The `com.sap.SCC.core_server.000632` log message (The recharging feature is deactivated) must be displayed in the starting log of both raters and updaters
 - The value of the `RECHARGING_STATUS` system indicator must be set to "off"

📌 Note

The `COUNTER_SNAPSHOT` table of the Core Database contains the counter snapshots used for recharging purpose. As these counter snapshots will not be used anymore, you can empty this table to optimize your data storage. To ensure the integrity of the database structure for future updates, SAP SE recommends that you **do not delete** this table.

4.1.8.6 Using SAP CI instead of BART Server for Recharging Operations

In case your landscape has been installed using the "Integration Scenario set to Billing, Invoicing, and Storage of Consumption Data in SAP Convergent Invoicing" installation scenario, SAP installer automatically set SAP CI as the system in charge of performing the recharging operations.

If your landscape has been installed using another installation scenario, you can integrate SAP CC with SAP CI and use SAP CI for recharging operations of high volumes of chargeable items. For further information about this landscape migration operation, refer to the [SAP CC 2023 Transition Guide](#) (Activation of Consumption Item Management) documentation.

You use recharging operations to schedule recharging activities in SAP Convergent Charging and SAP Convergent Invoicing.

📌 Note

In both landscapes, BART Server is still involved in the batch charging operations of chargeable items.

4.1.9 Communications Channels

[Keywords \[page 57\]](#)

[Preliminary Notes \[page 57\]](#)

[Description \[page 57\]](#)

[Modifying the Database Connection Settings \[page 57\]](#)

[Modifying the Database Communication Settings: Number of Dedicated Connections \[page 59\]](#)

[Securing the Communication Channels \[page 59\]](#)

4.1.9.1 Keywords

Communication channels, securing.

4.1.9.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- “Communication Channel Security” section of the [SAP CC 2023 Security Guide](#) documentation
- [Securing an SAP CC System Landscape](#) and [Installing and Launching Admin+](#) sections of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation

4.1.9.3 Description

SAP Convergent Charging communications rely on different communication channels whose use depend on the concerned elements. You can use the following procedures to configure the settings related to communication channels and thus fit your specific needs or performance requirements:

- [Modifying the Database Communication Settings: Number of Dedicated Connections \[page 59\]](#)
- [Securing the Communication Channels \[page 59\]](#)

4.1.9.4 Modifying the Database Connection Settings

At startup, each instance of the SAP CC system temporarily connects to the database system specified in the `boot.config` configuration file.

Back-end database connection settings are collected from this database and used by an instance of the SAP CC Core Server system to connect to the back-end database(s) after the startup phase.

Note

Database connection settings specified in the `boot.config` configuration file may differ from the parameters values stored in the database.

Procedure

To edit your SAP Convergent Charging Core Server system database connection settings, apply the following procedure:

1. Stop all the Core Server instances.
2. Go to the `/usr/sap/<SYSTEM_ID>/SYS/profile/boot/` folder.
3. Make a backup of the `boot.config` file.
4. Edit the `boot.config` file and modify the value of the following properties when relevant:
 - `SQLHELPER_LOGIN`
 - `SQLHELPER_PASSWORD`
 - `SQLHELPER_JDBC_URI`
5. Go to the "config" folder of one of the dispatcher instances. Use the folder: `"/usr/sap/<SID>/CCD<XX>/config/"`
6. Edit the `boot.config` file and modify the value of the following properties when relevant:
 - `SQLHELPER_LOGIN`
 - `SQLHELPER_PASSWORD`
 - `SQLHELPER_JDBC_URI`
7. Go to the "script" folder of the very same dispatcher instance: `"/usr/sap/<SID>/CCD<XX>/script/"`
8. Using Config Tool, export the Core Server parameters using the configuration export command:

```
./config.sh configuration export -login=<login> -password=<password>  
parameters.xml all
```

9. Make a backup of the exported `parameters.xml` file.
10. Edit the `parameters.xml` file and edit the relevant database connectivity settings defined within the "Backends: Database Management Settings" parameters group for each Core Server instance type.
11. Using Config Tool, import the modified `parameters.xml` file using the configuration import command:

```
./config.sh configuration import -login=<login> -password=<password>  
parameters.xml
```

12. Restart the SAP Convergent Charging Core Server system and check that database connectivity settings changes have been correctly taken into account.
To do that, check the logs and traces.

See Also

[Startup Configuration Files \[page 208\]](#)

4.1.9.5 Modifying the Database Communication Settings: Number of Dedicated Connections

To communicate with the databases available in your SAP CC system landscape, it is necessary to define dedicated connections whose number depends on the enabled services.

To modify the number of connections used by each instance of the SAP system, modify the value of the following system parameters for each concerned instance:

- [SQLHELPER_CONNECTION_COUNT](#), which defines the connections to open on the Core Database (valid for all the instances)
- [RATING_SESSION_SQLHELPER_CONNECTION_COUNT](#), which defines the connections to open on the Session Database, when this database is used (only valid for rater instances)

→ Remember

The value of this system parameter must be correlated to the total number of threads running in each instance of the SAP CC Core Server system.

For further information about these system parameters, refer to their dedicated documentation available in the [SAP CC 2023 System Parameter Reference](#) documentation.

4.1.9.6 Securing the Communication Channels

For security purposes, all communication channels (except the Messages over UDP²³ one) used to communicate within your SAP CC landscape can be secured.

For further information about the available securing procedures, refer to the dedicated [Securing an SAP CC System Landscape](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation.

4.1.10 Data Cache Management

[Keywords \[page 60\]](#)

[Preliminary Notes \[page 60\]](#)

[Description \[page 60\]](#)

²³ User Datagram Protocol

[Determining the Size of the Cached Structures \[page 61\]](#)

[Modifying the Size of Cached Structures \[page 62\]](#)

[Enabling the Cache Warm-Up Mechanism \[page 70\]](#)

[Enabling the Network Data Transfer \(NDT\) Mechanism \[page 72\]](#)

As an implementer you want to optimize and fine-tune SAP Convergent Charging (SAP CC) by implementing the network data transfer (NDT) mechanism.

[Modifying the Network Data Transfer \(NDT\) Mechanism \[page 72\]](#)

[Refreshment of the Shared Allowance Cache \[page 74\]](#)

4.1.10.1 Keywords

Cache, data cache, cached structure, cache size, cache warm-up, smart mode, normal mode, shared allowances, refresh, scheduler

4.1.10.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [Installing and Launching Admin+](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation
- [Caching Policies](#) description of the [SAP CC 2023 Application Help](#) documentation
- `refresh_shared_allowance_cache` command of the [SAP CC 2023 Primary Help for Admin+](#) documentation
- [Data Cache Management Settings](#) and [Allowance Management Process](#) groups in the [SAP CC 2023 System Parameter Reference](#) documentation

4.1.10.3 Description

As described in the [SAP CC 2023 Application Help](#) documentation, most of the instances of the Core Server system manage data within cached structures that are stored in memory. This memory is allocated and managed by each Java Virtual Machine (JVM) that runs an SAP CC system instance that composes the global system.

You can use the following procedures to manage some of these cached structures of your SAP CC system and running instances, and thus fit your specific needs or performance requirements:

- [Determining the Size of the Cached Structures \[page 61\]](#)
- [Modifying the Size of Cached Structures \[page 62\]](#)
- [Modifying the Guiding Cache \[page 63\]](#)

- [Modifying the Provisioning Cache \[page 64\]](#)
- [Modifying the Session Cache \[page 67\]](#)
- [Modifying the Shared Allowance Cache \[page 68\]](#)
- [Modifying the SQL Statements Cache \[page 70\]](#)
- [Enabling the Cache Warm-Up Mechanism \[page 70\]](#)
- [Modifying the Network Data Transfer \(NDT\) Mechanism \[page 72\]](#)
- [Configuring the Automated Refreshment of the Shared Allowance Caches \[page 75\]](#)

4.1.10.4 Determining the Size of the Cached Structures

To determine the size of a given cached structure, the best way consists in putting a set of objects in this cache and determining the average size of these objects. The recommended method consists in simulating the presence of 1,000 end customers of a service provider, and creating all the business objects that are relevant and necessary for your implementation:

- **Customer master data:**
 - 1,000 subscriber accounts
 - 1,000 provider contracts or subscriptions (and relevant accesses)
 - The relevant data tables (subscriber mapping tables and subscriber range tables)
- **Master data related to the service provider:** Relevant pricing objects ([charge plans](#), [offers](#) and suboffers), charges with [price plans](#) and [Charging Plan](#) including [pricing macros](#) or data tables like tier or [translation tables](#), [mapping](#) or [range tables](#)

To determine the size of a given cached structure, execute the following procedure:

1. Start an instance of each type (dispatcher, updater, guider, rater, and taxer when relevant) with the default values for sizing the cached structure.
2. Launch your [favorite user interface \[page 22\]](#) and identify as the administrator of the Core Server system.
3. Retrieve the S1 value of the following system parameters for each concerned instance:
 - [SUBSCRIPTION_CACHE_SIZE](#), which defines the memory allocated to store objects in the subscription cache
 - [GUIDING_CACHE_SIZE](#), which defines the memory allocated to store objects in the access cache
 - [SESSION_MEMORY_SIZE](#), which defines the memory allocated to store objects in the rating sessions cache
 - [SHARED_ALLOWANCE_CACHE_SIZE](#), which defines the memory allocated to store objects in the shared allowances cache
4. Retrieve the FM1 value of the following system indicators for each concerned instance:
 - [SUBSCRIPTION_CACHE_FREE_MEMORY](#), which indicates the remaining free memory in the subscription cache
 - [GUIDING_CACHE_FREE_MEMORY](#), which indicates the remaining free memory in the access cache
 - [SESSION_FREE_MEMORY](#), which indicates the remaining free memory in the rating sessions cache
 - [SHARED_ALLOWANCE_CACHE_FREE_MEMORY](#), which indicates the remaining free memory in the shared allowances cache
5. Create **NO** typical objects (1,000 for example) that will be stored in each cached structure.

6. Restart the instances started in Step 1.
7. Re-execute Step 3 and Step 4, considering the retrieved values as S_2 and FM_2 .
8. For each cached structure of each concerned instance, compute the consumed memory related to the created objects, taking into consideration that:
 - If the size of the cached structure has changed, apply the following formula: $(S_2 - FM_2) - (S_1 - FM_1)$
 - If the size of the cached structure has **not** changed, calculate the difference between the free memory available at the first launch and the free memory available at the second launch: $FM_1 - FM_2$
9. Divide the previous result by the number of objects you have created in the cached structure, and then multiply the result by the NF number of objects you plan to have in the future.
To sum up, the size of the cached structure can be estimated using the following formula, depending whether the size of the cached structure has changed between the 2 launches, or not:
 - $((FM_1 - FM_2) / N0) \times NF$
 - $((S_2 - FM_2) - (S_1 - FM_1)) / N0 \times NF$
10. Add the result to the first computed size: You now have the size of your cached structure, that you can divide by the number of available instances supposed to manage this volume of objects.
11. Increase S_2 and the total size of the JVM²⁴ with this number in order to prevent the memory allocated to the cached structure from being taken by another cached structure or by the JVM itself.

4.1.10.5 Modifying the Size of Cached Structures

To handle your business requirements, it is necessary to configure the different cached structures handled by the instances of the Core Server system. In case of a production system landscape, SAP SE recommends that you to use values that have previously been determined on a non-production landscape during test campaigns.

⚠ Caution

The size of the cached structures handled by a given instance must not exceed the value of the `MaxDirectMemorySize JVM25` option. If this constraint is not respected, `OutOfMemory` errors will occur.

To configure the different cached structures, execute the following procedure:

1. For each concerned instance, [modify the value of the relevant parameters \[page 22\]](#), as described in the dedicated sections afterwards.
2. Restart the concerned instances.

[Modifying the Guiding Cache \[page 63\]](#)

[Modifying the Provisioning Cache \[page 64\]](#)

[Modifying the Session Cache \[page 67\]](#)

[Modifying the Shared Allowance Cache \[page 68\]](#)

[Modifying the SQL Statements Cache \[page 70\]](#)

²⁴ Java Virtual Machine

²⁵ Java Virtual Machine

4.1.10.5.1 Modifying the Guiding Cache

Also known as the *access cache*, the guiding cache is a data cache that contains the accesses data used for request routing purpose.

→ Remember

The guiding cache is available in the guider instances of the Core Server system.

To configure the guiding cache, complete the following procedure:

1. [Modify the value of the following system parameters \[page 22\]](#) for the guider instances of the Core Server system:

- [GUIDING_CACHE_SIZE](#), which defines the total memory size reserved for the guiding cache in each guider instance of the Core Server system.

ⓘ Note

To determine the size of the guiding cache, the best way consists in having a sample of objects contained in the cache and determine the average size of these objects.

For further information, refer to the [Determining the Size of the Cached Structures \[page 61\]](#) section.

- [GUIDING_ENTRY_AVERAGE_SIZE](#), which defines the average size of the memory allocated for the storage of **one entry (values and key)** in the guiding cache.

ⓘ Note

The appropriate value for this parameter can be found by retrieving the value of the `avg` element in the last line of the value of the guider instance [GUIDING_CACHE_STATUS](#) indicator while the guiding cache is not empty. This value corresponds to the average size of the objects stored in the guiding cache, and should be used as the value for this parameter.

The possible consequences of an incorrect value for this parameter are the following:

- If your parameter value is too small, objects may be removed from the guiding cache because there is not enough memory available in the cache (see the `vmem` element in the guider instance [GUIDING_CACHE_STATUS](#) indicator), leading to decreased performance.
 - If your parameter value is too large, objects may also be removed from the guiding cache because there are not enough slots available in the cache (see the `vmap` element in the guider instance [GUIDING_CACHE_STATUS](#) indicator), leading to decreased performance.
- [GUIDING_CACHE_INSTANCES](#), which defines the maximum number of subcaches into the guiding cache, as the guiding cache is divided into smaller subcaches for reducing contention.

→ Recommendation

The value of this parameter is computed by default to the first prime number greater than 8 times the number of CPUs²⁶. As a rule, there is no need to modify this default value.

2. For each guider instance in the Core Server system, check the value of the `MaxDirectMemorySize` JVM option defined in the `jstart.config` file.

²⁶ Central Processing Unit

⚠ Caution

The size of the data caches handled by a given instance must not exceed the value of the `MaxDirectMemorySize` JVM option. If this constraint is not respected `OutOfMemory` errors will occur.

→ Recommendation

The formula to compute the appropriate value for the `MaxDirectMemorySize` JVM option of each guider instance is: `GUIDING_CACHE_SIZE` + 1 GB

3. Restart the guider instances in the Core Server system.

4.1.10.5.2 Modifying the Provisioning Cache

Also known as the *subscription cache*, the provisioning cache is a data cache that contains the provisioning data (provider contracts, subscriptions, counters and subscriber accounts).

This provisioning cache is available in the rater and updater instances of the Core Server system.

ⓘ Note

The provisioning cache managed by updater instances does not contain counters data.

Modify the Provisioning Cache of the Rater Instances

To configure the provisioning cache for the rater instances of the Core Server system, execute the following procedure:

1. [Modify the value of the following system parameters \[page 22\]](#) for the rater instances of the Core Server system:
 - `SUBSCRIPTION_CACHE_SIZE`, which defines the total memory size reserved for the provisioning cache for each rater of the Core Server system.

ⓘ Note

To determine the size of the provisioning cache for the rater instances of the Core Server system, the best way consists in having a sample of objects contained in the cache and determine the average size of these objects.

For further information, refer to the [Determining the Size of the Cached Structures \[page 61\]](#) procedure.

- `SUBSCRIPTION_OBJECT_AVERAGE_SIZE`, which defines the average size of of the memory allocated to the storage of one data object in the provisioning cache

ⓘ Note

The appropriate value for this parameter can be found by retrieving the value of the `avg` element in the last line of the value of the rater instance `SUBSCRIPTION_CACHE_STATUS` indicator while

the provisioning cache is not empty. This value corresponds to the average size of the objects stored in the provisioning cache, and should be used as the value for this parameter.

The possible consequences of an incorrect value for this parameter are the following:

- If your parameter value is too small, objects may be removed from the provisioning cache because there is not enough memory available in the cache (see the `vmem` element in the rater instance `SUBSCRIPTION_CACHE_STATUS` indicator), leading to decreased performance.
 - If your parameter value is too large, objects may also be removed from the provisioning cache because there are not enough slots available in the cache (see the `vmap` element in the rater instance `SUBSCRIPTION_CACHE_STATUS` indicator), leading to decreased performance.
- `SUBSCRIPTION_CACHE_INSTANCES`, which defines the maximum number of subcaches into the provisioning cache, as the provisioning cache is divided into smaller subcaches for reducing contention.

→ Recommendation

The value of this parameter is computed by default to the first prime number greater than 8 times the number of CPUs²⁷. As a rule, there is no need to modify this default value.

2. For each rater instance of the Core Server system, check the value of the `MaxDirectMemorySize` JVM option defined in the `jstart.config` file

⚠ Caution

The size of the data caches handled by a given instance must not exceed the value of the `MaxDirectMemorySize` JVM option. If this constraint is not respected `OutOfMemory` errors will occur.

→ Recommendation

The formula to compute the appropriate value for the `MaxDirectMemorySize` JVM option of each rater instance is: `SUBSCRIPTION_CACHE_SIZE + SESSION_MEMORY_SIZE + SHARED_ALLOWANCE_CACHE_SIZE + 1Gb`

3. Restart the rater instances in the Core Server system.

Modify the Provisioning Cache of the Updater Instances

To configure the provisioning cache for the updater instances of the Core Server system, execute the following procedure:

1. [Modify the value of the following system parameters \[page 22\]](#) for the updater instances of the Core Server system:
 - `SUBSCRIPTION_CACHE_SIZE`, which defines the total memory size reserved for the provisioning cache for each updater of the Core Server system

²⁷ Central Processing Unit

Note

To determine the size of the provisioning cache for the updater instances of the Core Server system, the best way consists in having a sample of objects contained in the cache and determine the average size of these objects.

For further information, refer to the [Determining the Size of the Cached Structures \[page 61\]](#) procedure.

- [SUBSCRIPTION_OBJECT_AVERAGE_SIZE](#), which defines the average size of of the memory allocated to the storage of one data object in the provisioning cache

Note

The appropriate value for this parameter can be found by retrieving the value of the `avg` element in the last line of the value of the updater instance [SUBSCRIPTION_CACHE_STATUS](#) indicator while the provisioning cache is not empty. This value corresponds to the average size of the objects stored in the provisioning cache, and should be used as the value for this parameter.

The possible consequences of an incorrect value for this parameter are the following:

- If your parameter value is too small, objects may be removed from the provisioning cache because there is not enough memory available in the cache (see the `vmem` element in the updater instance [SUBSCRIPTION_CACHE_STATUS](#) indicator), leading to decreased performance.
 - If your parameter value is too large, objects may also be removed from the provisioning cache because there are not enough slots available in the cache (see the `vmap` element in the updater instance [SUBSCRIPTION_CACHE_STATUS](#) indicator), leading to decreased performance.
- [SUBSCRIPTION_CACHE_INSTANCES](#), which defines the maximum number of subcaches into the provisioning cache, as the provisioning cache is divided into smaller subcaches for reducing contention.

→ Recommendation

The value of this parameter is computed by default to the first prime number greater than 8 times the number of CPUs. As a rule, there is no need to modify this default value.

2. For each updater instance in the Core Server system, check the value of the `MaxDirectMemorySize` JVM option defined in the `jstart.config` file.

⚠ Caution

The size of the data caches handled by a given instance must not exceed the value of the `MaxDirectMemorySize` JVM option. If this constraint is not respected `OutOfMemory` errors will occur.

→ Recommendation

The formula to compute the appropriate value for the `MaxDirectMemorySize` JVM option of each updater instance is: [SUBSCRIPTION_CACHE_SIZE](#) + 1Gb

3. Restart the updater instances in the Core Server system.

For further information about these system parameters, refer to their dedicated documentation available in the [SAP CC 2023 System Parameter Reference](#) documentation.

4.1.10.5.3 Modifying the Session Cache

Also known as the *charging session cache*, the session cache is a data cache that contains the data and the history of all the charging sessions for all the subscriber accounts managed by a given rater instance.

The session cache is available in the rater instances of the Core Server system.

To configure the session cache, execute the following procedure:

1. [Modify the value of the following system parameters \[page 22\]](#) for the rater instances of the Core Server system:

- [SESSION_MEMORY_SIZE](#), which defines the memory reserved for charging sessions (data and history) into each rater instance of the Core Server

ⓘ Note

To determine the size of the session cache, the best way consists in having a sample of objects contained in the cache and determine the average size of these objects.

For further information, refer to the [Determining the Size of the Cached Structures \[page 61\]](#) section.

- [SESSION_AVG_OBJECT_SIZE](#), which defines the average size of the memory allocated for the storage of **one charging session object** in the session cache.

ⓘ Note

The appropriate value for this parameter can be found by retrieving the value of the `eaavg` element in the last line of the value of the rater instance [SESSION_STATUS](#) indicator while the session cache is not empty. This value corresponds to the average size of the objects stored in the session cache, and should be used as the value for this parameter.

The possible consequences of an incorrect value for this parameter are the following:

- If your parameter value is too small, objects may be removed from the session cache because there is not enough memory available in the cache (see the `vmen` element in the rater instance [SESSION_STATUS](#) indicator), leading to decreased performance.
- If your parameter value is too large, objects may also be removed from the session cache because there are not enough slots available in the cache (see the `vmap` element in the rater instance [SESSION_STATUS](#) indicator), leading to decreased performance.

- [SESSION_AVG_ID_SIZE](#), which defines the average size of the memory allocated for the storage of **one charging session history object** in the session cache

ⓘ Note

The appropriate value for this parameter can be found by retrieving the value of the `eaavg` element in the last line of the value of the rater instance [SESSION_HISTORY_STATUS](#) indicator while the session cache is not empty. This value corresponds to the average size of the objects stored in the session cache, and should be used as the value for this parameter.

The possible consequences of an incorrect value for this parameter are the following:

- If your parameter value is too small, objects may be removed from the session cache because there is not enough memory available in the cache (see the `vmen` element in the rater instance [SESSION_HISTORY_STATUS](#) indicator), leading to decreased performance.

- If your parameter value is too large, objects may also be removed from the session cache because there are not enough slots available in the cache (see the `vmmap` element in the rater instance `SESSION_HISTORY_STATUS` indicator), leading to decreased performance.

- `SESSION_AVG_NB_PER_HISTORY`, which defines the average number of sessions per subscriber in the charging session cache.

Note

The value of this parameter should correspond to the number of charging sessions that are opened concurrently per subscriber account when using the session-based charging methods available in the stateful service client.

- `SESSION_MEMORY_INSTANCES`, which defines the maximum number of subcaches into the session cache, as the session cache is divided into smaller subcaches for reducing contention.

→ Recommendation

The value of this parameter is computed by default to the first prime number greater than 8 times the number of CPUs²⁸. As a rule, there is no need to modify this default value.

2. For each rater instance in the Core Server system, check the value of the `MaxDirectMemorySize` JVM option defined in the `jstart.config` file.

⚠ Caution

The size of the data caches handled by a given instance must not exceed the value of the `MaxDirectMemorySize` JVM option. If this constraint is not respected `OutOfMemory` errors will occur.

→ Recommendation

The formula to compute the appropriate value for the `MaxDirectMemorySize` JVM option of each rater instance is: `SUBSCRIPTION_CACHE_SIZE + SESSION_MEMORY_SIZE + SHARED_ALLOWANCE_CACHE_SIZE + 1 GB`

3. Restart the rater instances in the Core Server system.

4.1.10.5.4 Modifying the Shared Allowance Cache

The shared allowance cache is a data cache that contains the shared allowances (that represent allowances shared between subscriber accounts), and the distributed counters (that correspond to persistent counters of shared allowances).

This shared allowance cache is available in the rater instances of the Core Server system, and contains data that is shared among the running rater instances Core Server system.

Note

For performance reasons, the shared allowance cache can be refreshed:

²⁸ Central Processing Unit

- Automatically and regularly by a [dedicated scheduler \[page 75\]](#)
- On demand by using the `refresh_shared_allowance_cache` dedicated command of the [Admin+](#) user interface

To configure the shared allowance cache for the rater instances in the Core Server system, complete the following procedure:

1. [Modify the value of the following system parameters \[page 22\]](#) for the rater instances of the Core Server system:

- `SHARED_ALLOWANCE_CACHE_SIZE`, which defines the total memory size reserved for the shared allowance cache for each rater of the Core Server system.

ⓘ Note

To determine the size of the provisioning cache for the rater instances of the Core Server system, the best way consists in having a sample of objects contained in the cache and determine the average size of these objects.

For further information, refer to the [Determining the Size of the Cached Structures \[page 61\]](#) procedure.

- `SHARED_ALLOWANCE_OBJECT_AVERAGE_SIZE`, which defines the average size of the memory allocated to the storage of one data object in the shared allowance cache.

ⓘ Note

The appropriate value for this parameter can be found by retrieving the value of the `avg` element in the last line of the value of the rater instance `SHARED_ALLOWANCE_CACHE_STATUS` indicator while the shared allowance cache is not empty. This value corresponds to the average size of the objects stored in the shared allowance cache, and should be used as the value for this parameter.

The possible consequences of an incorrect value for this parameter are the following:

- If your parameter value is too small, objects may be removed from the provisioning cache because there is not enough memory available in the cache (see the `vmem` element in the rater instance `SHARED_ALLOWANCE_CACHE_STATUS` indicator), leading to decreased performance.
- If your parameter value is too large, objects may also be removed from the provisioning cache because there are not enough slots available in the cache (see the `vmap` element in the rater instance `SHARED_ALLOWANCE_CACHE_STATUS` indicator), leading to decreased performance.

- `SHARED_ALLOWANCE_CACHE_INSTANCES`, which defines the maximum number of subcaches into the shared allowance cache, as the shared allowance cache is divided into smaller subcaches for reducing contention.

→ Recommendation

The value of this parameter is computed by default to the first prime number greater than 8 times the number of CPUs²⁹. As a rule, there is no need to modify this default value.

2. For each rater instance of the Core Server system, check the value of the `MaxDirectMemorySize` JVM option defined in the `jstart.config` file.

²⁹ Central Processing Unit

⚠ Caution

The size of the data caches handled by a given instance must not exceed the value of the `XX:MaxDirectMemorySize` JVM option. If this constraint is not respected `OutOfMemory` errors will occur.

→ Recommendation

The formula to compute the appropriate value for the `XX:MaxDirectMemorySize` JVM option of each rater instance is: `SUBSCRIPTION_CACHE_SIZE + SESSION_MEMORY_SIZE + SHARED_ALLOWANCE_CACHE_SIZE + 1 GB`

3. Restart the rater instances of the Core Server system.

For further information about these system parameters, refer to their dedicated documentation available in the [SAP CC 2023 System Parameter Reference](#) documentation.

4.1.10.5.5 Modifying the SQL Statements Cache

⚠ Caution

SAP SE recommends you to avoid changing these parameters on a production landscape, except under the direct supervision of a support specialist from your SAP Support Team.

To modify the cached structure containing the SQL request statements, [modify the value of the following system parameters \[page 22\]](#) for each concerned instance:

- `SQLHELPER_STATEMENT_CACHE_SIZE`, which defines the memory allocated to store the cached objects and is used by all instances when communicating with the Core Database
- `RATING_SESSION_SQLHELPER_STATEMENT_CACHE_SIZE`, which defines the memory allocated to store the cached objects and is used by the rater instances when communicating with the Session Database

For further information about these system parameters, refer to their dedicated documentation available in the [SAP CC 2023 System Parameter Reference](#) documentation.

4.1.10.6 Enabling the Cache Warm-Up Mechanism

To increase the reactivity of the Core Server system during online and offline charging operations, the content of the cached structures can be pre-loaded from the Core Database and Session Database in order to avoid latency. These pre-loading operations rely on a cache warm-up mechanism that can be enabled or disabled to fit specific needs.

📌 Note

The cache warm-up mechanism is **disabled** by default.

To modify the configuration of the cache warm-up mechanism, execute the following procedure:

Modify the value of the following system parameters [page 22] for the rater and guider instances, taking into account the existing constraints between these parameters:

- [CACHE_WARMUP_THREAD_COUNT](#), by defining a number of thread allocated to warm-up operations, that usually equals to the number of available CPUs³⁰ minus one
- [SQLHELPER_CONNECTION_COUNT](#), by adding new connections to the Core Database
- Only for rater: [RATING_SESSION_SQLHELPER_CONNECTION_COUNT](#), by adding new connections to the Session Database (when the Session Database is used within your landscape)

❖ Example

To permanently disable the cache warm-up mechanism for all rater instances of the Core Server system, execute the following command:

```
set CACHE_WARMUP_THREAD_COUNT 0 all rater
```

```
set SQLHELPER_CONNECTION_COUNT X all rater, where X corresponds to the previous value of this parameter, decreased by the number of threads previously allocated to warm-up operations
```

❖ Example

To permanently disable the cache warm-up mechanism for all guider instances of the Core Server system, execute the following command:

```
set CACHE_WARMUP_THREAD_COUNT 0 all guider
```

```
set SQLHELPER_CONNECTION_COUNT X all guider, where X corresponds to the previous value of this parameter, decreased by the number of threads previously allocated to warm-up operations
```

❖ Example

To temporary allocate 4 threads to warm-up operations performed by a given instance of the Core Server system, execute the following commands:

```
set SQLHELPER_CONNECTION_COUNT X memory <INSTANCE_ID>, where X corresponds to the previous value of this parameter, increased by 4
```

```
set CACHE_WARMUP_THREAD_COUNT 4 memory <INSTANCE_ID>
```

Where <INSTANCE_ID> corresponds to the targeted rater or guider

Smart Warmup with the Smart Distribution Mode

When the cache warm-up mechanism is activated, it is possible to configure the Core Server system in order to activate a smart execution mode for the partitions distribution operations performed by the primary dispatcher. This execution mode gives the possibility to control the warm-up operations performed by the targeted instances during these partitions distribution operations, and thus to control the overall impact of warm-up operations on the online stateful charging operations.

To activate and configure this smart distribution mode, refer to the [Partition Distribution Using the Smart Mode \[page 201\]](#) section of this documentation.

³⁰ Central Processing Unit

4.1.10.7 Enabling the Network Data Transfer (NDT) Mechanism

As an implementer you want to optimize and fine-tune SAP Convergent Charging (SAP CC) by implementing the network data transfer (NDT) mechanism.

To increase the reactivity of the Core Server system, the content of the cached structures can be transferred directly from one SAP CC system instance to another using the network. These network transfer operations decrease the overall solicitation of the Core Database and Session Database, and decrease the duration of the warm-up operations performed by rater instances and guider instances during partition redistribution.

Note

As SAP CC 2022 FPS 2 Patch Level 2 **the network data transfer (NDT) mechanism is disabled by default.**

Check the system parameter values in your SAP system landscapes and determine if you need to change them. See [Checking the Status of the Network Data Transfer \(NDT\) Mechanism](#).

As an implementer you want to optimize and fine-tune SAP CC. As of SAP CC 2022 FPS 2 Patch Level 2, the network data transfer (NDT) mechanism is not enabled by default anymore. You need to determine if this mechanism is relevant for you and then plan its implementation.

Caution

Whatever your installed version, contact your SAP Support Team to verify if this mechanism is relevant for your implementation and integration project.

See:

- [Modifying the Network Data Transfer \(NDT\) Mechanism \[page 72\]](#)
- [Fine-Tuning the Network Data Transfer \(NDT\) Mechanism \[page 74\]](#)

4.1.10.8 Modifying the Network Data Transfer (NDT) Mechanism

To increase the reactivity of the Core Server system, the content of the cached structures can be transferred directly from one SAP CC system instance to another using the network. These network transfer operations decrease the overall solicitation of the Core Database and Session Database, and decrease the duration of the warm-up operations performed by rater instances and guider instances during partition redistribution.

Note

As SAP CC 2022 FPS 2 Patch Level 2 **the network data transfer (NDT) mechanism is disabled by default.**

Check the system parameter values in your SAP system landscapes and determine if you need to change them. See [Checking the Status of the Network Data Transfer \(NDT\) Mechanism](#).

Procedure

As a system administrator, to modify the configuration of the network data transfer (NDT) mechanism, complete the following procedure:

1. Launch your [favorite user interface \[page 22\]](#) and log on to as the administrator of the Core Server system.
2. Modify the value of the following system parameters for each dispatcher instance of the Core Server system:
 - [RATER_PARTITION_SWITCH_CACHE_TRANSFER_ENABLED](#), which gives the possibility to enable or disable the use of network data transfer operations when switching partitions handled by rater instances.
 - [GUIDER_PARTITION_SWITCH_CACHE_TRANSFER_ENABLED](#), which gives the possibility to enable or disable the use of network data transfer operations when switching partitions handled by guider instances.
 - [DATA_TRANSFER_REQUEST_HANDLER_QUEUE_SIZE](#), which gives the possibility to specify the maximum number of Class1 and Class2 requests that can be queued in the dispatcher instance.
 - [DATA_TRANSFER_REQUEST_HANDLER_THREAD_COUNT](#), which gives the possibility to specify the number of threads dedicated to the processing of Class1 and Class2 requests in the dispatcher instance.
3. Modify the value of the following system parameters for each rater and/or guider instance of the Core Server system:
 - [DATA_TRANSFER_CLASS1_QUEUE_SIZE](#) and [DATA_TRANSFER_CLASS2_QUEUE_SIZE](#), which give the possibility to specify the maximum number of respectively Class1 and Class2 requests that can be queued in the instance
 - [DATA_TRANSFER_CLASS1_THREAD_COUNT](#) and [DATA_TRANSFER_CLASS2_THREAD_COUNT](#), which give the possibility to specify the number of threads allocated to the instance for processing respectively Class1 and Class2 requests
 - [DATA_TRANSFER_CLASS1_RESPONSE_HANDLER_THREAD_COUNT](#) and [DATA_TRANSFER_CLASS2_RESPONSE_HANDLER_THREAD_COUNT](#), which give the possibility to specify the number of threads allocated to the instance for processing responses to respectively Class1 and Class2 requests
 - [DATA_TRANSFER_CLASS2_MAX_SEND_THROUGHPUT](#), which gives the possibility to specify the maximum network bandwidth that the instance can use to respond to Class2 requests
 - [DATA_TRANSFER_CLASS2_MAX_RECEIVE_THROUGHPUT](#), which gives the possibility to specify the maximum network bandwidth that the instance can use to receive responses to Class2 requests
 - [DATA_TRANSFER_CLASS2_MAX_MESSAGE_SIZE](#), which gives the possibility to specify the maximum size of messages that can be sent by the instance when responding to Class2 requests
 - [DATA_TRANSFER_CLASS1_TIMEOUT](#) and [DATA_TRANSFER_CLASS2_TIMEOUT](#), which give the possibility to specify the maximum time (in seconds) that the instance can take to respond to respectively Class1 and Class2 requests
4. Restart the instances that relate to your system parameter changes.
5. **For expert system administrators**, you can consider some optimization and fine-tuning. See [Fine-Tuning the Network Data Transfer \(NDT\) Mechanism \[page 74\]](#).

For further information about these system parameters, refer to their dedicated documentation available in the [SAP CC 2023 System Parameter Reference](#) documentation.

[Fine-Tuning the Network Data Transfer \(NDT\) Mechanism \[page 74\]](#)

4.1.10.8.1 Fine-Tuning the Network Data Transfer (NDT) Mechanism

Procedure

⚠ Caution

Fine-tuning may put the system at risk. Only expert system administrators can consider these optimizations in production SAP system landscapes.

The Network Data Transfer (NDT) mechanism relies on two different types of messages (requests and responses) used by both rater instances and guider instances:

- Class1 messages correspond to data transfer requests and responses performed during priority operations such as real-time operations, administrations queries during data transfer operations, and so on
- Class2 messages correspond to data transfer requests and responses performed during nonpriority operations such as data transfer operations in a context of cache warm-up operations

To optimize your SAP CC Core Server system, you can fine-tune some system parameters. For optimization purpose, as an expert system administrator, you can control the behavior of these messages during data transfer operations by configuring:

1. The resources allocated to rater instances and guider instances when processing Class1 or Class2 messages (number of threads, size of queues):
 - DATA_TRANSFER_CLASS1_THREAD_COUNT
 - DATA_TRANSFER_CLASS2_THREAD_COUNT
 - DATA_TRANSFER_CLASS1_QUEUE_SIZE
 - DATA_TRANSFER_CLASS2_QUEUE_SIZE
2. The bandwidth allocated to rater instances and guider instances when dealing with Class2 messages, to avoid interfering with real-time services like stateful charging:
 - DATA_TRANSFER_CLASS2_MAX_RECEIVE_THROUGHPUT
 - DATA_TRANSFER_CLASS2_MAX_SEND_THROUGHPUT
3. The size of the Class2 messages, to avoid overloading the network:
 - DATA_TRANSFER_CLASS2_MAX_MESSAGE_SIZE

Test and adjust your changes in quality assurance SAP system landscapes.

4.1.10.9 Refreshment of the Shared Allowance Cache

Contrary to the other cached structures that contain partitioned data, the shared allowance cache contains data that is shared among the running rater instances in the SAP Convergent Charging system (Core Server). To ensure consistency and synchronization between the running rater instances, the cached structure containing the shared allowances must be regularly refreshed. These refreshing operations can be:

- **Automatically** executed by dedicated scheduler (managed by the primary dispatcher instance):
 - That you can enable or disable.
 - Whose recurrence can be configured to fit specific needs.
- **Manually** performed using the `refresh_shared_allowance_cache` dedicated command that is available in the Admin+ user interface

ⓘ Note

- The shared allowance cache can be refreshed according to using the following execution modes:
 - **Incremental**, which gives the possibility to add the new shared allowances, remove the deleted shared allowances and update the distributed counters statuses.
 - **Full**, which gives the possibility to add or update all valid shared allowances and all distributed counters statuses.
- The scheduler in charge of refreshing the shared allowance cache is enabled by default, and uses the incremental execution mode.

[Configuring the Automated Refreshment of the Shared Allowance Caches \[page 75\]](#)

[Manually Refreshing the Shared Allowances Cache \[page 75\]](#)

When needed you can trigger the refreshment of the shared allowance cache.

4.1.10.9.1 Configuring the Automated Refreshment of the Shared Allowance Caches

Procedure

To modify the configuration of the scheduler in charge of refreshing the cached structure containing the shared allowances, execute the following procedure:

1. Launch the Cockpit or Admin+ user interface and identify as the administrator of the Core Server system.
2. For each dispatcher instance in the Core Server system, modify the value of the following parameters:
 - `SHARED_ALLOWANCE_CACHE_REFRESH_SCHEDULER_ENABLED`, which gives the possibility to enable or disable the execution of the scheduler.
 - `SHARED_ALLOWANCE_CACHE_REFRESH_SCHEDULER_RECURRENCE`, which defines the recurrence period of the scheduler.
3. Restart the dispatcher instances in the Core Server system.

4.1.10.9.2 Manually Refreshing the Shared Allowances Cache

When needed you can trigger the refreshment of the shared allowance cache.

Related Information

[refresh_shared_allowance_cache](#)

4.1.11 Data Files Generation (Item Files)

[Keywords \[page 76\]](#)

[Preliminary Notes \[page 77\]](#)

[Description \[page 77\]](#)

[Configuring the CIF \[page 77\]](#)

[Customizing the Charging Output Integration Framework \(CIF\) \[page 80\]](#)

As a "Customizing" activity for expert implementers, you can fine configure the generations of output items from your SAP Convergent Charging system (Core Server).

[Configuring the RIF \[page 119\]](#)

[Modifying the Item/Data Files Processor \[page 120\]](#)

[Modifying the Versions of Data Files Generated by Raters \[page 123\]](#)

[Enabling the File Name Sequencing for Data Files Generated by Raters \[page 123\]](#)

[Enabling the Line Numbering for Data Files Generated by Raters \[page 124\]](#)

[Enabling the Archive Files Cleaning for Data Files Generated by Raters \[page 124\]](#)

[Enabling the Precreation Policy for Data Files Generated by the Rater and Bulkloader Instances \[page 125\]](#)

[Modifying the Version of Error Files Generated by Bulkloaders \[page 126\]](#)

[Enabling the File Name Sequencing for Error Files Generated by Bulkloaders \[page 126\]](#)

[Enabling the Recording of File Metadata \[page 127\]](#)

[Enabling the Event Date Shifting Mechanism for Data Files Generated by the Rater Instances \[page 127\]](#)

[Enabling the Billable Item Validation for Data Files Generated by Rater Instances \[page 128\]](#)

[Enabling the Billable Item Validation for Data Files Generated by Bulkloader Instances \(Cloud\) \[page 128\]](#)

[Executing a Charging Plan for Consumption Item Mapping \[page 129\]](#)

[Requesting Verbose Logs for Creation of Billable Items \(BITs\) - Scenario with SAP S/4HANA Cloud Public Edition \[page 131\]](#)

4.1.11.1 Keywords

Data files, error files, bulkloader

4.1.11.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [Data Files Generation](#) and [Data Files Bulk Loading Process](#) description available in the [SAP CC 2023 Application Help](#) documentation
- [Output Data Generation Process](#) and [Output Data Transfer Process \(Billable Items Processing\)](#) system parameter group description available in the [SAP CC 2023 System Parameter Reference](#) documentation

4.1.11.3 Description

During the execution of the different processes handled by SAP Convergent Charging, data files are generated for multiple purposes such as integration with third-party systems, error management, notifications, logging, tracing, and so on. You can use the following procedures to configure the generation of the data files and thus fit your specific needs:

- [Modifying the Item/Data Files Processor \[page 120\]](#)
- [Modifying the Versions of Data Files Generated by Raters \[page 123\]](#)
- [Enabling the File Name Sequencing for Data Files Generated by Raters \[page 123\]](#)
- [Enabling the Line Numbering for Data Files Generated by Raters \[page 124\]](#)
- [Enabling the Archive Files Cleaning for Data Files Generated by Raters \[page 124\]](#)
- [Enabling the Precreation Policy for Data Files Generated by the Rater and Bulkloader Instances \[page 125\]](#)
- [Modifying the Version of Error Files Generated by Bulkloaders \[page 126\]](#)
- [Enabling the File Name Sequencing for Error Files Generated by Bulkloaders \[page 126\]](#)
- [Enabling the Recording of File Metadata \[page 127\]](#)
- [Enabling the Event Date Shifting Mechanism for Data Files Generated by the Rater Instances \[page 127\]](#)
- [Enabling the Billable Item Validation for Data Files Generated by Rater Instances \[page 128\]](#)
- [Enabling the Billable Item Validation for Data Files Generated by Bulkloader Instances \(Cloud\) \[page 128\]](#)
- [Requesting Verbose Logs for Creation of Billable Items \(BITs\) - Scenario with SAP S/4HANA Cloud Public Edition \[page 131\]](#)

4.1.11.4 Configuring the CIF

Prerequisite

The feature is enabled. See [Enabling the Charging Output Integration Framework \(CIF\) Processor \[page 122\]](#).

Possible Settings

To fit specific needs such as data files path, multithreaded generation, rollover policy, file compression... you can configure the data file generation of all available channels (prepaid, postpaid, charged, and acquired) using the following parameters:

Setting (XML Element)	Description
rootPath	Writing location for generated files. For further information, refer to the description of the XXX_ROOT_PATH (BulkWriter) system parameter.
channelCount	Number of writing channels. For further information, refer to the description of the XXX_CHANNEL_COUNT (BulkWriter) system parameter.
timeBasedFileRolloverPolicy	Rolling policy for generated files. For further information, refer to the description of the XXX_TIME_BASED_FILE_ROLLOVER_POLICY (BulkWriter) and XXX_MAX_SIZE_BASED_FILE_ROLLOVER_POLICY (BulkWriter) system parameters.
maxSizeBasedFileRolloverPolicy	
deflate	Compression policy, that respects the RFC 1951 specifications.
deflateOutputFormat	For further information, refer to the description of the XXX_DEFLATE (BulkWriter) and XXX_DEFLATE_OUTPUT_FORMAT (BulkWriter) system parameters.
storeFileInformation	Flag used to store information about the generated files into the CHARGED_ITEM_FILES table of the Core Database
<div style="border: 1px solid #ccc; background-color: #f9f9f9; padding: 10px;"> <p>Note</p> <p>In case of an installation scenario integrated with SAP S/4HANA Cloud Public Edition, this parameter is automatically set to false. SAP SE recommends that you do not modify this value.</p> </div>	
fileVersion	Version of the generated data files. To modify this parameter, refer to the Modifying the Versions of Data Files Generated by Raters [page 123] dedicated procedure available afterwards
lineNumbering	Flag used to write line numbers in the generated data files. To modify this parameter, refer to the Enabling the Line Numbering for Data Files Generated by Raters [page 124] dedicated procedure available afterwards
cleanArchivedFile	Flag used to enable or disable the removal of uncommitted items from the generated data files. To modify this parameter, refer to the Enabling the Archive Files Cleaning for Data Files Generated by Raters [page 124] dedicated procedure available afterwards.
fileSequenceId	Identifier used for sequencing the names of the generated data files. To modify this parameter, refer to the Enabling the File Name Sequencing for Error Files Generated by Bulkloaders [page 126] dedicated procedure available afterwards.
preCreateFile	Flag used to enable or disable the pre-creation of data files. To modify this parameter, refer to the Enabling the Precreation Policy for Data Files Generated by the Rater and Bulkloader Instances [page 125] dedicated procedure available afterwards.

Setting (XML Element)	Description
eventDateShifter	To modify this mechanism, refer to the Enabling the Event Date Shifting Mechanism for Data Files Generated by the Rater Instances [page 127] dedicated procedure available afterwards.
billableItemValidator	To modify this mechanism, refer to the Enabling the Billable Item Validation for Data Files Generated by Rater Instances [page 128] dedicated procedure available afterwards.

→ Tip

Template files named `cif.rater.config.xml.sk` and `cif.bulkloader.config.xml.sk` are available in the `exe/uc/<OS>/CC_CORE_SERVER/config/<scenario>` subfolder of the [SAP Central Repository](#), within subfolders whose name depends on the implementation and installation scenario:

- `sapci` in case of integrated scenario with SAP Convergent Invoicing in its system (SAP S/4HANA or SAP ERP)
- `s4hc` in case of integrated scenario with SAP S/4HANA Cloud Public Edition
- `standalone` otherwise

Procedure

- To configure the CIF³¹ parameters for the rater instances, complete the following procedure:
 1. Using the [Setup Tool user interface](#) execute the `cif export` command to export the CIF configuration of the rater instances in the running SAP CC Core Server system.
 2. Edit the retrieved `cif.rater.config.xml` configuration file.
 3. Modify the relevant parameters.
 4. Save your modifications.
 5. Using the [Setup Tool user interface](#) execute the `cif import` command to import the modified CIF configuration for the rater instances of the Core Server system.
 6. Restart the rater instances in the Core Server system.
- To configure the CIF parameters for the bulkloader instances, complete the following procedure:
 1. Using the [Setup Tool user interface](#) execute the `cif export` command to export the CIF configuration of the bulkloader instances in the running SAP CC Core Server system.
 2. Edit the retrieved `cif.bulkloader.config.xml` configuration file.
 3. Modify the relevant parameters.
 4. Save your modifications.
 5. Using the [Setup Tool user interface](#) execute the `cif import` command to import the modified CIF configuration for the bulkloader instances of the Core Server system.
 6. Restart the bulkloader instances in the Core Server system.

³¹ Charging output Integration Framework

4.1.11.5 Customizing the Charging Output Integration Framework (CIF)

As a "Customizing" activity for expert implementers, you can fine configure the generations of output items from your SAP Convergent Charging system (Core Server).

→ Remember

This section is dedicated to [expert implementers](#) who are members of the implementation project team. In this *Customizing* activity, you design, configure, and tune the Charging Output Integration Framework (CIF) of SAP Convergent Charging (SAP CC).

The *CIF (Charging output Integration Framework)* is dedicated to the management of all output items produced by SAP Convergent Charging:

- Charged transactions (used by the old SAP CC *Transaction Integration Framework (TIF)*)
- Charged items
- Billable items (a model owned by SAP Convergent Invoicing)
- Chargeable items
- Consumption items (a model owned by SAP Convergent Invoicing)

Several processings can be configured to manage not only the transactions produced by the rating engine, but also the events involved in the generation of the usage transactions (for example allowing the "implementer" to configure the storage of the chargeable items' data in a data storage provided by SAP Convergent Invoicing).

Those processings are implemented by some processors that are configured and combined into XML configuration files.

As output items are managed by rater and instances, 2 CIF³² configurations have to be defined: one for the rater instances and another one for the bulkloader instances.

The configurations are described in two configuration files and then stored in the Core Database thanks to the [Setup Tool user interface](#) by using the `cif import` command. Enter the two commands below:

```
setup cif import rater <raterConfigFile.xml>
setup cif import bulkloader <bulkloaderConfigFile.xml>
```

→ Tip

The configurations can be exported from the Core Database system by using the `cif export` command.

⚠ Caution

Importing configuration files changes the parameter values stored in the back-end database system (SAP CC Core Database). There is no `undo` command. SAP SE recommends that you first export your configuration files to a backup file that can be used to restore the SAP CC system.

The change of these configurations requires restarting the rater and bulkloader instances to consider the new behaviors.

³² Charging output Integration Framework

The two configuration files can then be considered as logic that handle all the SAP CC output items (including the items in error).

Moreover, the system administrator can choose the operations to be applied on the generated output items. Indeed, according to their specifications, the processors can propose different operations to read, write, validate, store, route, modify, and transform the SAP CC output items.

[Output Item Pipelines \[page 81\]](#)

[CIF Processors \[page 82\]](#)

[File Channels and Destinations \[page 86\]](#)

[Transition Between CIF Processors \[page 87\]](#)

[SAP CC Items and CIF Routing \[page 89\]](#)

[Processors \[page 89\]](#)

4.1.11.5.1 Output Item Pipelines

Regarding the processings of the output items, the following pipelines are supported, and some of them can be mixed according to the type and the value of the items.

Performed by Rater Instances	Performed by Bulkloader Instances
1 - (rating context) → Charged Transaction => Files (old SAP CC TIF ³³ implementation. No more used but still available.)	
2 - (rating context) → Charged Item => Files	
3 - (rating context) → Charged Item => Files	-> Billable Item => SAP Convergent Invoicing or SAP S/4HANA Cloud Public Edition
4 - Chargeable Item (+ additional fields) => Files	
5 - Chargeable Item (+ additional fields) => Files	-> Consumption Item => SAP Convergent Invoicing

³³ Transaction Integration Framework

Legend:

- →: A transition between processors
- =>: A transition between processors that can use the CIF routing (chargeable items and charged items) or can benefit from the Customer Management Area (CMA) function.

CMA can be used to route billable items and consumption items towards different landscapes connectable via SAP JCo³⁴ or via WS³⁵ to SAP CC according to a destination set for each customer account.

❖ Example

If a subscriber account A is initialized with a CMA's name X and a subscriber account B with a CMA name Y, then all the items from A will be sent to area X and all the items from B to the area Y if CMA is supported by the CIF configuration.

- ->: A transition between processor that additionally requires an item mapping definition to be processed. This mapping definition notion does not take part of the CIF framework but is implemented by the External item Integration Framework (EIF).

ⓘ Note

Each transformation (i.e. creating a billable item from a charged item or creating a consumption item from a chargeable item) requires a mapping definition and one or several processors to compute it (see the -> arrows in pipelines description above).

A mapping definition is a table of correspondence between the property names of an item used as input by a processor, and the property names of another item that will be generated by the processor.

Those mapping definitions are managed in SAP CC by using the Core Tool or the Cockpit user interfaces. However, some predefined mapping definitions are imported in SAP CC (and should not be modified in most cases) via the [Setup Tool](#) user interface.

ⓘ Note

- **Pipeline 1:**

This pipeline is no longer used in SAP CC deployments (old SAP CC TIF) and the following example will be the unique example describing processors for handling charged transactions. However, only this pipeline allows the user to implement its own transaction clearing processor (thanks to the wrapper processor). **But this can generate bad performance and transactional issues.**

→ Recommendation

Please consult your SAP CC Support Team before starting such a development.

4.1.11.5.2 CIF Processors

To implement the [previous pipelines \[page 81\]](#), two groups of processors have to be considered:

³⁴ Java Connector

³⁵ Web Services

- One group is dedicated to transactions corresponding to the priced items from the SAP CC charging process (charged transactions, charged items, and billable items).
- The other group is dedicated to the usage events that have been used as usage input data to calculate prices (chargeable item and consumption item).

Among those two groups, some specialized subgroups of processors are dedicated to each type of items.

Furthermore, the CIF³⁶ transaction processor dedicated to the charged items (see [chargedItemTransactionProcessor \[page 93\]](#)) implements two permanent pipelines to process the postpaid and prepaid charged items separately.

In a similar way, two permanent pipelines are also implemented by the chargeable item transaction processor (see `chargeableItemTransactionProcessor`):

- One for the "charged" chargeable items
- Another one for the "acquired" chargeable items

Here is an overview about the processor structure implemented by the CIF:

- Transaction processor groups: `dispatchTransaction`, `transactionProcessorSequence(*)`, `noTransactionProcessor`

Note

(*) However, there is an exception with `transactionProcessorSequence` which was initially designed only for transactions and which became the CIF root element when the event processors have been introduced in SAP CC (for compatibility reasons with previous configuration files. See the [Processors \[page 89\]](#) section).

- Charged transaction group (deprecated old SAP CC Transaction Integration Framework framework): `transactionProcessorWrapper`
- Charged item group: `chargedItemTransactionProcessor`
With:
 - Postpaid Charged Item branch
 - Prepaid Charged Item branch
- Billable item groups: `billableItemValidator`, `billableItemLoader`, `wsBillableItemLoader`
- Event processor groups:
 - Chargeable item group: `chargeableItemTransactionProcessor`
With:
 - Charged Chargeable Item branch: the chargeable items on which the charging process has been applied
 - Acquired Chargeable Item branch: the chargeable items on which only the acquisition process has been performed
 - Consumption item groups: `consumptionItemValidator`, `consumptionItemLoader`

Those groups are independent and the processors belonging to transaction and event groups cannot be combined.

Some « generic » processors can be used by transaction and event pipelines.

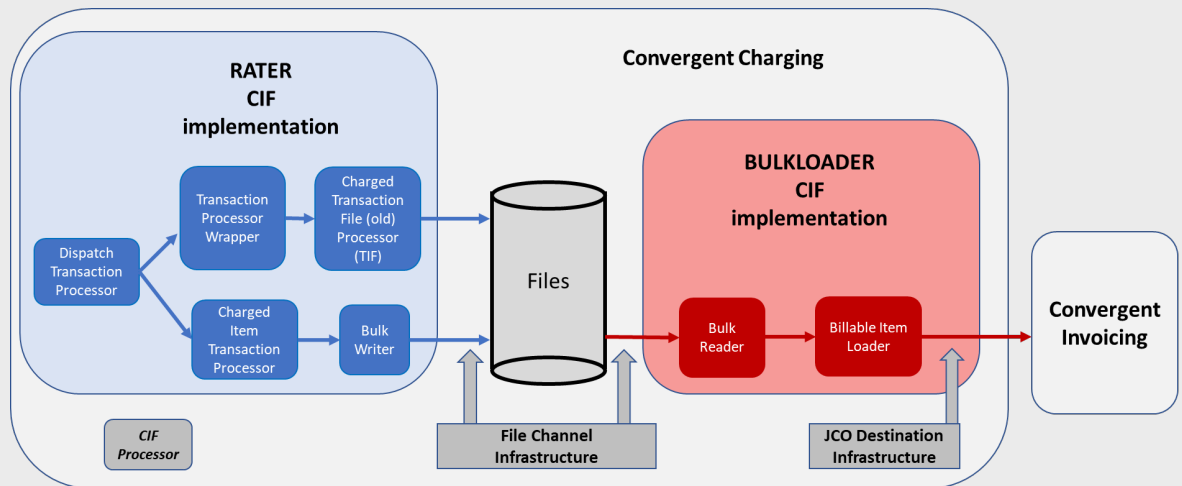
³⁶ Charging output Integration Framework

Generic Processors group: itemSwitch, eventDateShifter, sequence, bulkWriter, bulkReader, customerManagementAreaRouting, errorHandling, multiJCODestination, multiDestination.

Naturally, based on the role of each processor, some of them will be used by the rater instances and others by the bulkloader instances.

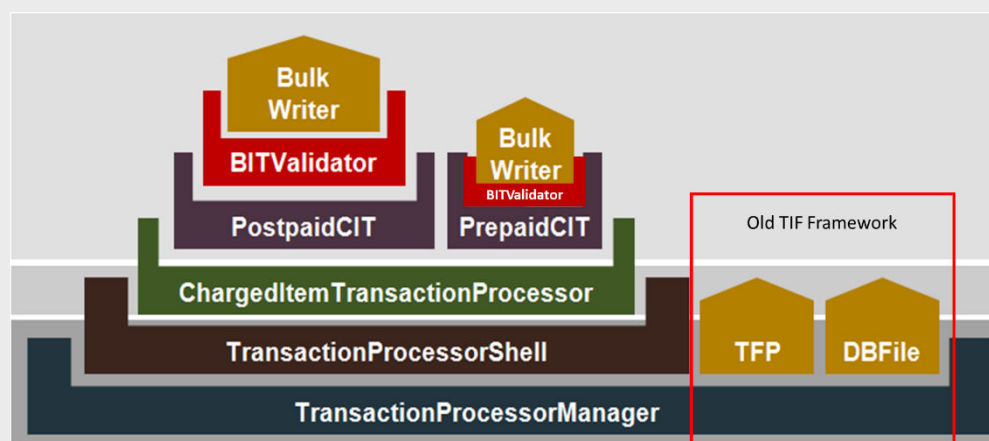
❁ Example

The following schema details how the pipelines 1 and 3 are implemented with CIF processors:



Globally, considering an example of processes performed by a rater, the following sequence for managing the transactions occurs:

- Open postpaid charged item and prepaid charged item channels
- Check that each charged item can be mapped onto a billable item
- Write postpaid charged items into the channel dedicated to postpaid (in data files and error files for invalid items)
- Write prepaid charged items into the channel dedicated to prepaid (in data files and error files for invalid items)



Sample of a CIF configuration file used by raters:

```
<chargedItemTransactionProcessor>
  <postpaidChargedItem>
    <billableItemValidator>
      <bulkWriter adminParameterPrefixName="POSTPAID_CIT_WRITER"

```

```

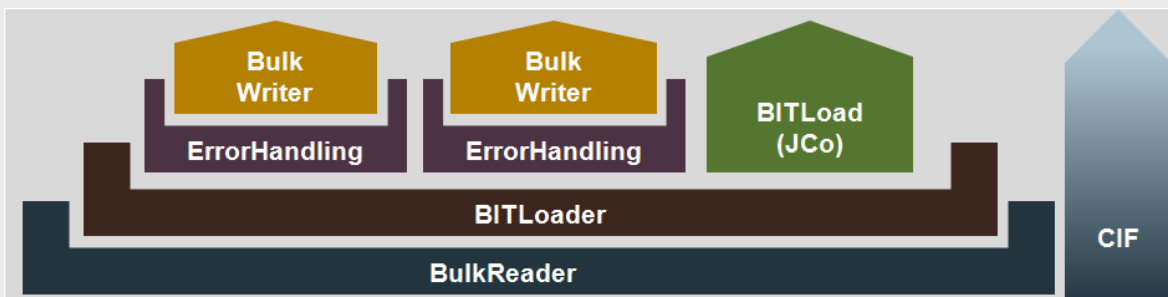
channelCount="2"      rootPath="CC_POSTPAID\Instance#@INSTANCE_ID@"
                      timeBasedFileRolloverPolicy="HOURLY"
                      maxSizeBasedFileRolloverPolicy="1M" deflate="true"
                      autoCommit="false" />
    </billableItemValidator>
</postpaidChargedItem>
<prepaidChargedItem>
  <billableItemValidator>
    <bulkWriter adminParameterPrefixName="PREPAID_CIT_WRITER"
                rootPath="CC_PREPAID\Instance#@INSTANCE_ID@"
channelCount="2"      timeBasedFileRolloverPolicy="HOURLY"
                      maxSizeBasedFileRolloverPolicy="1M" deflate="true"
                      autoCommit="false" />
    </billableItemValidator>
  </prepaidChargedItem>
</chargedItemTransactionProcessor>

```

- `postpaidChargedItem` handles postpaid charged items
- `prepaidChargedItem` handles prepaid and refill charged items
- `billableItemValidator` checks that a charged item can be mapped onto a billable item
- `bulkWriter` writes charged items into files

❁ Example

In a similar way, considering an example of processes performed by a bulkloader, the following sequence of actions occurs:



```

<bulkReader adminParameterPrefixName="POSTPAID_CIT_READER"
            rootPath="CC_POSTPAID\Instance#@INSTANCE_ID@"
            channelCount="2"
            bufferSize="1000"
            removeFile="true">
  <billableItemLoader adminParameterPrefixName="BIT_LOADER">
    <errorHandling errorType="invalidBillableItem">
      <bulkWriter
adminParameterPrefixName="BIT_LOADER_ERR_INVALID_BIT_WRITER"
                rootPath="CC_CI_INVALID\Instance#@INSTANCE_ID@"
                channelCount="2" timeBasedFileRolloverPolicy="HOURLY"
                maxSizeBasedFileRolloverPolicy="1M"
                deflate="false" autoCommit="true" />
    </errorHandling>
    <errorHandling errorType="communicationException">
      <bulkWriter
adminParameterPrefixName="BIT_LOADER_ERR_COM_EXCEPTION_WRITER"
                rootPath="CC_CI_COM_EXCEPTION\Instance#@INSTANCE_ID@"
                channelCount="2" timeBasedFileRolloverPolicy="HOURLY"
                maxSizeBasedFileRolloverPolicy="1M"
                deflate="false" autoCommit="true" />
    </errorHandling>
  </billableItemLoader>

```

```
</bulkReader>
```

- `bulkReader` loads postpaid charged items from files
- `billableItemLoader` maps charged items onto billable items, send them to SAP CI via JCo³⁷
- `errorHandling`
- `bulkWriter`

4.1.11.5.3 File Channels and Destinations

The SAP CC implementer who configures does not need to care about how the data files or connections to SAP Convergent Invoicing are managed. Indeed, SAP Convergent Charging implements an infrastructure that provides the notions of **channels** and **destinations**. Only those notions are handled by the processors. The underlying management of files (including file naming, creation, closing, deletion, locking, errors), the JCo³⁸ connections to SAP Convergent Invoicing, and connections to WS³⁹ provided by SAP S/4HANA Cloud Public Edition are transparent for the user.

File Channel

A **File Channel** references a set of files used to manage the items (data files, error files, and control files). SAP CC implements some working directories in which the data files will be written by the rater instances and will be read by the bulkloader instances (however the bulkloader instances can also write data files too).

A "root" directory can be shared by all the rater and bulkloader instances but it is mandatory to use separated directories for each pair (rater, bulkloader) instances because only one instance at a time can read or write in a given directory.

For example, the `rootPath` attribute in the previous example (see `bulkWriter`), uses the variable `@INSTANCE_ID@` to create a working directory for each instance. Then, based on a `channelCount` attribute, the user can decide the number of data files opened simultaneously per processor instance, into which the processor is able to write/read items in parallel.

The two processors that use the file channels are mainly the [bulkWriter \[page 98\]](#) and [bulkReader \[page 101\]](#) processors.

Destinations

A **Destination** references a connector with SAP Convergent Charging (JCo) or a connector with SAP S/4HANA Cloud Public Edition (WS).

Destinations are used by the bulkloader instances in order to push the items into SAP Convergent Invoicing.

³⁷ Java Connector

³⁸ Java Connector

³⁹ Web Services

Indeed, SAP Convergent Invoicing provides some connections based on the SAP JCo stack and SAP S/4HANA Cloud Public Edition provides some Web Services. That the reason why the CIF⁴⁰ requires to qualify the destination (JCo or WS) because SAP CC can be connected to SAP Convergent Charging and to SAP S/4HANA Cloud Public Edition billing service.

- The destination connected to SAP Convergent Invoicing (on premise) is called a JCo Destination. To create a JCo Destination in an SAP CC system, you can run the following [Setup Tool](#) command:

```
setup jcodestination import -login=<login> -passwd=<pwd> <sapApplication  
("CRM" || "ERP")> <destination name (unique)> <JCo destination from file>
```

Refer to the [JCo Destinations \[page 143\]](#) section of this documentation for more information.

- The destination connected to Convergent Invoicing (in S/4HANA Cloud Public Edition) landscape is called a WS Destination. To create a WS Destination in an SAP CC system, you can run the following [Setup Tool](#) command:

```
setup wsdestination import -login=<login> -passwd=<pwd> <destination name  
(unique)> <WS destination from file>
```

Refer to the [WS Destinations \[page 234\]](#) section of this documentation for more information.

A bulkloader instance requires at least a destination. However, the bulkloader instances can deal with multiple destinations by using the Customer Management Area (CMA) feature.

Only the destinations created at setup time are available and usable by the bulkloader instances.

⚠ Restriction

It is not allowed in a CIF configuration, to simultaneously handle WS and JCo destinations. Indeed, these two destinations are used in two different integration scenarios.

4.1.11.5.4 Transition Between CIF Processors

Two types of transition can occur between CIF⁴¹ processors: cascaded and sequenced.

- **Cascaded:** The result of a processor (parent) is transmitted to the children processors.
- **Sequenced:** Each processor listed in the sequence is executed independently from the previous one. However, each can use its parent output data.

🔗 Example

cif.rater.config.xml

In this sample, cascaded processors are highlighted *in italic*, sequenced processors are **in bold**.

```
<transactionProcessorSequence>  
  <chargedItemTransactionProcessor>  
    <postpaidChargedItem>  
    <eventDateShifter>  
    <sequence>  
      <billableItemValidator />
```

⁴⁰ Charging output Integration Framework

⁴¹ Charging output Integration Framework

```

<customerManagementAreaRouting>
  <bulkWriter adminParameterPrefixName="POSTPAID_CIT_WRITER"
rootPath="SAPCC_CIT/POSTPAID/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@"
channelCount="4"
      timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="true" deflateOutputFormat="GZIP"
storeFileInformation="true"
      fileVersion="2" lineNumbering="false"
fileSequenceId="CHARGED_ITEM" cleanArchivedFile="false"
preCreateFile="ROLLOVER" />
  </customerManagementAreaRouting>
</sequence>
</eventDateShifter>
</postpaidChargedItem>
<prepaidChargedItem>
<eventDateShifter>
  <sequence>
    <billableItemValidator />
    <customerManagementAreaRouting>
      <bulkWriter adminParameterPrefixName="PREPAID_CIT_WRITER"
rootPath="SAPCC_CIT/PREPAID/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@"
channelCount="4"
        timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="true" deflateOutputFormat="GZIP"
storeFileInformation="false"
        fileVersion="2" lineNumbering="false"
fileSequenceId="CHARGED_ITEM" cleanArchivedFile="false"
preCreateFile="ROLLOVER" />
      </customerManagementAreaRouting>
    </sequence>
  </eventDateShifter>
</prepaidChargedItem>
</chargedItemTransactionProcessor>
</transactionProcessorSequence>

```

Each CIF processor is configured by setting values in their XML attributes.

❁ Example

```

<bulkWriter adminParameterPrefixName="PREPAID_CIT_WRITER" rootPath="SAPCC_CIT/
PREPAID/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@" channelCount="4"
      timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="true" deflateOutputFormat="GZIP"
storeFileInformation="false"
      fileVersion="2" lineNumbering="false"
fileSequenceId="CHARGED_ITEM" cleanArchivedFile="false"
preCreateFile="ROLLOVER" />

```

It is possible to use in a processor some **variables**, depending on the instance by referencing them with @VARIABLE_NAME@.

The 3 variables that can be referenced are:

- @INSTANCE_ID@
- @DESTINATION_NAME@
- @JCO_DESTINATION_NAME@

See the examples in this documentation.

4.1.11.5.5 SAP CC Items and CIF Routing

Based on item names (as defined by their related item class), the user can select the items based on their origin and values of specified fields in order to route them on specific channels.

A processor must be defined for each route and the user must ensure that a pair (`bulkWriter`, `bulkReader`) must be defined for each channel.

The routing is handled by the `itemSwitch` processor. Its XML element defines a `switch/case/default` structure, with, for each case, an `itemCondition` based on the item name and a specific field value belonging to the item (see `itemSwitch` in [Processors \[page 89\]](#) section).

For each case, the user has to define a processor that will store the selected item in the related file channel.

4.1.11.5.6 Processors

⚠ Caution

This section is dedicated to [expert implementers](#) who are members of the implementation project team. In this [Customizing](#) activity, you design, configure, and tune the Charging Output Integration Framework (CIF) of SAP Convergent Charging (SAP CC).

[dispatchTransactionProcessor \(old TIF framework\) \[page 90\]](#)

[transactionProcessorWrapper \(old TIF framework\) \[page 91\]](#)

[transactionProcessorSequence \[page 92\]](#)

[nopTransactionProcessor \[page 92\]](#)

[chargedItemTransactionProcessor \[page 93\]](#)

[chargeableItemTransactionProcessor \[page 94\]](#)

[itemSwitch \[page 95\]](#)

[bulkWriter \[page 98\]](#)

[bulkReader \[page 101\]](#)

[eventDateShifter \[page 105\]](#)

[errorHandling \[page 106\]](#)

[billableItemValidator and consumptionItemValidator \[page 108\]](#)

[customerManagementAreaRouting \[page 109\]](#)

[multiJCoDestination and multiDestination \[page 111\]](#)

[billableItemLoader \[page 114\]](#)

[wsBillableItemLoader \[page 116\]](#)

[consumptionItemLoader \[page 117\]](#)

4.1.11.5.6.1 dispatchTransactionProcessor (old TIF framework)

dispatchTransactionProcessor **(old TIF framework)**

Description

Handles the ChargedTransaction defined by the old transaction format (TIF⁴²) and the ChargedItem (CIF) simultaneously.

CIF Usage

Rater instances only

⚠ Caution

Reserved for old transaction format (TIF) - **DEPRECATED**

Attributes

None

Parent XML Element

None (root)

Example

```
<dispatchTransactionProcessor>
  <transactionProcessorWrapper class="a java class implementing the TIF API" />
  <transactionProcessorSequence>
    <chargedItemTransactionProcessor>
      ...
    </chargedItemTransactionProcessor>
    <chargeableItemTransactionProcessor>
      ...
    </chargeableItemTransactionProcessor>
  </transactionProcessorSequence>
</dispatchTransactionProcessor>
```

⁴² Transaction Integration Framework

4.1.11.5.6.2 transactionProcessorWrapper (old TIF framework)

transactionProcessorWrapper (old TIF framework)

Description

Runs a specific transaction processor that handles the old TIF transaction format and implements the TIF transaction processor interface.

CIF Usage

Rater instances only

⚠ Caution

Reserved for old transaction format (TIF) - **DEPRECATED**

The user can implement its own transaction processor by developing its own Java code. However, SAP SE informs users that the processor code will be executed into the Business and DB transaction created by the charging process. That means that the customized processor code can impact performance and the DB ACID principles implemented by SAP CC (deprecated).

Attributes

class: the class name of the TIF transaction processor

Parent XML Element

[dispatchTransactionProcessor](#) [page 90]

Example

```
<dispatchTransactionProcessor>
  <transactionProcessorWrapper class="a java class implementing the TIF API" />
  <transactionProcessorSequence>
    <chargedItemTransactionProcessor>
      ...
    </chargedItemTransactionProcessor>
    <chargeableItemTransactionProcessor>
      ...
    </chargeableItemTransactionProcessor>
  </transactionProcessorSequence>
</dispatchTransactionProcessor>
```

4.1.11.5.6.3 transactionProcessorSequence

→ Remember

This section is dedicated to [expert implementers](#) who are members of the implementation project team. In this *Customizing* activity, you design, configure, and tune the Charging Output Integration Framework (CIF) of SAP Convergent Charging (SAP CC).

transactionProcessorSequence

Description

Used as root XML element (when `dispatchTransactionProcessor` element is not used) to sequence the execution of transaction processors, whatever the item types to process. The maximum number of processors to sequence is limited to 100.

CIF Usage

Rater instances

XML Attributes

None

Parent XML Elements

None (root) or [dispatchTransactionProcessor](#) [page 90]

Example

```
<transactionProcessorSequence
  <chargedItemTransactionProcessor>
    ...
  </chargedItemTransactionProcessor>
  <chargeableItemTransactionProcessor>
    ...
  </chargeableItemTransactionProcessor>
</transactionProcessorSequence
```

4.1.11.5.6.4 nopTransactionProcessor

→ Remember

This section is dedicated to [expert implementers](#) who are members of the implementation project team. In this *Customizing* activity, you design, configure, and tune the Charging Output Integration Framework (CIF) of SAP Convergent Charging (SAP CC).

`nopTransactionProcessor`

Description

Empty processor.

CIF Usage

Rater instances

XML Attributes

None

Parent XML Element

None

4.1.11.5.6.5 chargedItemTransactionProcessor

→ Remember

This section is dedicated to [expert implementers](#) who are members of the implementation project team. In this [Customizing](#) activity, you design, configure, and tune the Charging Output Integration Framework (CIF) of SAP Convergent Charging (SAP CC).

`chargedItemTransactionProcessor`

Description

Performs processings on "charged items".

Implements 2 default branches to route:

- Postpaid charged items: you specify the `postpaidChargedItem` XML element.
- Prepaid charged items: you specify the `prepaidChargedItem` XML element.

ⓘ Note

The prepaid route is optional because SAP Convergent Charging can be configured to not produce prepaid transactions.

CIF Usage

Rater instances

XML Attributes

None

Parent XML Element

[transactionProcessorSequence](#) [page 92]

Example

```
<transactionProcessorSequence>
  <chargedItemTransactionProcessor>
    <postpaidChargedItem>
      ...
    </postpaidChargedItem>
    <prepaidChargedItem>
      ...
    </prepaidChargedItem>
  </chargedItemTransactionProcessor>
</transactionProcessorSequence>
```

4.1.11.5.6 chargeableItemTransactionProcessor

→ Remember

This section is dedicated to [expert implementers](#) who are members of the implementation project team. In this [Customizing](#) activity, you design, configure, and tune the Charging Output Integration Framework (CIF) of SAP Convergent Charging (SAP CC).

chargeableItemTransactionProcessor

Description

Performs processings on "chargeable items."

Implements 2 branches to route:

- Charged chargeable items: the chargeable items that have been processed by the charging process. You specify the `chargedChargeableItem` XML element.
- Acquired chargeable items: the chargeable items that have been processed by the acquisition process. You specify the `acquiredChargeableItem` XML element.

A processor is mandatory for both routes.

CIF Usage

Rater instances

XML Attributes

None

Parent XML Element

[transactionProcessorSequence](#) [page 92]

Example

```
<transactionProcessorSequence>
  <chargeableItemTransactionProcessor>
    <chargedChargeableItem>
      ...
    </chargedChargeableItem>
    <acquiredChargeableItem>
      ...
    </acquiredChargeableItem>
  </chargeableItemTransactionProcessor>
</transactionProcessorSequence>
```

4.1.11.5.6.7 itemSwitch

→ Remember

This section is dedicated to [expert implementers](#) who are members of the implementation project team. In this *Customizing* activity, you design, configure, and tune the Charging Output Integration Framework (CIF) of SAP Convergent Charging (SAP CC).

itemSwitch

Description

Routes items towards specific channels based on their name and values of specified fields. For each case, the item is sent to a specific processor and, if no case is found, a default one is applied. This switcher is limited to 10 “switch/case” conditions.

The selection of the items is implemented thanks to the `itemFieldCondition` that parses all the items received by the parent processor. The below attributes allow the user to select the items.

CIF Usage

Rater instances

Attributes

- `ofClass`: the name of the item (defined by the item class) which will be parsed by the `ItemSwitch` processor. This attribute is set with the ID of the chargeable item class or with the ID of the charged item class corresponding to the items to filter.
- `named` (optional): the name of the field that must be checked to validate the case or not. Please note that the `ItemSwitch` processor does not check that this field name is defined by the corresponding class (`ChargeableItemClass` or the `ChargedItemClass`). However, if this attribute stays empty or does not exist, no condition on field will be applied. Then all items matching the `ofClass` attribute will be accepted by the condition.
- `equals` (optional): the value that must be compared to the field value. This is a string comparison so if the item field type is a number or a date, the `toString()` method is applied before the comparison. Empty value (“”) is accepted as a correct value for checking that the field value is empty or null.

Note

The field conditions are evaluated according to their declaration order. As soon as a condition is verified, the next ones are dropped.

At last, the default case is applied if no condition is verified.

Parent XML Elements

postpaidChargedItem, prepaidChargedItem, chargedChargeableItem, acquiredChargeableItem

Example

cif.rater.config.xml

Charged items *in italic>*, chargeable items **in bold>**.

```
<?xml version="1.0" encoding="utf-8"?>
<transactionProcessorSequence>
  <chargedItemTransactionProcessor>
    <postpaidChargedItem>
<itemSwitch>
<!-- ===== -->
<!-- VOI : BITTEXT50 = prepaid -->
<!-- ===== -->
<case>
  <itemFieldCondition ofClass="VOI" named="BITTEXT50" equals="prepaid" />
<eventDateShifter>
<sequence>
<billableItemValidator />
<bulkWriter adminParameterPrefixName="POSTPAID_CIT_WRITER_01"
rootPath="SAPCC_CIT/POSTPAID/Instance#@INSTANCE_ID@/voi_bittext50_prepaid"
channelCount="2" timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="true" deflateOutputFormat="GZIP"
autoCommit="false" fileVersion="2" fileSequenceId="CHARGED_ITEM" />
</sequence>
</eventDateShifter>
</case>
<!-- ===== -->
<!-- VOI : BITTEXT50 = <empty string> -->
<!-- ===== -->
<case>
  <itemFieldCondition ofClass="VOI" named="BITTEXT50" equals="" />
<eventDateShifter>
<sequence>
<billableItemValidator />
<bulkWriter adminParameterPrefixName="POSTPAID_CIT_WRITER_02"
rootPath="SAPCC_CIT/POSTPAID/Instance#@INSTANCE_ID@/voi_bittext50_empty_string"
channelCount="2" timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="true" deflateOutputFormat="GZIP"
autoCommit="false" fileVersion="2" fileSequenceId="CHARGED_ITEM" />
</sequence>
</eventDateShifter>
</case>
<!-- ===== -->
<!-- DAT : DAT = prepaid -->
<!-- ===== -->
<case>
  <itemFieldCondition ofClass="DAT" named="BITTEXT50" equals="prepaid" />
<eventDateShifter>
<sequence>
<billableItemValidator />
<bulkWriter adminParameterPrefixName="POSTPAID_CIT_WRITER_03"
rootPath="SAPCC_CIT/POSTPAID/Instance#@INSTANCE_ID@/dat_bittext50_prepaid"
channelCount="2" timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="true" deflateOutputFormat="GZIP"
```



```

autoCommit="false" fileVersion="2" fileSequenceId="CHARGED_ITEM" />
</sequence>
</eventDateShifter>
</case>
<!-- ===== -->
<!-- DEFAULT ROUTE -->
<!-- ===== -->
<default>
<eventDateShifter>
<sequence>
<billableItemValidator />
<bulkWriter adminParameterPrefixName="POSTPAID_CIT_WRITER" rootPath="SAPCC_CIT/
POSTPAID/Instance#@INSTANCE_ID@"
channelCount="2" timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="true" deflateOutputFormat="GZIP"
autoCommit="false" fileVersion="2" fileSequenceId="CHARGED_ITEM" />
</sequence>
</eventDateShifter>
</default>
</itemSwitch>
</postpaidChargedItem>
<prepaidChargedItem>
<eventDateShifter>
<sequence>
<billableItemValidator />
<bulkWriter adminParameterPrefixName="PREPAID_CIT_WRITER" rootPath="SAPCC_CIT/
PREPAID/Instance#@INSTANCE_ID@" channelCount="2"
timeBasedFileRolloverPolicy="HOURLY" maxSizeBasedFileRolloverPolicy="1M"
deflate="true" deflateOutputFormat="GZIP" autoCommit="false"
fileVersion="2" fileSequenceId="CHARGED_ITEM" />
</sequence>
</eventDateShifter>
</prepaidChargedItem>
</chargedItemTransactionProcessor>
<!--
===== -->
<!-- Chargeable item / consumption items section -->
<!--
===== -->
<chargeableItemTransactionProcessor>
<chargedChargeableItem>
<itemSwitch>
<!-- ===== -->
<!-- VOI_TICKET : text = prepaid -->
<!-- Same destination than Charged Item when BITTEXT50 = prepaid -->
<!-- ===== -->
<case>
  <itemFieldCondition ofClass="VOI_TICKET" named="user.text"
equals="prepaid" />
  <sequence>
  <consumptionItemValidator />
  <bulkWriter adminParameterPrefixName="CHARGED_CI_WRITER_01" rootPath="SAPCC_CI/
CHARGED/Instance#@INSTANCE_ID@/voi_ticket_prepaid"
channelCount="2" timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="true" deflateOutputFormat="GZIP"
autoCommit="false" fileVersion="2" fileSequenceId="CHARGEABLE_ITEM" />
  </sequence>
</case>
<!-- ===== -->
<!-- VOI_TICKET : text = <empty string> -->
<!-- Same destination than Charged Item when VOI : BITTEXT50 = <empty string> -->
<!-- ===== -->
<case>
  <itemFieldCondition ofClass="VOI_TICKET" named="user.text" equals="" />
  <sequence>
  <consumptionItemValidator />
  <bulkWriter adminParameterPrefixName="CHARGED_CI_WRITER_02" rootPath="SAPCC_CI/
CHARGED/Instance#@INSTANCE_ID@/voi_ticket_empty_string"

```

```

channelCount="2" timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="true" deflateOutputFormat="GZIP"
autoCommit="false" fileVersion="2" fileSequenceId="CHARGEABLE_ITEM" />
</sequence>
</case>
<!-- ===== -->
<!-- VOI_TICKET : UNKNOWN_ROUTING_FIELD = destination -->
<!-- Specific destination (Billable Items and Charged Items are separated in
different system -->
<!-- ===== -->
<case>
<itemFieldCondition ofClass="VOI_TICKET" named="user.UNKNOWN_ROUTING_FIELD"
equals="ERP300" />
<sequence>
<consumptionItemValidator />
<bulkWriter adminParameterPrefixName="CHARGED_CI_WRITER_04" rootPath="SAPCC_CI/
CHARGED/Instance#@INSTANCE_ID@/voi_ticket_unknown_field_name"
channelCount="2" timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="true" deflateOutputFormat="GZIP"
autoCommit="false" fileVersion="2" fileSequenceId="CHARGEABLE_ITEM" />
</sequence>
</case>
<!-- ===== -->
<!-- DEFAULT DIRECTORY -->
<!-- ===== -->
<default>
<sequence>
<consumptionItemValidator />
<bulkWriter adminParameterPrefixName="CHARGED_CI_WRITER" rootPath="SAPCC_CI/
CHARGED/Instance#@INSTANCE_ID@" channelCount="2"
timeBasedFileRolloverPolicy="HOURLY" maxSizeBasedFileRolloverPolicy="1M"
deflate="true" deflateOutputFormat="GZIP" autoCommit="false"
fileVersion="2" fileSequenceId="CHARGEABLE_ITEM" />
</sequence>
</default>
</itemSwitch>
</chargedChargeableItem>
<acquiredChargeableItem>
<sequence>
<consumptionItemValidator />
<bulkWriter adminParameterPrefixName="ACQUIRED_CI_WRITER" rootPath="SAPCC_CI/
ACQUIRED/Instance#@INSTANCE_ID@" channelCount="2"
timeBasedFileRolloverPolicy="HOURLY" maxSizeBasedFileRolloverPolicy="1M"
deflate="true" deflateOutputFormat="GZIP" autoCommit="false"
fileVersion="2" fileSequenceId="CHARGEABLE_ITEM" />
</sequence>
</acquiredChargeableItem>
</chargeableItemTransactionProcessor>
</transactionProcessorSequence>

```

4.1.11.5.6.8 bulkWriter

→ Remember

This section is dedicated to [expert implementers](#) who are members of the implementation project team. In this *Customizing* activity, you design, configure, and tune the Charging Output Integration Framework (CIF) of SAP Convergent Charging (SAP CC).

bulkWriter

Description

Generates item data files.

CIF Usage

Rater and bulkloader instances

XML Attributes

Note that the attributes below are translated into parameters by SAP Convergent Charging. Refer to the [Output Data Generation Process](#) section of the [SAP CC 2023 System Parameter Reference](#) documentation.

- `adminParameterPrefixName` represents the parameter name prefix set by the translation by SAP CC of each attribute (it replaces the “XXX” prefix below).
For example: if `adminParameterPrefixName = POSTPAID_CIT_WRITER` then the other XML attributes are translated by SAP CC into persistent parameters with their related value: [POSTPAID_CIT_WRITER_ROOT_PATH](#), [POSTPAID_CIT_WRITER_CHANNEL_COUNT](#), ...
See each parameter link below for more info.
- `rootPath`: contains the relative or absolute path of the directory containing the data files to create. See [XXX_ROOT_PATH \(BulkWriter\)](#) for more information.
- `channelCount`: represents the number of channels to use when writing the data files in a directory (cannot be lower than 1). See [XXX_CHANNEL_COUNT \(BulkWriter\)](#) for more information.
- `timeBasedFileRolloverPolicy`: defines the rolling time-based policy for the generated data files. It is triggered when system current date reaches time based rollover policy. See [XXX_TIME_BASED_FILE_ROLLOVER_POLICY \(BulkWriter\)](#) for more information.
- `maxSizeBasedFileRolloverPolicy`: defines the rolling size-based policy for the generated data files. It is triggered when the size of the file reaches a certain amount. See [XXX_MAX_SIZE_BASED_FILE_ROLLOVER_POLICY \(BulkWriter\)](#) for more information.
- `deflate` and `deflateOutputFormat`: define the compression policy (respecting the RFC 1951 specifications). See [XXX_DEFLATE \(BulkWriter\)](#) and [XXX_DEFLATE_OUTPUT_FORMAT \(BulkWriter\)](#) for more information
- `fileVersion`: represents the version to use when generating data files. See [XXX_FILE_VERSION \(BulkWriter\)](#) for more information.
- `lineNumbering`: writes the line numbers in the generated data files. See [XXX_LINE_NUMBERING \(BulkWriter\)](#) for more information.
- `fileSequenceId`: represents the identifier to use for sequencing the names of the generated data files. See [XXX_FILE_SEQUENCE_ID \(BulkWriter\)](#) for more information.
- `preCreateFile`: enables or disables the pre-creation of data files. See [XXX_PRE_CREATE_FILE \(BulkWriter\)](#) for more information.
- `cleanArchivedFile`: removes the uncommitted items from the generated data files. See [XXX_CLEAN_ARCHIVED_FILE \(BulkWriter\)](#) for more information.
- `storeFileInformation`: stores (or not) information about the generated files into the `CHARGED_ITEM_FILES` table of the Core Database. Default is true.

Note

This attribute must be set to `false` with the SAP S/4HANA Cloud Public Edition configuration (ws mode) or with prepaid charged items. This way, file information used for rerating purpose is not stored

in the database, because rerating is not a supported feature in these configurations (ws mode or prepaid).

Parent XML Elements

errorHandling, itemSwitch(case), sequence, customerManagementAreaRouting, chargedItemTransactionProcessor, (prepaidChargedItem and postpaidChargedItem), chargeableItemTransactionProcessor (chargedChargeableItem and aquiredChargeableItem)

Example

From a rater CIF config:

```
<transactionProcessorSequence>
  <chargedItemTransactionProcessor>
    <postpaidChargedItem>
      <eventDateShifter>
        <sequence>
          <billableItemValidator />
          <customerManagementAreaRouting>
            <bulkWriter adminParameterPrefixName="POSTPAID_CIT_WRITER"
rootPath="SAPCC_CIT/POSTPAID/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@"
channelCount="4"
                timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="true" deflateOutputFormat="GZIP"
storeFileInformation="true" fileVersion="2" lineNumbering="false"
fileSequenceId="CHARGED_ITEM" cleanArchivedFile="false"
preCreateFile="ROLLOVER" />
          </customerManagementAreaRouting>
        </sequence>
      </eventDateShifter>
    </postpaidChargedItem>
    <prepaidChargedItem>
      <eventDateShifter>
        <sequence>
          <billableItemValidator />
          <customerManagementAreaRouting>
            <bulkWriter adminParameterPrefixName="PREPAID_CIT_WRITER"
rootPath="SAPCC_CIT/PREPAID/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@"
channelCount="4"
                timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="true" deflateOutputFormat="GZIP"
storeFileInformation="false" fileVersion="2" lineNumbering="false"
fileSequenceId="CHARGED_ITEM" cleanArchivedFile="false"
preCreateFile="ROLLOVER" />
          </customerManagementAreaRouting>
        </sequence>
      </eventDateShifter>
    </prepaidChargedItem>
  </chargedItemTransactionProcessor>
</transactionProcessorSequence>
```

From a bulkloader CIF config that works with the rater config above:

```
<sequence>
  <multiJCoDestination>
    <bulkReader adminParameterPrefixName="POSTPAID_CIT_READER"
rootPath="SAPCC_CIT/POSTPAID/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@"
channelCount="4"
      bufferSize="1000" removeFile="true">
    <billableItemLoader adminParameterPrefixName="POSTPAID_BIT_LOADER"
destination="@JCO_DESTINATION_NAME@" autoCommit="true">
      <errorHandling errorType="invalidBillableItem">
```

```

        <bulkWriter
adminParameterPrefixName="POSTPAID_CIT_ERR_INVALID_WRITER" rootPath="SAPCC_CIT/
POSTPAID/INVALID/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@" channelCount="4"
timeBasedFileRolloverPolicy="HOURLY" maxSizeBasedFileRolloverPolicy="1M"
deflate="false" storeFileInformation="true" fileVersion="2"
fileSequenceId="POSTPAID_CIT_ERR_INVALID"/>
    </errorHandling>
    <errorHandling errorType="communicationException">
        <bulkWriter
adminParameterPrefixName="POSTPAID_CIT_ERR_COM_EXCEPTION_WRITER"
rootPath="SAPCC_CIT/POSTPAID/COM_EXCEPTION/Instance#@INSTANCE_ID@/
@JCO_DESTINATION_NAME@" channelCount="4" timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="false" storeFileInformation="true"
fileVersion="2" fileSequenceId="POSTPAID_CIT_ERR_COM_EXCEPTION"/>
    </errorHandling>
    </billableItemLoader>
</bulkReader>
</multiJCoDestination>
<multiJCoDestination>
    <bulkReader adminParameterPrefixName="PREPAID_CIT_READER"
rootPath="SAPCC_CIT/PREPAID/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@"
channelCount="4"
    bufferSize="1000" removeFile="true">
        <billableItemLoader adminParameterPrefixName="PREPAID_BIT_LOADER"
destination="@JCO_DESTINATION_NAME@" autoCommit="true">
            <errorHandling errorType="invalidBillableItem">
                <bulkWriter
adminParameterPrefixName="PREPAID_CIT_ERR_INVALID_WRITER" rootPath="SAPCC_CIT/
PREPAID/INVALID/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@" channelCount="4"
timeBasedFileRolloverPolicy="HOURLY" maxSizeBasedFileRolloverPolicy="1M"
deflate="false" storeFileInformation="false" fileVersion="2"
fileSequenceId="PREPAID_CIT_ERR_INVALID"/>
            </errorHandling>
            <errorHandling errorType="communicationException">
                <bulkWriter
adminParameterPrefixName="PREPAID_CIT_ERR_COM_EXCEPTION_WRITER"
rootPath="SAPCC_CIT/PREPAID/COM_EXCEPTION/Instance#@INSTANCE_ID@/
@JCO_DESTINATION_NAME@" channelCount="4" timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="false" storeFileInformation="false"
fileVersion="2" fileSequenceId="PREPAID_CIT_ERR_COM_EXCEPTION"/>
            </errorHandling>
        </billableItemLoader>
    </bulkReader>
</multiJCoDestination>
</sequence>

```

4.1.11.5.6.9 bulkReader

→ Remember

This section is dedicated to [expert implementers](#) who are members of the implementation project team. In this *Customizing* activity, you design, configure, and tune the Charging Output Integration Framework (CIF) of SAP Convergent Charging (SAP CC).

bulkReader

Description

Reads the charged and chargeable item data files and to send data to an item processor that computes each data.

CIF Usage

Bulkloader instances

Requires an item processor as child element (most of time a loader)

Attributes

Note that the attributes below are translated into parameters by SAP Convergent Charging. Refer to the [SAP CC 2023 System Parameter Reference](#) documentation.

- `adminParameterPrefixName` represents the parameter name prefix set by the translation by SAP CC of each attribute (it replaces the "XXX" prefix below).
By example: if `adminParameterPrefixName = POSTPAID_CIT_READER` then the other XML attributes are translated by SAP CC into persistent parameters with their related value: [POSTPAID_CIT_READER_ROOT_PATH](#), [POSTPAID_CIT_READER_CHANNEL_COUNT](#), ...
See each parameter link below for more info.
- `rootPath`: contains the relative or absolute path of the directory containing the data files to read.
See [XXX_ROOT_PATH \(BulkReader\)](#) for more information.
- `channelCount`: represents the number of channels to use when reading the data files in a directory (cannot be lower than 1). See [XXX_CHANNEL_COUNT \(BulkReader\)](#) for more information
- `bufferSize`: the number of items read before sending the set of items to the next processor.
See [XXX_BUFFER_SIZE \(BulkReader\)](#) for more information.
- `removeFile`: used to specify if the data files used by the bulkloader instances should be kept after being completely read. See [XXX_REMOVE_FILE \(BulkReader\)](#) for more information

Parent XML Elements

sequence, multiDestination, multiJCODestination

Example

From a bulkloader CIF config that handles the charged items and chargeable items:

```
<sequence>
  <xmlMapping name="testSender"
class="com.highdeal.tests.cortex.tasks.trx.helpers.cif.GenericItemProcessorSender
Factory" />
  <bulkReader adminParameterPrefixName="POSTPAID_CIT_READER"
    rootPath="SAPCC_CIT/POSTPAID/Instance#@INSTANCE_ID@" channelCount="4"
bufferSize="1000" removeFile="true">
    <sequence>
      <billableItemLoader adminParameterPrefixName="POSTPAID_BIT_LOADER"
destination="CI_DESTINATION">
        <errorHandling errorType="invalidBillableItem">
          <sequence>
            <bulkWriter
adminParameterPrefixName="POSTPAID_CIT_ERR_INVALID_WRITER" rootPath="SAPCC_CIT/
POSTPAID/INVALID/Instance#@INSTANCE_ID@" channelCount="4"
```

```

        timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="false" fileVersion="2"
fileSequenceId="POSTPAID_CIT_ERR_INVALID"
/>
<testSender label="chargedItemPostpaidErrorInvalid" />
</sequence>
</errorHandling>
<errorHandling errorType="communicationException">
<sequence>
<bulkWriter adminParameterPrefixName="POSTPAID_CIT_ERR_COM_EXCEPTION_WRITER"
rootPath="SAPCC_CIT/POSTPAID/COM_EXCEPTION/Instance#@INSTANCE_ID@"
channelCount="4" timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="false" fileVersion="2"
fileSequenceId="POSTPAID_CIT_ERR_COM_EXCEPTION"
/>
<testSender label="chargedItemPostpaidErrorCommunication" />
</sequence>
</errorHandling>
</billableItemLoader>
<testSender label="chargedItem" />
        </sequence>
        </bulkReader>
        <bulkReader
adminParameterPrefixName="PREPAID_CIT_READER" rootPath="SAPCC_CIT/PREPAID/
Instance#@INSTANCE_ID@" channelCount="4" bufferSize="1000" removeFile="true">
        <sequence>
        <billableItemLoader
adminParameterPrefixName="PREPAID_BIT_LOADER" destination="CI_DESTINATION">
        <errorHandling errorType="invalidBillableItem">
        <sequence>
        <bulkWriter
adminParameterPrefixName="PREPAID_CIT_ERR_INVALID_WRITER" rootPath="SAPCC_CIT/
PREPAID/INVALID/Instance#@INSTANCE_ID@" channelCount="4"
        timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="false" fileVersion="2"
fileSequenceId="PREPAID_CIT_ERR_INVALID"
        />
        <testSender label="chargedItemPrepaidErrorInvalid" />
        </sequence>
        </errorHandling>
        <errorHandling errorType="communicationException">
        <sequence>
        <bulkWriter
adminParameterPrefixName="PREPAID_CIT_ERR_COM_EXCEPTION_WRITER"
rootPath="SAPCC_CIT/PREPAID/COM_EXCEPTION/Instance#@INSTANCE_ID@"
        channelCount="4" timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="false" fileVersion="2"
fileSequenceId="PREPAID_CIT_ERR_COM_EXCEPTION"
        />
        <testSender
label="chargedItemPrepaidErrorCommunication" />
        </sequence>
        </errorHandling>
        </billableItemLoader>
        <testSender label="chargedItem" />
        </sequence>
        </bulkReader>
        <bulkReader
adminParameterPrefixName="CHARGED_CI_READER" rootPath="SAPCC_CI/CHARGED/
Instance#@INSTANCE_ID@" channelCount="4" bufferSize="1000" removeFile="true"
itemType="chargeableItem">
        <sequence>
        <consumptionItemLoader destination="CI_DESTINATION"
isCharged="true">
        <errorHandling errorType="communicationException">
        <sequence>

```

```

        <bulkWriter
adminParameterPrefixName="CHARGED_CI_ERR_COM_EXCEPTION_WRITER"
rootPath="SAPCC_CI/CHARGED/COM_EXCEPTION/Instance#@INSTANCE_ID@"
        channelCount="4" timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="false" fileVersion="2"
fileSequenceId="CHARGED_CI_ERR_COM_EXCEPTION"
        />
        <testSender
label="chargeableItemChargedErrorCommunication" />
        </sequence>
        </errorHandling>
        <errorHandling errorType="invalid">
        <sequence>
        <bulkWriter
adminParameterPrefixName="CHARGED_CI_ERR_INVALID_WRITER" rootPath="SAPCC_CI/
CHARGED/INVALID/Instance#@INSTANCE_ID@" channelCount="4"
        timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="false" fileVersion="2"
fileSequenceId="CHARGED_CI_ERR_INVALID"
        />
        <testSender label="chargeableItemChargedErrorInvalid" />
        </sequence>
        </errorHandling>
        </consumptionItemLoader>
        <testSender label="chargeableItem" />
        </sequence>
        </bulkReader>
        <bulkReader
adminParameterPrefixName="ACQUIRED_CI_READER" rootPath="SAPCC_CI/ACQUIRED/
Instance#@INSTANCE_ID@" channelCount="4" bufferSize="1000" removeFile="true"
itemType="chargeableItem">
        <sequence>
        <consumptionItemLoader destination="CI_DESTINATION" isCharged="false">
        <errorHandling errorType="communicationException">
        <sequence>
        <bulkWriter
adminParameterPrefixName="ACQUIRED_CI_ERR_COM_EXCEPTION_WRITER"
rootPath="SAPCC_CI/ACQUIRED/COM_EXCEPTION/Instance#@INSTANCE_ID@"
channelCount="4" timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="false" fileVersion="2"
fileSequenceId="ACQUIRED_CI_ERR_COM_EXCEPTION"
        />
        <testSender label="chargeableItemAcquiredErrorCommunication" />
        </sequence>
        </errorHandling>
        <errorHandling errorType="invalid">
        <sequence>
        <bulkWriter
adminParameterPrefixName="ACQUIRED_CI_ERR_INVALID_WRITER" rootPath="SAPCC_CI/
ACQUIRED/INVALID/Instance#@INSTANCE_ID@" channelCount="4"
        timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="false" fileVersion="2"
fileSequenceId="ACQUIRED_CI_ERR_INVALID"/>
        <testSender label="chargeableItemAcquiredErrorInvalid" />
        </sequence>
        </errorHandling>
        </consumptionItemLoader>
        <testSender label="chargeableItemAcquired" />
        </sequence>
        </bulkReader>

```


4.1.11.5.6.10 eventDateShifter

→ Remember

This section is dedicated to [expert implementers](#) who are members of the implementation project team. In this *Customizing* activity, you design, configure, and tune the Charging Output Integration Framework (CIF) of SAP Convergent Charging (SAP CC).

eventDateShifter

Description

Subtracts 1 second to the charged item transaction date. This feature allows the SAP CC implementer to adapt the charged transactions produced by SAP Convergent Charging (SAP CC) to the billing cycles defined in the billing system.

→ Remember

Indeed, in SAP CC, a recurring period (for by example a monthly subscription fee) always includes the "from" datetime and excludes the "to" date/time. **By subtracting 1 second to the transactions, the implementer can assign a transaction generated at the end of the period (often the recurring fees) to the current invoice.**

CIF Usage

Rater instances

XML Attributes

None

Parent XML Elements

postpaidChargedItem, prepaidChargedItem, sequence, case

Example

```
<chargedItemTransactionProcessor>
  <postpaidChargedItem>
    <eventDateShifter>
      <billableItemValidator mode="WS">
        <customerManagementAreaRouting>
          <bulkWriter adminParameterPrefixName="POSTPAID_CIT_WRITER"
rootPath="SAPCC_CIT/POSTPAID/Instance#@INSTANCE_ID@/@DESTINATION_NAME@"
channelCount="4"
          timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="true" deflateOutputFormat="GZIP"
fileVersion="2" storeFileInformation="false" cleanArchivedFile="true"
fileSequenceId="CHARGED_ITEM" preCreateFile="ROLLOVER" />
        </customerManagementAreaRouting>
      </billableItemValidator>
    </eventDateShifter>
  </postpaidChargedItem>
</chargedItemTransactionProcessor>
```

```
</chargedItemTransactionProcessor>
```

4.1.11.5.6.11 errorHandling

→ Remember

This section is dedicated to [expert implementers](#) who are members of the implementation project team. In this [Customizing](#) activity, you design, configure, and tune the Charging Output Integration Framework (CIF) of SAP Convergent Charging (SAP CC).

errorHandling

Description

Handles errors that can be returned by some item processors. This element is triggered only if the type of the error matches the error type specified in the `errorType` attribute. If an error occurs, most of time the “error” item processor consists in writing the items in error into a dedicated channel reserved for errors.

CIF Usage

Bulkloader instances

XML Attributes

`errorType`: the type of the error that will trigger the processor. Supported values are:

- `communicationException`: when a communication error occurred.
- `invalidBillableItem` (with `wsBillableItemLoader`, `billableItemLoader`): the billable item is rejected by the billing system because it is invalid (the GPART/VKONT is wrong, the item is malformed, ...).
- `invalid` (with `consumptionItemLoader`): the consumption item is rejected by SAP Convergent Invoicing because it is invalid (the GPART/VKONT is wrong, the item is malformed, ...).

Parent XML Elements

[wsBillableItemLoader](#) [page 116], `billableItemLoader`, `consumptionItemLoader`

Example

```
<sequence>
  <multiJCoDestination>
    <bulkReader ...>
      <billableItemLoader adminParameterPrefixName="POSTPAID_BIT_LOADER"
destination="@JCO_DESTINATION_NAME@" autoCommit="true">
        <errorHandling errorType="invalidBillableItem">
          <bulkWriter
adminParameterPrefixName="POSTPAID_CIT_ERR_INVALID_WRITER" rootPath="SAPCC_CIT/
POSTPAID/INVALID/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@"
channelCount="4" timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="false" storeFileInformation="true"
fileVersion="2" fileSequenceId="POSTPAID_CIT_ERR_INVALID"/>
        </errorHandling>
      </billableItemLoader>
    </multiJCoDestination>
  </sequence>
```

```

        <errorHandling errorType="communicationException">
            <bulkWriter
adminParameterPrefixName="POSTPAID_CIT_ERR_COM_EXCEPTION_WRITER"
rootPath="SAPCC_CIT/POSTPAID/COM_EXCEPTION/Instance#@INSTANCE_ID@/
@JCO_DESTINATION_NAME@" channelCount="4"
timeBasedFileRolloverPolicy="HOURLY" maxSizeBasedFileRolloverPolicy="1M"
deflate="false" storeFileInformation="true" fileVersion="2"
fileSequenceId="POSTPAID_CIT_ERR_COM_EXCEPTION"/>
            </errorHandling>
        </billableItemLoader>
    </bulkReader>
</multiJCoDestination>
<multiJCoDestination>
    <bulkReader ...>
        <billableItemLoader adminParameterPrefixName="PREPAID_BIT_LOADER"
destination="@JCO_DESTINATION_NAME@" autoCommit="true">
            <errorHandling errorType="invalidBillableItem">
                <bulkWriter
adminParameterPrefixName="PREPAID_CIT_ERR_INVALID_WRITER" rootPath="SAPCC_CIT/
PREPAID/INVALID/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@" channelCount="4"
timeBasedFileRolloverPolicy="HOURLY" maxSizeBasedFileRolloverPolicy="1M"
deflate="false" storeFileInformation="false" fileVersion="2"
fileSequenceId="PREPAID_CIT_ERR_INVALID"/>
            </errorHandling>
            <errorHandling errorType="communicationException">
                <bulkWriter
adminParameterPrefixName="PREPAID_CIT_ERR_COM_EXCEPTION_WRITER"
rootPath="SAPCC_CIT/PREPAID/COM_EXCEPTION/Instance#@INSTANCE_ID@/
@JCO_DESTINATION_NAME@" channelCount="4"
timeBasedFileRolloverPolicy="HOURLY" maxSizeBasedFileRolloverPolicy="1M"
deflate="false" storeFileInformation="false" fileVersion="2"
fileSequenceId="PREPAID_CIT_ERR_COM_EXCEPTION"/>
            </errorHandling>
        </billableItemLoader>
    </bulkReader>
</multiJCoDestination>
<multiJCoDestination>
    <bulkReader ...>
        <errorHandling errorType="communicationException">
            <bulkWriter
adminParameterPrefixName="CHARGED_CI_ERR_COM_EXCEPTION_WRITER"
rootPath="SAPCC_CI/CHARGED/COM_EXCEPTION/Instance#@INSTANCE_ID@/
@JCO_DESTINATION_NAME@" channelCount="4"
timeBasedFileRolloverPolicy="HOURLY" maxSizeBasedFileRolloverPolicy="1M"
deflate="false" storeFileInformation="true" fileVersion="2"
fileSequenceId="CHARGED_CI_ERR_COM_EXCEPTION"/>
            </errorHandling>
            <errorHandling errorType="invalid">
                <bulkWriter
adminParameterPrefixName="CHARGED_CI_ERR_INVALID_WRITER" rootPath="SAPCC_CI/
CHARGED/INVALID/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@" channelCount="4"
timeBasedFileRolloverPolicy="HOURLY" maxSizeBasedFileRolloverPolicy="1M"
deflate="false" storeFileInformation="true" fileVersion="2"
fileSequenceId="CHARGED_CI_ERR_INVALID"/>
            </errorHandling>
        </consumptionItemLoader>
    </bulkReader>
</multiJCoDestination>
<multiJCoDestination>
    <bulkReader ...>
        <errorHandling errorType="communicationException">
            <bulkWriter
adminParameterPrefixName="ACQUIRED_CI_ERR_COM_EXCEPTION_WRITER"
rootPath="SAPCC_CI/ACQUIRED/COM_EXCEPTION/Instance#@INSTANCE_ID@/
@JCO_DESTINATION_NAME@" channelCount="4"
timeBasedFileRolloverPolicy="HOURLY" maxSizeBasedFileRolloverPolicy="1M"
deflate="false" storeFileInformation="true" fileVersion="2"

```

```

fileSequenceId="ACQUIRED_CI_ERR_COM_EXCEPTION" />
  </errorHandling>
  <errorHandling errorType="invalid">
    <bulkWriter
adminParameterPrefixName="ACQUIRED_CI_ERR_INVALID_WRITER" rootPath="SAPCC_CI/
ACQUIRED/INVALID/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@" channelCount="4"
timeBasedFileRolloverPolicy="HOURLY" maxSizeBasedFileRolloverPolicy="1M"
deflate="false" storeFileInformation="true" fileVersion="2"
fileSequenceId="ACQUIRED_CI_ERR_INVALID" />
    </errorHandling>
  </consumptionItemLoader>
</bulkReader>
</multiJCoDestination>
</sequence>

```

4.1.11.5.6.12 billableItemValidator and consumptionItemValidator

→ Remember

This section is dedicated to [expert implementers](#) who are members of the implementation project team. In this *Customizing* activity, you design, configure, and tune the Charging Output Integration Framework (CIF) of SAP Convergent Charging (SAP CC).

billableItemValidator **and** consumptionItemValidator

Description

Validates the billable and consumption items before their storage in a file channel. This processor validates the mapping definition by checking that all the properties of the billing/consumption items can be correctly set with their type constraints.

CIF Usage

Rater instances

XML Attributes

None

Parent XML Elements

postpaidChargedItem, prepaidChargedItem, chargedChargeableItem, acquiredChargeableItem, sequence, [eventDateShifter](#) [page 105]

Example

```

<transactionProcessorSequence>
  <chargedItemTransactionProcessor>
    <postpaidChargedItem>
      <eventDateShifter>

```

```

    <sequence>
      <billableItemValidator />
      <customerManagementAreaRouting>
        <bulkWriter .../>
      </customerManagementAreaRouting>
    </sequence>
  </eventDateShifter>
</postpaidChargedItem>
<prepaidChargedItem>
  <eventDateShifter>
    <sequence>
      <billableItemValidator />
      <customerManagementAreaRouting>
        <bulkWriter .../>
      </customerManagementAreaRouting>
    </sequence>
  </eventDateShifter>
</prepaidChargedItem>
</chargedItemTransactionProcessor>
<chargeableItemTransactionProcessor>
  <chargedChargeableItem>
    <sequence>
      <consumptionItemValidator />
      <customerManagementAreaRouting>
        <bulkWriter .../>
      </customerManagementAreaRouting>
    </sequence>
  </chargedChargeableItem>
  <acquiredChargeableItem>
    <sequence>
      <consumptionItemValidator />
      <customerManagementAreaRouting>
        <bulkWriter .../>
      </customerManagementAreaRouting>
    </sequence>
  </acquiredChargeableItem>
</chargeableItemTransactionProcessor>
</transactionProcessorSequence>

```

Example with WS mode (it accepts an item processor)

```

<chargedItemTransactionProcessor>
  <postpaidChargedItem>
    <eventDateShifter>
      <billableItemValidator mode="WS">
        <customerManagementAreaRouting>
          <bulkWriter ... />
        </customerManagementAreaRouting>
      </billableItemValidator>
    </eventDateShifter>
  </postpaidChargedItem>
</chargedItemTransactionProcessor>

```

4.1.11.5.6.13 customerManagementAreaRouting

→ Remember

This section is dedicated to [expert implementers](#) who are members of the implementation project team. In this *Customizing* activity, you design, configure, and tune the Charging Output Integration Framework (CIF) of SAP Convergent Charging (SAP CC).

customerManagementAreaRouting

Description

Retrieves the destination of the item in the related subscriber account. In an SAP CC system landscape with several SAP billing systems, SAP CC selects the relevant system by using the customer management area (CMA) information set in the subscriber account owning the provider contract that has generated the item.

CIF Usage

Rater instances

Attributes

None

Parent XML Elements

postpaidChargedItem, prepaidChargedItem, chargedChargeableItem, acquiredChargeableItem, sequence, [eventDateShifter](#) [page 105]

Example

```
<transactionProcessorSequence>
  <chargedItemTransactionProcessor>
    <postpaidChargedItem>
      <eventDateShifter>
        <sequence>
          <billableItemValidator/>
          <customerManagementAreaRouting>
            <bulkWriter adminParameterPrefixName="POSTPAID_CIT_WRITER"
rootPath="SAPCC_CIT/POSTPAID/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@"
channelCount="4"
                timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="true" deflateOutputFormat="GZIP"
storeFileInformation="true"
                fileVersion="2" lineNumbering="false"
fileSequenceId="CHARGED_ITEM" cleanArchivedFile="false"
preCreateFile="ROLLOVER"/>
          </customerManagementAreaRouting>
        </sequence>
      </eventDateShifter>
    </postpaidChargedItem>
    <prepaidChargedItem>
      <eventDateShifter>
        <sequence>
          <billableItemValidator />
          <customerManagementAreaRouting>
            <bulkWriter adminParameterPrefixName="PREPAID_CIT_WRITER"
rootPath="SAPCC_CIT/PREPAID/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@"
channelCount="4"
                timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="true" deflateOutputFormat="GZIP"
storeFileInformation="false"
                fileVersion="2" lineNumbering="false"
fileSequenceId="CHARGED_ITEM" cleanArchivedFile="false"
preCreateFile="ROLLOVER"/>
          </customerManagementAreaRouting>
        </sequence>
      </eventDateShifter>
    </prepaidChargedItem>
  </chargedItemTransactionProcessor>
</transactionProcessorSequence>
```

Another example with WS Destination:

```
<chargedItemTransactionProcessor>
  <postpaidChargedItem>
    <eventDateShifter>
      <billableItemValidator mode="WS">
        <customerManagementAreaRouting>
          <bulkWriter adminParameterPrefixName="POSTPAID_CIT_WRITER"
rootPath="SAPCC_CIT/POSTPAID/Instance#@INSTANCE_ID@/@DESTINATION_NAME@"
channelCount="4"
          timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="true" deflateOutputFormat="GZIP"
          fileVersion="2" storeFileInformation="false"
cleanArchivedFile="true" fileSequenceId="CHARGED_ITEM" preCreateFile="ROLLOVER"/>
        </customerManagementAreaRouting>
      </billableItemValidator>
    </eventDateShifter>
  </postpaidChargedItem>
</chargedItemTransactionProcessor>
```

4.1.11.5.6.14 multiJCoDestination and multiDestination

→ Remember

This section is dedicated to [expert implementers](#) who are members of the implementation project team. In this *Customizing* activity, you design, configure, and tune the Charging Output Integration Framework (CIF) of SAP Convergent Charging (SAP CC).

multiJCoDestination **and** multiDestination

Description

Routes the items according to the associated Customer Management Area (CMA).

📌 Note

- The implementation of this processor will internally create as many routes as the number of destinations created in SAP CC and used by the CMA. This means that all the nested processors (XML sub elements) cannot reference a “constant” value in their destination attribute and only the @JCO_DESTINATION_NAME@ (for multiJCoDestination) and @DESTINATION_NAME@ (for multiDestination) variables are authorized as values in the destination attribute.
- Moreover, as “multi” can also mean “one” destination, the multiDestination element used for connections from SAP CC to SAP S/4HANA Cloud Public Edition must be used even if only one destination is used. It is the same remark with multiJCoDestination for the connections with SAP Convergent Invoicing. Anyway, such processors are not mandatory with only one billing system not using SAP S/4HANA Cloud Public Edition.

CIF Usage

Bulkloader instances

XML Attributes

None

Parent XML Elements

postpaidChargedItem, prepaidChargedItem, chargedChargeableItem, acquiredChargeableItem, sequence

Example

```
<sequence>
  <multiJCoDestination>
    <bulkReader adminParameterPrefixName="POSTPAID_CIT_READER"
rootPath="SAPCC_CIT/POSTPAID/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@"
channelCount="4" bufferSize="1000" removeFile="true">
      <billableItemLoader adminParameterPrefixName="POSTPAID_BIT_LOADER"
destination="@JCO_DESTINATION_NAME@" autoCommit="true">
        <errorHandling errorType="invalidBillableItem">
          <bulkWriter
adminParameterPrefixName="POSTPAID_CIT_ERR_INVALID_WRITER" rootPath="SAPCC_CIT/
POSTPAID/INVALID/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@" channelCount="4"
timeBasedFileRolloverPolicy="HOURLY" maxSizeBasedFileRolloverPolicy="1M"
deflate="false" storeFileInformation="true" fileVersion="2"
fileSequenceId="POSTPAID_CIT_ERR_INVALID"/>
          </errorHandling>
        <errorHandling errorType="communicationException">
          <bulkWriter
adminParameterPrefixName="POSTPAID_CIT_ERR_COM_EXCEPTION_WRITER"
rootPath="SAPCC_CIT/POSTPAID/COM_EXCEPTION/Instance#@INSTANCE_ID@/
@JCO_DESTINATION_NAME@" channelCount="4" timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="false" storeFileInformation="true"
fileVersion="2" fileSequenceId="POSTPAID_CIT_ERR_COM_EXCEPTION"/>
          </errorHandling>
        </billableItemLoader>
      </bulkReader>
    </multiJCoDestination>
    <multiJCoDestination>
      <bulkReader adminParameterPrefixName="PREPAID_CIT_READER" rootPath="SAPCC_CIT/
PREPAID/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@" channelCount="4"
bufferSize="1000" removeFile="true">
        <billableItemLoader adminParameterPrefixName="PREPAID_BIT_LOADER"
destination="@JCO_DESTINATION_NAME@" autoCommit="true">
          <errorHandling errorType="invalidBillableItem">
            <bulkWriter
adminParameterPrefixName="PREPAID_CIT_ERR_INVALID_WRITER" rootPath="SAPCC_CIT/
PREPAID/INVALID/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@"
channelCount="4" timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="false" storeFileInformation="false"
fileVersion="2" fileSequenceId="PREPAID_CIT_ERR_INVALID"/>
            </errorHandling>
          <errorHandling errorType="communicationException">
            <bulkWriter adminParameterPrefixName="PREPAID_CIT_ERR_COM_EXCEPTION_WRITER"
rootPath="SAPCC_CIT/PREPAID/COM_EXCEPTION/Instance#@INSTANCE_ID@/
@JCO_DESTINATION_NAME@" channelCount="4" timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="false" storeFileInformation="false"
fileVersion="2" fileSequenceId="PREPAID_CIT_ERR_COM_EXCEPTION"/>
            </errorHandling>
          </billableItemLoader>
        </bulkReader>
      </multiJCoDestination>
    <multiJCoDestination>
      <bulkReader adminParameterPrefixName="CHARGED_CI_READER" rootPath="SAPCC_CI/
CHARGED/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@" channelCount="4"
bufferSize="1000" removeFile="true" itemType="chargeableItem">
        <consumptionItemLoader destination="@JCO_DESTINATION_NAME@" isCharged="true"
autoCommit="true">

```



```

<errorHandling errorType="communicationException">
<bulkWriter adminParameterPrefixName="CHARGED_CI_ERR_COM_EXCEPTION_WRITER"
rootPath="SAPCC_CI/CHARGED/COM_EXCEPTION/Instance#@INSTANCE_ID@/
@JCO_DESTINATION_NAME@" channelCount="4" timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="false" storeFileInformation="true"
fileVersion="2" fileSequenceId="CHARGED_CI_ERR_COM_EXCEPTION"/>
</errorHandling>
<errorHandling errorType="invalid">
<bulkWriter
adminParameterPrefixName="CHARGED_CI_ERR_INVALID_WRITER" rootPath="SAPCC_CI/
CHARGED/INVALID/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@" channelCount="4"
timeBasedFileRolloverPolicy="HOURLY" maxSizeBasedFileRolloverPolicy="1M"
deflate="false" storeFileInformation="true" fileVersion="2"
fileSequenceId="CHARGED_CI_ERR_INVALID"/>
</errorHandling>
</consumptionItemLoader>
  </bulkReader>
    </multiJCoDestination>
      <multiJCoDestination>
        <bulkReader adminParameterPrefixName="ACQUIRED_CI_READER"
rootPath="SAPCC_CI/ACQUIRED/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@"
channelCount="4"
          bufferSize="1000" removeFile="true" itemType="chargeableItem">
            <consumptionItemLoader destination="@JCO_DESTINATION_NAME@"
isCharged="false" autoCommit="true">
              <errorHandling errorType="communicationException">
                <bulkWriter
adminParameterPrefixName="ACQUIRED_CI_ERR_COM_EXCEPTION_WRITER"
rootPath="SAPCC_CI/ACQUIRED/COM_EXCEPTION/Instance#@INSTANCE_ID@/
@JCO_DESTINATION_NAME@" channelCount="4" timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="false" storeFileInformation="true"
fileVersion="2" fileSequenceId="ACQUIRED_CI_ERR_COM_EXCEPTION"/>
                </errorHandling>
              <errorHandling errorType="invalid">
                <bulkWriter
adminParameterPrefixName="ACQUIRED_CI_ERR_INVALID_WRITER" rootPath="SAPCC_CI/
ACQUIRED/INVALID/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@" channelCount="4"
timeBasedFileRolloverPolicy="HOURLY" maxSizeBasedFileRolloverPolicy="1M"
deflate="false" storeFileInformation="true" fileVersion="2"
fileSequenceId="ACQUIRED_CI_ERR_INVALID"/>
                </errorHandling>
              </consumptionItemLoader>
            </bulkReader>
          </multiJCoDestination>
        </sequence>

```

Example with SAP S/4HANA Cloud Public Edition landscapes (mandatory):

```

<multiDestination>
  <bulkReader adminParameterPrefixName="POSTPAID_CIT_READER"
rootPath="SAPCC_CIT/POSTPAID/Instance#@INSTANCE_ID@/@DESTINATION_NAME@"
channelCount="4" bufferSize="100" removeFile="true">
    <wsBillableItemLoader verbose="false">
      <errorHandling errorType="invalidBillableItem">
        <bulkWriter
adminParameterPrefixName="POSTPAID_CIT_ERR_INVALID_WRITER" rootPath="SAPCC_CIT/
POSTPAID/INVALID/Instance#@INSTANCE_ID@/@DESTINATION_NAME@" channelCount="4"
timeBasedFileRolloverPolicy="HOURLY" maxSizeBasedFileRolloverPolicy="1M"
deflate="false" fileVersion="2" storeFileInformation="false"
fileSequenceId="POSTPAID_CIT_ERR_INVALID" />
        </errorHandling>
      <errorHandling errorType="communicationException">
        <bulkWriter
adminParameterPrefixName="POSTPAID_CIT_ERR_COM_EXCEPTION_WRITER"
rootPath="SAPCC_CIT/POSTPAID/COM_EXCEPTION/Instance#@INSTANCE_ID@/
@DESTINATION_NAME@" channelCount="4" timeBasedFileRolloverPolicy="HOURLY"

```

```

maxSizeBasedFileRolloverPolicy="1M" deflate="false" fileVersion="2"
storeFileInformation="false" fileSequenceId="POSTPAID_CIT_ERR_COM_EXCEPTION" />
  </errorHandling>
  </wsBillableItemLoader>
</bulkReader>
</multiDestination>

```

4.1.11.5.6.15 billableItemLoader

→ Remember

This section is dedicated to [expert implementers](#) who are members of the implementation project team. In this *Customizing* activity, you design, configure, and tune the Charging Output Integration Framework (CIF) of SAP Convergent Charging (SAP CC).

billableItemLoader

Description

Loads the billable items in SAP Convergent Invoicing (on premise) in its system (ERP or S/4HANA). In case of an error, the expert implementer can optionally specify an `errorHandling` processor to handle items in error.

CIF Usage

Bulkloader instances

XML Attributes

📌 Note

The attributes below are translated into system parameters by SAP Convergent Charging. You can view their values and change them with the SAP CC administrative tools.

Refer to the [SAP CC 2023 System Parameter Reference](#) documentation.

- `adminParameterPrefixName` represents the internal parameter name prefix set by the interpretation by SAP CC of each attribute. It defines the appliance scope of values set in each attribute. For example: if `adminParameterPrefixName = POSTPAID_BIT_LOADER_CLIENT`, then the other XML attributes will be translated by SAP CC into internal parameters applicable to the postpaid charged item. Possible values are:
 - `POSTPAID_BIT_LOADER_CLIENT`
 - `PREPAID_BIT_LOADER_CLIENT`
- `destination` represents the name of the targeted JCo destination that is used to push the billable items. The `@JCO_DESTINATION_NAME@` variable must be set when the loader is used within a `multiJCoDestination` element.
- `autoCommit` gives the possibility to perform a single RFC⁴³ call for billable item loading and commit/rollback operation (set to `true` by default).

- `currencyAdjustment` indicates how the currency precisions are chosen when sending billable items to SAP Convergent Invoicing (on premise).
Refer to the [XXX_CURRENCY_ADJUSTMENT \(BillableItemLoader\)](#) system indicator for further information.

Parent XML Element

[bulkReader](#) [page 101]

Example

```
<sequence>
  <multiJCoDestination>
    <bulkReader adminParameterPrefixName="POSTPAID_CIT_READER"
rootPath="SAPCC_CIT/POSTPAID/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@"
channelCount="4"
  bufferSize="1000" removeFile="true">
      <billableItemLoader adminParameterPrefixName="POSTPAID_BIT_LOADER"
destination="@JCO_DESTINATION_NAME@" autoCommit="true">
          <errorHandling errorType="invalidBillableItem">
              <bulkWriter
adminParameterPrefixName="POSTPAID_CIT_ERR_INVALID_WRITER" rootPath="SAPCC_CIT/
POSTPAID/INVALID/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@" channelCount="4"
timeBasedFileRolloverPolicy="HOURLY" maxSizeBasedFileRolloverPolicy="1M"
deflate="false" storeFileInformation="true" fileVersion="2"
fileSequenceId="POSTPAID_CIT_ERR_INVALID"/>
          </errorHandling>
          <errorHandling errorType="communicationException">
              <bulkWriter
adminParameterPrefixName="POSTPAID_CIT_ERR_COM_EXCEPTION_WRITER"
rootPath="SAPCC_CIT/POSTPAID/COM_EXCEPTION/Instance#@INSTANCE_ID@/
@JCO_DESTINATION_NAME@" channelCount="4" timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="false" storeFileInformation="true"
fileVersion="2" fileSequenceId="POSTPAID_CIT_ERR_COM_EXCEPTION"/>
          </errorHandling>
      </billableItemLoader>
    </bulkReader>
  </multiJCoDestination>
  <multiJCoDestination>
    <bulkReader adminParameterPrefixName="PREPAID_CIT_READER"
rootPath="SAPCC_CIT/PREPAID/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@"
channelCount="4"
  bufferSize="1000" removeFile="true">
      <billableItemLoader adminParameterPrefixName="PREPAID_BIT_LOADER"
destination="@JCO_DESTINATION_NAME@" autoCommit="true">
          <errorHandling errorType="invalidBillableItem">
              <bulkWriter
adminParameterPrefixName="PREPAID_CIT_ERR_INVALID_WRITER" rootPath="SAPCC_CIT/
PREPAID/INVALID/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@" channelCount="4"
timeBasedFileRolloverPolicy="HOURLY" maxSizeBasedFileRolloverPolicy="1M"
deflate="false" storeFileInformation="false" fileVersion="2"
fileSequenceId="PREPAID_CIT_ERR_INVALID"/>
          </errorHandling>
          <errorHandling errorType="communicationException">
              <bulkWriter
adminParameterPrefixName="PREPAID_CIT_ERR_COM_EXCEPTION_WRITER"
rootPath="SAPCC_CIT/PREPAID/COM_EXCEPTION/Instance#@INSTANCE_ID@/
@JCO_DESTINATION_NAME@" channelCount="4" timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="false" storeFileInformation="false"
fileVersion="2" fileSequenceId="PREPAID_CIT_ERR_COM_EXCEPTION"/>
          </errorHandling>
      </billableItemLoader>
    </bulkReader>
  </multiJCoDestination>
</sequence>
```

```
</multiJCoDestination>
</sequence>
```

4.1.11.5.6.16 wsBillableItemLoader

→ Remember

This section is dedicated to [expert implementers](#) who are members of the implementation project team. In this *Customizing* activity, you design, configure, and tune the Charging Output Integration Framework (CIF) of SAP Convergent Charging (SAP CC).

wsBillableItemLoader

Description

Loads/pushes the billable items in SAP S/4HANA Cloud Public Edition. In case of an error, the expert implementer can optionally specify an [errorHandling processor \[page 106\]](#) to handle items in error.

CIF Usage

Bulkloader instances

XML Attribute

`verbose` gives the possibility to add verbose log messages in confirmation messages related to billable items creation operations in SAP S/4HANA Cloud Public Edition (`false` by default).

Note

There is no `destination` attribute in this loader because this element must be always used within the `multiDestination` element and then, the destination is always retrieved thanks to the Customer Management Area (CMA) mechanism.

Parent XML Element

[bulkReader \[page 101\]](#) and must be always used within a `multiDestination` element with SAP S/4HANA Cloud Public Edition.

Example

```
<multiDestination>
  <bulkReader adminParameterPrefixName="POSTPAID_CIT_READER"
    rootPath="SAPCC_CIT/POSTPAID/Instance#@INSTANCE_ID@/@DESTINATION_NAME@"
    channelCount="4" bufferSize="100" removeFile="true">
    <wsBillableItemLoader verbose="false">
      <errorHandling errorType="invalidBillableItem">
        <bulkWriter
          adminParameterPrefixName="POSTPAID_CIT_ERR_INVALID_WRITER" rootPath="SAPCC_CIT/
          POSTPAID/INVALID/Instance#@INSTANCE_ID@/@DESTINATION_NAME@" channelCount="4"
          timeBasedFileRolloverPolicy="HOURLY" maxSizeBasedFileRolloverPolicy="1M"
```

```

deflate="false" fileVersion="2" storeFileInformation="false"
fileSequenceId="POSTPAID_CIT_ERR_INVALID" />
</errorHandling>
<errorHandling errorType="communicationException">
  <bulkWriter
adminParameterPrefixName="POSTPAID_CIT_ERR_COM_EXCEPTION_WRITER"
rootPath="SAPCC_CIT/POSTPAID/COM_EXCEPTION/Instance#@INSTANCE_ID@/
@DESTINATION_NAME@" channelCount="4" timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="false" fileVersion="2"
storeFileInformation="false" fileSequenceId="POSTPAID_CIT_ERR_COM_EXCEPTION" />
  </errorHandling>
</wsBillableItemLoader>
</bulkReader>
</multiDestination>

```

4.1.11.5.6.17 consumptionItemLoader

→ Remember

This section is dedicated to [expert implementers](#) who are members of the implementation project team. In this [Customizing](#) activity, you design, configure, and tune the Charging Output Integration Framework (CIF) of SAP Convergent Charging (SAP CC).

consumptionItemLoader

Description

Loads consumption items in SAP Convergent Invoicing (on premise). In case of an error, the expert implementer can optionally specify an `errorHandling` processor to handle items in error.

CIF Usage

Bulkloader instances

XML Attributes

Please note that the XML attributes below are translated into parameters by SAP Convergent Charging. Please consult the [SAP CC 2023 System Parameter Reference](#) documentation.

- `destination` represents the name of the targeted JCo destination that is used for pushing the consumption items. The `@JCO_DESTINATION_NAME@` variable must be set when the loader is used within a `multiJCoDestination` element.
- `autoCommit` gives the possibility to perform a single RFC call for consumption item loading and commit/rollback operation (set to `true` by default).
- `isCharged` is used to configure the RFC call to SAP Convergent Invoicing in order to indicate whether the items being sent are charged or no.
If `true`, only the consumption items issued from an SAP CC charging process will be selected.
Otherwise, only the consumption items issued from an acquisition process is selected.

Parent XML Element

[bulkReader \[page 101\]](#)

Example

```
<sequence>
  <multiJCoDestination>
    <bulkReader adminParameterPrefixName="CHARGED_CI_READER"
rootPath="SAPCC_CI/CHARGED/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@"
channelCount="4"
  bufferSize="1000" removeFile="true" itemType="chargeableItem">
    <consumptionItemLoader destination="@JCO_DESTINATION_NAME@"
isCharged="true" autoCommit="true">
      <errorHandling errorType="communicationException">
        <bulkWriter
adminParameterPrefixName="CHARGED_CI_ERR_COM_EXCEPTION_WRITER"
rootPath="SAPCC_CI/CHARGED/COM_EXCEPTION/Instance#@INSTANCE_ID@/
@JCO_DESTINATION_NAME@" channelCount="4" timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="false" storeFileInformation="true"
fileVersion="2" fileSequenceId="CHARGED_CI_ERR_COM_EXCEPTION"/>
        </errorHandling>
      <errorHandling errorType="invalid">
        <bulkWriter
adminParameterPrefixName="CHARGED_CI_ERR_INVALID_WRITER" rootPath="SAPCC_CI/
CHARGED/INVALID/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@" channelCount="4"
timeBasedFileRolloverPolicy="HOURLY" maxSizeBasedFileRolloverPolicy="1M"
deflate="false" storeFileInformation="true" fileVersion="2"
fileSequenceId="CHARGED_CI_ERR_INVALID"/>
        </errorHandling>
      </consumptionItemLoader>
    </bulkReader>
  </multiJCoDestination>
  <multiJCoDestination>
    <bulkReader adminParameterPrefixName="ACQUIRED_CI_READER"
rootPath="SAPCC_CI/ACQUIRED/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@"
channelCount="4" bufferSize="1000" removeFile="true" itemType="chargeableItem">
    <consumptionItemLoader destination="@JCO_DESTINATION_NAME@"
isCharged="false" autoCommit="true">
      <errorHandling errorType="communicationException">
        <bulkWriter
adminParameterPrefixName="ACQUIRED_CI_ERR_COM_EXCEPTION_WRITER"
rootPath="SAPCC_CI/ACQUIRED/COM_EXCEPTION/Instance#@INSTANCE_ID@/
@JCO_DESTINATION_NAME@" channelCount="4" timeBasedFileRolloverPolicy="HOURLY"
maxSizeBasedFileRolloverPolicy="1M" deflate="false" storeFileInformation="true"
fileVersion="2" fileSequenceId="ACQUIRED_CI_ERR_COM_EXCEPTION"/>
        </errorHandling>
      <errorHandling errorType="invalid">
        <bulkWriter
adminParameterPrefixName="ACQUIRED_CI_ERR_INVALID_WRITER" rootPath="SAPCC_CI/
ACQUIRED/INVALID/Instance#@INSTANCE_ID@/@JCO_DESTINATION_NAME@" channelCount="4"
timeBasedFileRolloverPolicy="HOURLY" maxSizeBasedFileRolloverPolicy="1M"
deflate="false" storeFileInformation="true" fileVersion="2"
fileSequenceId="ACQUIRED_CI_ERR_INVALID"/>
        </errorHandling>
      </consumptionItemLoader>
    </bulkReader>
  </multiJCoDestination>
</sequence>
```

4.1.11.6 Configuring the RIF

Prerequisite

The feature is enabled. See [Enabling the Rating Integration Framework \(RIF\) \[page 122\]](#).

Possible Settings

To fit specific needs such as data files path, multithreaded generation, rollover policy, file compression... you can configure the data file generation of rating requests using the following parameters:

Setting (XML Element)	Description
<code>rootPath</code>	Writing location for generated files. For further information, refer to the description of the XXX_ROOT_PATH (BulkWriter) system parameter.
<code>channelCount</code>	Number of writing channels. For further information, refer to the description of the XXX_CHANNEL_COUNT (BulkWriter) system parameter.
<code>timeBasedFileRolloverPolicy</code>	Rolling policy for generated files. For further information, refer to the description of the XXX_TIME_BASED_FILE_ROLLOVER_POLICY (BulkWriter) and XXX_MAX_SIZE_BASED_FILE_ROLLOVER_POLICY (BulkWriter) system parameters.
<code>deflate</code>	Compression policy, that respects the RFC 1951 specifications.
<code>deflateOutputFormat</code>	For further information, refer to the description of the XXX_DEFLATE (BulkWriter) and XXX_DEFLATE_OUTPUT_FORMAT (BulkWriter) system parameters.
<code>preCreateFile</code>	Flag used to enable or disable the pre-creation of data files. To modify this parameter, refer to the Enabling the Precreation Policy for Data Files Generated by the Rater and Bulkloader Instances [page 125] dedicated procedure available afterwards.

→ Tip

Template files named `rif.rater.config.xml.sk` is available in the `exe/uc/<OS>/CC_CORE_SERVER/config/<scenario>` subfolder of the [SAP Central Repository](#), within subfolders whose name depends on the installation scenario:

- `sapci` in case of integrated scenario with SAP Convergent Invoicing
- `s4hc` in case of integrated scenario with SAP S/4HANA Cloud Public Edition edition
- `standalone` otherwise

Procedure

To configure the RIF⁴⁴ parameters, complete the following procedure:

1. Using the [Setup Tool user interface](#) execute the [rif export command](#) to export the RIF configuration of the rater instances in the running SAP CC Core Server system.
2. Edit the retrieved `rif.rater.config.xml` configuration file.
3. Save your modifications.
4. Using the [Setup Tool user interface](#) execute the [rif import command](#) to import the modified RIF configuration for the rater instances of the Core Server system.
5. Restart the rater instances in the Core Server system.

4.1.11.7 Modifying the Item/Data Files Processor

During charging and refilling operations, the running rater instances generate data files whose persistency is managed by a [dedicated framework \[page 80\]](#) which gives the possibility to implement the following file processors:

- **Transaction File** processor (deprecated), which creates a single file whose content can be customized.
- **Data File** processor (deprecated), which creates multiple data files which contain different data related to transactions.
- **Charged Item File, Refill Record File, or Chargeable Item File** processor, which give the possibility to create data files whose content corresponds to taxed & charged transactions transcribed into:
 - Chargeable items, during chargeable items acquisition and charging operations
 - Charged items, during chargeable items charging and prepaid accounts refilling operations
 - Refill records, during prepaid accounts refilling operations
- **Rerate File** processor, which gives the possibility to create data files whose content can be used by a third-party system for rerating purposes.

[Enabling the Transaction Integration Framework \(TIF\) to Generate Transaction Files - DEPRECATED \[page 121\]](#)

[Enabling the Transaction Integration Framework \(TIF\) to Generate Data Files - DEPRECATED \[page 121\]](#)

[Enabling the Charging Output Integration Framework \(CIF\) Processor \[page 122\]](#)

[Enabling the Rerating Integration Framework \(RIF\) \[page 122\]](#)

⁴⁴ Rerating Integration Framework

4.1.11.7.1 Enabling the Transaction Integration Framework (TIF) to Generate Transaction Files - DEPRECATED

⚠ Caution

The use of the *Transaction File processor* is **deprecated as of release 2.0 of SAP CC**. See now: [Enabling the Charging Output Integration Framework \(CIF\) Processor \[page 122\]](#)

To ensure compatibility with offers created through previous versions of SAP Convergent Charging, it is still possible to use it.

For further information about this file processor, refer to the description of the [Output Data Generation Process \(Transaction File Processing\) - Deprecated](#) group available in the [SAP CC 2023 System Parameter Reference](#) documentation.

To enable the Transaction File processor, execute the following procedure:

1. Launch your [favorite user interface \[page 22\]](#) and log on as the administrator of the Core Server system.
2. For each rater instance of the Core Server system, modify the value of the `TRANSAC_PROC_CLASS` system parameter to the following value: `com.highdeal.tif.tfp.TransactionFileProcessor`
3. Restart the rater instances in the Core Server system.

4.1.11.7.2 Enabling the Transaction Integration Framework (TIF) to Generate Data Files - DEPRECATED

⚠ Caution

The use of the *Data File processor* is **deprecated as of release 2.0 of SAP CC**. See now: [Enabling the Charging Output Integration Framework \(CIF\) Processor \[page 122\]](#)

To ensure compatibility with offers created through previous versions of SAP CC, it is still possible to use it.

For further information about this file processor, refer to the description of the [Output Data Generation Process \(DB File Processing\) - Deprecated](#) group available in the [SAP CC 2023 System Parameter Reference](#) documentation.

To enable the Data File processor, execute the following procedure:

1. Launch your [favorite user interface \[page 22\]](#) and log on as the administrator of the Core Server system.
2. For each rater of the Core Server system, modify the value of the `TRANSAC_PROC_CLASS` system parameter to the following value: `com.highdeal.tif.dbFile.TransactionFileProcessor`
3. Restart the rater instances in the Core Server system.

4.1.11.7.3 Enabling the Charging Output Integration Framework (CIF) Processor

To enable the Charging output Integration Framework (CIF) processor and generate data files containing either charged items, chargeable items, or refill records, complete the following procedure:

1. Launch your [favorite user interface \[page 22\]](#) and log on as the administrator of the Core Server system.
2. For each rater instance of your Core Server system, modify the value of the `TRANSAC_PROC_CLASS` system parameter to the following value:
`com.highdeal.tif.chargeditem.TransactionProcessorShell`
3. Restart the rater instances in the Core Server system.

Note

The CIF Processor is enabled by default if you chose to activate SAP CI during the installation.

Next Step

[Configuring the CIF \[page 77\]](#)

4.1.11.7.4 Enabling the Rerating Integration Framework (RIF)

By default, the identifier of the rerate processor is set to `com.highdeal.rif.nop.NOPrerateProcessor`. This factory setting is used when:

- SAP Convergent Invoicing manages the rerating feature⁴⁵
- BART Server manages the rerating feature but SAP Convergent Invoicing is not deployed in the SAP system landscape

In a non-standard implementation where the BART Server system manages the rerating feature and SAP Convergent Invoicing manages the reversal of generated billable items (BITs), it is necessary to redefine the rerate processor to `com.highdeal.rif.chargeditem.RerateProcessorShell`.

Another Java class can be customized during the implementation and integration time. The identifier of the rerate processor can then be set to the name of this class.

1. Launch your [favorite user interface \[page 22\]](#) and identify as the administrator of the Core Server system.
2. For each rater instance, modify the value of the `RERATE_PROC_CLASS` system parameter. The possible values are:
 - `com.highdeal.rif.nop.NOPrerateProcessor` (factory setting)
 - `com.highdeal.rif.chargeditem.RerateProcessorShell`
 - Another Java class name (customized integration)

⁴⁵ SAP Convergent Invoicing must be configured to manage both billable items and consumption items sent by SAP Convergent Charging

3. Restart the rater instances of the Core Server system.

Next Step

[Configuring the RIF \[page 119\]](#)

4.1.11.8 Modifying the Versions of Data Files Generated by Raters

During charging and refilling operations, raters generate data files containing information about incoming events. To modify the version of these data files generated by raters, execute the following procedure:

1. Launch your [favorite user interface \[page 22\]](#)
2. Export the CIF⁴⁶ configuration of the rater instances using the `cif export` command
3. Edit the retrieved `rater.cif.xml` configuration file
4. For each `bulkwriter` XML element located under a `chargedItemTransactionProcessor` XML element, set the `fileVersion` attribute to **1** or **2**
5. For each `bulkwriter` XML element located under a `chargeableItemTransactionProcessor` XML element, set the `fileVersion` attribute to **1** or **2**
6. Save your modifications
7. Import the modified CIF configuration for the rater instances using the `cif import` command
8. Restart the rater instances of the Core Server system

For more information about the CIF, refer to the [Customizing the Charging Output Integration Framework \(CIF\) \[page 80\]](#) section of the [SAP CC 2023 Administration Guide \[page 8\]](#).

4.1.11.9 Enabling the File Name Sequencing for Data Files Generated by Raters

To enable this file name sequencing for data files generated by raters, execute the following procedure:

1. Launch your [favorite user interface \[page 22\]](#) and log on as the administrator of the Core Server system.
2. Get the number of database connections currently set for **rater** instances using the following command:

```
get SQLHELPER_CONNECTION_COUNT persistent rater
```

3. Increase this number of connections by 1 using the following command:
`set SQLHELPER_CONNECTION_COUNT <increased_value> persistent rater`
Where `<increased_value>` corresponds to the number of database connections, increased by 1
4. Enable the sequencing for error files by executing the following command:
`set ITEM_FILE_SEQUENCE_ENABLED true persistent rater`

⁴⁶ Charging output Integration Framework

5. Launch your [favorite user interface \[page 22\]](#).
6. Export the CIF⁴⁷ configuration of the rater instances using the `cif export` command.
7. Edit the retrieved `rater.cif.xml` configuration file.
8. For each `bulkwriter` XML element located under a `chargedItemTransactionProcessor` XML element, set the following attributes to the relevant values:
 - `fileVersion` to **2**
 - `fileSequenceId` to **CHARGED_ITEM**
9. For each `bulkwriter` XML element located under a `chargeableItemTransactionProcessor` XML element, set the following attributes to the relevant values:
 - `fileVersion` to **2**
 - `fileSequenceId` to **CHARGEABLE_ITEM**
10. Save your modifications.
11. Import the modified CIF configuration for the rater instances using the `cif import` command.
12. Restart the rater instances in the Core Server system.

4.1.11.10 Enabling the Line Numbering for Data Files Generated by Raters

To enable the line numbering for data files generated by raters, execute the following procedure:

1. Launch your [favorite user interface \[page 22\]](#)
2. Export the CIF⁴⁸ configuration of the rater instances using the `cif export` command
3. Edit the retrieved `rater.cif.xml` configuration file
4. For each `bulkwriter` XML element, set the `lineNumbering` attribute to **true**
5. Save your modifications
6. Import the modified CIF configuration for the rater instances using the `cif import` command
7. Restart the rater instances of the Core Server system

4.1.11.11 Enabling the Archive Files Cleaning for Data Files Generated by Raters

SAP CC gives the possibility to activate an automatic cleaning mechanism in order to remove the uncommitted items from data files, and the associated control files. To enable this automatic cleaning mechanism for data files generated by raters, execute the following procedure:

1. Launch your [favorite user interface \[page 22\]](#)
2. Export the CIF⁴⁹ configuration of the rater instances using the `cif export` command
3. Edit the retrieved `rater.cif.xml` configuration file

⁴⁷ Charging output Integration Framework

⁴⁸ Charging output Integration Framework

⁴⁹ Charging output Integration Framework

4. For each `bulkwriter` XML element, set the `cleanArchivedFile` attribute to `true`
5. Save your modifications
6. Import the modified CIF configuration for the rater instances using the `cif import` command
7. Restart the rater instances of the Core Server system

4.1.11.12 Enabling the Precreation Policy for Data Files Generated by the Rater and Bulkloader Instances

For optimization purpose, data files generated by rater and bulkloader instances can be asynchronously pre-created, instead of waiting for the associated channel to create these files on demand.

- To enable the precreation of data files generated by the rater instances, execute the following procedure:
 1. Launch your [favorite user interface \[page 22\]](#).
 2. Export the CIF⁵⁰ and RIF⁵¹ configurations of the rater instances using the following commands:

```
cif export rater rater.cif.xml
rif export rater rater.rif.xml
```

3. In production systems that are live, make backup copies.
4. Edit the retrieved `rater.cif.xml` and `rater.rif.xml` configuration files.
5. For each `bulkwriter` XML element, set the `preCreate` attribute to `true`.
6. Save your modifications.
7. Import the modified CIF and RIF configurations for the rater instances using the following commands:

```
cif import rater rater.cif.xml
rif import rater rater.rif.xml
```

8. Restart the rater instances in the Core Server system.
- To enable the precreation of data files generated by the bulkloader instances, complete the following procedure:
 1. Launch your [favorite user interface \[page 22\]](#).
 2. Export the CIF and RIF configurations of the bulkloader instances using the following commands:

```
cif export bulkloader bulkloader.cif.xml
rif export bulkloader bulkloader.rif.xml
```

3. In production systems that are live, make backup copies.
4. Edit the retrieved `bulkloader.cif.xml` and `bulkloader.rif.xml` configuration files.
5. For each `bulkwriter` XML element, set the `preCreate` attribute to `true`.
6. Save your modifications.
7. Import the modified CIF and RIF configurations for the bulkloader instances using the following commands:

```
cif import bulkloader bulkloader.cif.xml
rif import bulkloader bulkloader.rif.xml
```

8. Restart the bulkloader instances in the Core Server system.

⁵⁰ Charging output Integration Framework

⁵¹ Rerating Integration Framework

4.1.11.13 Modifying the Version of Error Files Generated by Bulkloaders

During charging and refilling operations, raters generate data files containing information about incoming events. These data files are taken into account by bulkloaders, in charge of converting the content of these files and sending them to third-party systems. When an error occurs during bulk loading operations, the bulkloaders generate error files whose content depends on the configured version.

To modify the version of error files used by bulkloaders, execute the following procedure:

1. Launch your [favorite user interface \[page 22\]](#)
2. Export the CIF⁵² configuration of the bulkloader instances using the `cif export` command
3. Edit the retrieved `bulkloader.cif.xml` configuration file
4. For each `bulkwriter` XML element, set the `fileVersion` attribute to **1** or **2**
5. Save your modifications
6. Import the modified CIF configuration for the bulkloader instances using the `cif import` command
7. Restart the bulkloader instances of the Core Server system

4.1.11.14 Enabling the File Name Sequencing for Error Files Generated by Bulkloaders

The version 2 of error files generated by bulkloaders gives the possibility to add a sequence number to the names of the files. To enable this sequencing for error files, execute the following procedure:

1. Launch your [favorite user interface \[page 22\]](#) user interface and identify as the administrator of the Core Server system
2. Get the number of database connections currently set for **bulkloader** instances using the following command:

```
get SQLHELPER_CONNECTION_COUNT persistent bulkloader
```
3. Increase this number of connections by 1 using the following command:

```
set SQLHELPER_CONNECTION_COUNT <increased_value> persistent bulkloader
```

Where `<increased_value>` corresponds to the number of database connections, increased by 1
4. Enable the sequencing for error files by executing the following command:

```
set ITEM_FILE_SEQUENCE_ENABLED true persistent bulkloader
```
5. Launch your [favorite user interface \[page 22\]](#)
6. Export the CIF⁵³ configuration of the bulkloader instances using the `cif export` command
7. Edit the retrieved `bulkloader.cif.xml` configuration file
8. For each `bulkwriter` XML element located under a `bulkReader` XML element, set the following attributes to the relevant values:
 - `fileVersion` to **2**
 - `fileSequenceId` to a unique value (see [XXX_FILE_SEQUENCE_ID \(BulkWriter\)](#) parameter for further details)

⁵² Charging output Integration Framework

⁵³ Charging output Integration Framework

9. Save your modifications
10. Import the modified CIF configuration for the bulkloader instances using the `cif import` command
11. Restart the bulkloader instances of the Core Server system

4.1.11.15 Enabling the Recording of File Metadata

To monitor the generation of data files at rater and bulkloader level, execute the following procedure:

1. Launch your [favorite user interface \[page 22\]](#) and identify as the administrator of the Core Server system
2. For each rater and bulkloader instance of the Core Server system, enable the service in charge of recording metadata related to data files generated by SAP CC by executing the following commands:

```
set FILE_METADATA_RECORDING_ENABLED true persistent rater
set FILE_METADATA_RECORDING_ENABLED true persistent bulkloader
```

Note

For further information about this parameter, click on the link hereafter:
[FILE_METADATA_RECORDING_ENABLED](#).

3. Modify if necessary the update interval related to the recording service by modifying the [FILE_METADATA_UPDATE_INTERVAL](#) system parameter.
4. Restart the rater and bulkloader instances of the Core Server system. Metadata related to data files generated during the execution of the different processes are now recorded in the Core Database. You can use the [Analyze Item Files](#) dedicated application available in the SAP CC Cockpit user interface to visualize and analyze these metadata.

4.1.11.16 Enabling the Event Date Shifting Mechanism for Data Files Generated by the Rater Instances

To enhance the integration with SAP Convergent Invoicing in its system, an event date shifting mechanism is available in SAP Convergent Charging (SAP CC) to match the behavior of both systems regarding the interval of event dates (inclusion, exclusion).

As a system administrator, to enable this mechanism and shift the event dates, complete the following procedure:

1. Use the [SAP CC 2023 Setup Tool](#) user interface to export the CIF⁵⁴ configuration of the rater instances executing the following command:

```
cif export rater rater.cif.xml
```

2. Edit the retrieved `rater.cif.xml` configuration file.
3. Add the necessary `eventDateShifter` XML element in the processing channel, such as:
 - Around each `sequence` XML element that surrounds a `billableItemValidator` XML element

⁵⁴ Charging output Integration Framework

- Around each `billableItemValidator` XML element that is not surrounded by a `sequence` XML element.
4. Save your modifications.
 5. Import the modified CIF configuration for the rater instances using the following command:

```
cif import rater rater.cif.xml
```

6. Restart the rater instances in the Core Server system.

4.1.11.17 Enabling the Billable Item Validation for Data Files Generated by Rater Instances

To detect some possible errors during the generation of the billable items, SAP Convergent Charging (SAP CC) gives the possibility to perform a verification of the format of the charged items' fields.

→ Recommendation

- In case of charged item aggregation, SAP SE recommends that you disable the billable item validation to avoid losing charged items related to events which are already confirmed.
- The billable item validation mechanism may impact the global performance of your SAP system landscape. As a consequence, SAP SE recommends that you use this mechanism in validation landscapes to ensure the correct generation of billable items, and then disable it in production landscapes.

As a system administrator, to enable this validation mechanism, complete the following procedure:

1. Launch your [favorite user interface \[page 22\]](#).
2. Export the CIF⁵⁵ configuration of the rater instances using the `cif export` command.
3. Edit the retrieved `rater.cif.xml` configuration file
4. Add the necessary `billableItemValidator` XML element in the processing channel. SAP SE recommends that you put this element before the output operation within the data files, to avoid writing data that will later lead to errors
5. Save your modifications.
6. Import the modified CIF configuration for the rater instances using the `cif import` command.
7. Restart the rater instances in the Core Server system.

4.1.11.18 Enabling the Billable Item Validation for Data Files Generated by Bulkloader Instances (Cloud)

To detect some possible errors during the adaptation of billable items to the targeted web service, SAP CC gives the possibility to perform a verification of the billable items previously created by the rater instances in your SAP system.

⁵⁵ Charging output Integration Framework

As a system administrator, to enable this validation mechanism, complete the following procedure:

1. Launch your [favorite user interface \[page 22\]](#) and identify as the administrator of the Core Server system.
2. Export the CIF⁵⁶ configuration of the bulkloader instances using the following `cif export` command:

```
cif export bulkloader bulkloader.cif.xml
```

3. Edit the retrieved `bulkloader.cif.xml` configuration file.
4. Add the necessary `billableItemValidator` XML element in the processing channel, and set a `mode` attribute to "WS".
5. Save your modifications.
6. Import the modified CIF configuration for the bulkloader instances using the following command:

```
cif import bulkloader bulkloader.cif.xml
```
7. Restart the bulkloader instances in the Core Server system.

4.1.11.19 Executing a Charging Plan for Consumption Item Mapping

From an existing SAP CC 5.0 SP 6 system running with the older consumption item mapping, execute the following procedure to upgrade to the new consumption item mapping that will retrieve GPART from the external account code.

Update Procedure:

1. Set the `ACQUISITION_WITH_CHARGING_PLAN_ENABLED` to `TRUE`.

⚠ Caution

For compatibility reasons, this parameter is set to `false` in the case of an update of SAP CC 5.0 from SP 5 (or lower) to SP 6, but set to `true` in case of a new installation.

2. Use the [Setup Tool \[page 22\]](#) user interface.
3. Export from the Core Server system the two files requested by the consumption item mapping.
Execute the following commands:

```
setupTool eif exportDefaultMapping chargeableItem CC  
<sapcc_ci_additionalFields.xml>  
setupTool eif exportDefaultMapping chargeableItem CI  
<sapci_ci_defaultMapping.xml>
```

where `<sapcc_ci_additionalFields.xml>` and `<sapci_ci_defaultMapping.xml>` are the names you want to save the files as.
4. Create a backup of these two files.
5. Edit the `<sapcc_ci_additionalFields.xml>` file as follows:
 1. **Remove** the `subscriberAccountCode` variable:

```
<exportableItemMappingField name="default"  
  citcFieldName="default.subscriberAccountCode">  
  <additionalInformation name="value" value="subscriberAccountCode"  
    type="string" />  
</exportableItemMappingField>
```

⁵⁶ Charging output Integration Framework

2. **Add** a new variable (if not already declared):

```
<exportableItemMappingField name="default"
citcFieldName="default.externalAccountCode">
  <additionalInformation name="value" value="externalAccountCode"
type="string" />
</exportableItemMappingField>
```

Note

If you want to complete the default mapping policy with the external account name, add another variable as above, replacing `externalAccountCode` by `externalAccountName`.

6. Save your modifications.
7. Edit the `<sapci_ci_defaultMapping.xml>` file by adding a new variable as follows:

```
<?xml version="1.0" encoding="UTF-8"?>
<exportableItemMapping externalSystemCode="CI">
  <exportableItemMappingField name="CITID"
citcFieldName="default.chargeableItemId" />
  <exportableItemMappingField name="CITIDTYPE"
citcFieldName="default.chargeableItemIdType" />
  <exportableItemMappingField name="SRCTAID"
citcFieldName="default.chargedItemSetIdStr" />
  <exportableItemMappingField name="SRCTATYPE"
citcFieldName="default.chargedItemSetIdType" />
  <exportableItemMappingField name="ACCESS_USERID"
citcFieldName="default.userServiceIdentifier" />
  <exportableItemMappingField name="ACCESS_SERVICEID"
citcFieldName="default.serviceIdentifier" />
  <exportableItemMappingField name="CONSUMDATE"
citcFieldName="default.consumptionDate" />
  <exportableItemMappingField name="GPART"
citcFieldName="default.externalAccountCode" />
  <exportableItemMappingField name="SUBAP"
citcFieldName="default.contractType" />
  <exportableItemMappingField name="VTREF"
citcFieldName="default.contractId" />
  <exportableItemMappingField name="CONTRACTITEMID"
citcFieldName="default.contractItemExternalId" />
  <exportableItemMappingField name="RATINGDATE"
citcFieldName="default.eventProcessingDate" />
</exportableItemMapping>
```

Note

If you want to complete the default mapping policy with the external account name, add another mapping line as above, replacing `GPART` by `VKONT` and `externalAccountCode` by `externalAccountName`.

8. Save your modifications.
9. **Stop the rater instances.**
For further information about stopping SAP CC instances, refer to the [Starting and Stopping the Server Systems](#) section in the [SAP CC 2023 Installation and Maintenance Guide](#) documentation.
10. Control the termination of the rater instances using the dedicated app [Analyze Item Files](#) in the SAP Convergent Charging Cockpit user interface.
 1. Wait until all the chargeable item data files acquired and charged have been processed by the bulkloader instances.
 2. Manage the potential error files.

11. Import the two previously created files. Execute the following commands:


```
setupTool eif importDefaultMapping chargeableItem
<sapcc_ci_additionalFields.xml>
setupTool eif importDefaultMapping chargeableItem <sapci_ci_defaultMapping.xml>
where <sapcc_ci_additionalFields.xml> and <sapci_ci_defaultMapping.xml> are the names
you saved the files as.
```
12. Stop the Core Server system.

For further information about stopping the Core Server, refer to the [Starting and Stopping the Server Systems](#) section in the [SAP CC 2023 Installation and Maintenance Guide](#).
13. Start the updater and dispatcher instances of the Core Server system.

For further information about starting SAP CC instances, refer to the [Starting and Stopping the Server Systems](#) section in the [SAP CC 2023 Installation and Maintenance Guide](#).
14. Open the Core Tool user interface and refresh each existing consumption item mapping in SAP CC.

Refer to the [Modifying the Consumption Item Mapping](#) section of the [SAP CC 2023 Primary Help for Core Tool](#) documentation.

Check that the former subscriber account code has been replaced by the new external account code and that the mapping is the one expected.
15. Start the rater, guider, taxer and bulkloader instances of the Core Server system.

4.1.11.20 Requesting Verbose Logs for Creation of Billable Items (BITs) - Scenario with SAP S/4HANA Cloud Public Edition

In an integrated *SAP solution* scenario with SAP S/4HANA Cloud Public Edition, it is possible to ask SAP S/4HANA Cloud Public Edition to add verbose log messages to the confirmation messages related to the creation operations of billable items (BITs).

To request for these verbose log messages, execute the following procedure:

1. [Launch](#) the Admin+ user interface and identify as the administrator of the Core Server system.
2. For each concerned bulkloader instance, modify the value of the POSTPAID_WS_BIT_LOADER_VERBOSE system parameter (see the [XXX_VERBOSE \(WsBillableItemLoader\)](#) system parameters) in order to enable or disable the verbose mode for the log messages sent by SAP S/4HANA Cloud Public Edition.

For further information about this system parameter, refer to its dedicated documentation available in the [SAP CC 2023 System Parameter Reference](#) documentation.

4.1.12 Data Purging

[Keywords \[page 132\]](#)

[Preliminary Notes \[page 132\]](#)

[Description \[page 132\]](#)

[Configuring the Allowances Purge Mechanism and Its Scheduler \[page 132\]](#)

[Configuring the File Metadata Purge Mechanism and Its Scheduler \[page 134\]](#)

[Configuring the Product Usage Purge Mechanism and Its Scheduler \[page 136\]](#)

4.1.12.1 Keywords

Purge, allowance, change list, file metadata, retention period, expired, scheduler, product usage metrics

4.1.12.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [Data Purging](#) description of the [SAP CC 2023 Application Help](#) documentation
- [Purging and Archiving \[page 426\]](#) section of the [SAP CC 2023 Administration Guide \[page 8\]](#) documentation
- [Installing and Launching Admin+](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation

4.1.12.3 Description

As described in the [SAP CC 2023 Application Help](#) documentation, SAP Convergent Charging manages high volumes of data that is stored within the different databases (Core Database, Session Database and BART Database). To ensure performance, it is necessary to remove obsolete and/or useless data.

You can use this procedure to configure the purge of:

- Expired allowances whose expiration date exceeds a given retention period
- Metadata related to data files generated by SAP CC during the execution of the different processes
- Metrics related to the product usage

4.1.12.4 Configuring the Allowances Purge Mechanism and Its Scheduler

Purge operations related to expired allowances data can be executed:

- Automatically using a dedicated scheduler
- Manually using the `start_purge_allowances` command of the Admin+ user interface
- Automatically or manually using an external triggering tool that implements some APIs of SAP CC.

To ensure the global performance of the SAP system, regular purges are required.

Allowance data is stored into the Core Database system, in the ALLO table.

→ Remember

In the SAP system, the active updater instance executes the scheduler, and this scheduler drives the rater instances that process the purge operations. This orchestration is fundamental.

For automated purges with SAP Convergent Charging, the following table contains the list of system parameters you can use:

System Parameter	Description
ALLOWANCES_PURGE_RETENTION_PERIOD	Number of days until which expired allowances are kept into the database and cannot be deleted
ALLOWANCES_PURGE_THREAD_COUNT	Number of threads to use when performing the allowances purge operations
ALLOWANCES_PURGE_SCHEDULER_ENABLED	Enables/disables the scheduling of purge operations related to expired allowances
ALLOWANCES_PURGE_SCHEDULER_RECURRENCE	Execution recurrence of the dedicated scheduler
ALLOWANCES_PURGE_SCHEDULER_MAX_THROUGHPUT	Maximum number of charging contracts per second that the scheduler can consider when purging allowances

By default, the scheduler in charge of executing allowances purge operations is preconfigured:

- To be triggered every day at midnight
- To be executed using 1 thread per rate
- To purge the allowances of 10 provider contracts per second at the most
- To take into account a default retention period for allowances that must be the same than the retention period used for recharging purposes (set as 40 days by default)

📌 Note

Only one execution of the scheduler is possible at the same time. It is executed by the updater instance that has the ACTIVE state at the moment of the purge.

The date/time of this execution is recorded in the [ALLOWANCES_PURGE_SCHEDULER_LAST_TRIGGER](#) indicator, for information purpose. Check the values of this indicator for all the updater instances to know which instance executed the scheduler and when.

Procedure

⚠ Caution

For performance purposes, the execution of the scheduler in charge of purging the expired allowances in contracts is associated with the execution scheduler used to perform the activation of provider contracts.

When the executions of these two schedulers occur at the same time, a "merged operation" is performed to immediately remove expired allowances of each activated provider contract. As this merged operation

also shares the technical configured resources (threads and throughputs), **SAP SE recommends that you decouple the executions of the two schedulers if you detect any overload or latency.**

Check that the purges are enabled (ACTIVATION_SCHEDULER_ENABLED and ALLOWANCES_PURGE_SCHEDULER_ENABLED) and check the current configurations (main options, suboptions, and tuning options) in your SAP system.

To modify the configuration of the purge operations of data that relate to expired allowances, execute the following procedure:

1. Launch your [favorite user interface \[page 22\]](#) and identify as the administrator of the Core Server system.
2. For each rater instance, modify the values of the following system parameters:

- [ALLOWANCES_PURGE_RETENTION_PERIOD](#)
- [ALLOWANCES_PURGE_THREAD_COUNT](#)

Change both the persistent and the runtime values.

You do not need to restart these instances in the system.

3. If you only modified the persistent value of the system parameters, you must restart the rater instances.
4. For each updater instance, modify the values of the following system parameters:

- [ALLOWANCES_PURGE_SCHEDULER_ENABLED](#)
- [ALLOWANCES_PURGE_SCHEDULER_RECURRENCE](#)
- [ALLOWANCES_PURGE_SCHEDULER_MAX_THROUGHPUT](#)

Change both the persistent and the runtime values.

You do not need to restart these instances in the system.

5. If you only modified the persistent value of the system parameters, you must restart the updater instances.

See Also

[Manually Purging the Expired Allowances \[page 430\]](#)

Related Information

[Detailed Purge and Archive in Core Database \[page 426\]](#)

4.1.12.5 Configuring the File Metadata Purge Mechanism and Its Scheduler

Purge operations related to metadata for data files (aka item files) can be executed:

- Automatically using a dedicated scheduler
- Manually using the `purge_file_metadata` command of the Admin+ user interface
- Automatically or manually using an external triggering tool that implements some APIs of SAP CC.

To ensure the global performance of the SAP system, regular purges are required.

For each data file (aka item file) generated by the SAP system, some metadata information is recorded and stored into the Core Database system, in the FILE_METADATA table.

For automated purges with SAP Convergent Charging, the following system parameters are available:

System Parameter	Description
FILE_METADATA_PURGE_SCHEDULER_ENABLED	Enables/disables the scheduler in charge of purging metadata related to data files generated by SAP CC
FILE_METADATA_PURGE_SCHEDULER_RECURRENCE	Execution recurrence of the dedicated scheduler, which corresponds by default to an execution every day at midnight
FILE_METADATA_PURGE_RETENTION_PERIOD	Number of days until which file metadata whose reference date/time is exceeded must be taken into account by the dedicated scheduler in charge of purging file metadata

Preparation

Determine the custom values that suit your requirements for automated purges.

Procedure

1. Launch your [favorite user interface \[page 22\]](#) and identify as the administrator of the Core Server system.
2. For each updater instance, modify the values of the following system parameters:
 - [FILE_METADATA_PURGE_SCHEDULER_ENABLED](#)
 - [FILE_METADATA_PURGE_SCHEDULER_RECURRENCE](#)
 - [FILE_METADATA_PURGE_RETENTION_PERIOD](#)If you modified the runtime values, the changes are immediate.
You do not need to restart the updater instances in the system.
3. If you only modified the persistent value of the system parameters, you must restart the updater instances.

See Also

[Manually Purging the File Metadata \[page 435\]](#)

Related Information

[Detailed Purge and Archive in Core Database \[page 426\]](#)

4.1.12.6 Configuring the Product Usage Purge Mechanism and Its Scheduler

As described in the [Recording SAP Product Usage Metrics \[page 212\]](#) dedicated section, metrics related to SAP product usage are recorded in the Core Database by a dedicated scheduler of SAP Convergent Charging (SAP CC). In addition to the recording of these metrics, this scheduler is also responsible for executing the purge of metrics that exceed the retention period.

As a consequence, no manual purge operation is available. You can only tune the purge of product usage metrics by:

- Modifying the retention period for the recorded metrics through the [METRIC_RECORD_TIME_WINDOW](#) system parameter
- Enabling the scheduler in case it has been disabled through the [METRIC_RECORDING_SCHEDULER_ENABLED](#) system parameter

for each updater instance of the Core Server

Modify the Retention Period

Set up `METRIC_RECORD_TIME_WINDOW` to the persistent value that suits your needs. It defaults to 1,825 days that represents 5 years. Changes cannot be immediate.

Restart all the updater instances.

Enable the Scheduler Back

Set up `METRIC_RECORDING_SCHEDULER_ENABLED` to true.

Change all the persistent and runtime values so you do not need to restart the updater instances.

Disable

Set up `METRIC_RECORDING_SCHEDULER_ENABLED` to false.

Change all the persistent and runtime values so you do not need to restart the updater instances.

Related Information

[Detailed Purge and Archive in Core Database \[page 426\]](#)

4.1.13 Databases Management

[Mechanisms for the Session Database \[page 137\]](#)

4.1.13.1 Mechanisms for the Session Database

[Table Rollover Policy for Charging Sessions \[page 137\]](#)

4.1.13.1.1 Table Rollover Policy for Charging Sessions

[Keywords \[page 137\]](#)

[Preliminary Notes \[page 137\]](#)

[Description \[page 138\]](#)

[Enabling the Table Rollover Mechanism \[page 138\]](#)

[Fine-Tuning the Table Rollover Policy \[page 138\]](#)

4.1.13.1.1.1 Keywords

Session Database, session-based charging, rating session, charging session, rollover, fragmentation

4.1.13.1.1.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [Table Rollover for Rating Sessions](#) and [Dual Database](#) sections of the [SAP CC 2023 Application Help](#) documentation
- [Database Management Settings](#) group in the [SAP CC 2023 System Parameter Reference](#) documentation

4.1.13.1.1.3 Description

As described in the description of the [Dual Database](#) feature available in the [SAP CC 2023 Application Help](#) documentation, the Session Database is an optional database that contains the different data related to the business objects handled by SAP CC during the session-based charging operations.

When this database is used, each event that occurs on a given rating session leads to one or multiple operations that directly impact the content of the Session Database. These frequent modifications may lead to the fragmentation of the database tables, which decreases its performances and can consequently decrease the overall performance of your landscape.

You can use this procedure to configure a rollover mechanism that reduces the fragmentation of the storage related to the rating sessions within the Session Database.

4.1.13.1.1.4 Enabling the Table Rollover Mechanism

If the [RATING_SESSION_TABLE_ROLLOVER_COUNT](#) system parameter has been set to a value higher than 1, the table rollover mechanism is activated. In this case, the rater instances record the session data in the relevant table considered as destination for the current period.

Note

You can use the [RATING_SESSION_TABLE_ROLLOVER_STATUS](#) indicator to see the status of the mechanism, particularly the validity period of the currently used destination.

4.1.13.1.1.5 Fine-Tuning the Table Rollover Policy

If the Session Database is part of your SAP system landscape, fine-tune the table rollover mechanism.

As described in the [SAP CC 2023 Application Help](#) documentation, the configuration of the rollover mechanism is based on the following system parameters:

- [RATING_SESSION_TABLE_ROLLOVER_COUNT](#), used to specify the number of tables that can be used as destinations by the rater instances to store the rating sessions
- [RATING_SESSION_TABLE_ROLLOVER_PERIOD](#), that defines the validity period (in days) of the table that is currently used as destination for storing the rating sessions data

To fit your specific needs, SAP SE recommends that you take into consideration the maximum duration of your rating sessions. Indeed, the validity period must be large enough to avoid that a pending rating session that has been created within a given destination table locks the defragmentation of this table after the table switch.

Example

Considering 2 destination tables used to store rating sessions whose maximum observed duration is 1 day, you can set a validity period of 7 days. This validity period implies that:

- During the 7 first days, the rating sessions will be created in the current destination table
- The 8th day, the new rating sessions will be created in the newly switched destination table. The cleanup of the previous destination table begins and will lead to the deletion of the ended rating sessions, but will not impact the pending ones
- The 9th day, all rating sessions created in the previous destination table are theoretically ended and can be deleted
- The 10th day, the previous destination table is empty, and is thus no more fragmented

Once you determined a validity period, SAP SE recommends that you start using 2 destination tables. You can increase this number up to 4 destination tables, but you need to keep in mind that each destination table represents the same physical storage, that needs to be available in your landscape. Increasing the number of destination tables thus requires multiplying the physical storage space. Theoretically, when the validity is well-tuned, 2 destination tables should be enough.

📌 Note

If you hot change the number of destination tables or the validity period, the “From” date available in the [RATING_SESSION_TABLE_ROLLOVER_STATUS](#) indicator will not reflect the real start date of the period.

4.1.14 Java Virtual Machine

[Keywords \[page 139\]](#)

[Preliminary Notes \[page 139\]](#)

[Description \[page 140\]](#)

[Configuration Options \[page 140\]](#)

[Enabling the Generation of Java GC Logs \[page 142\]](#)

4.1.14.1 Keywords

JVM⁵⁷ options, virtual machine, memory heap, garbage collection, buffers

4.1.14.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- “JVM⁵⁸ option recommendations for SAP Convergent Charging” SAP Note [2006073](#)  documentation

⁵⁷ Java Virtual Machine

⁵⁸ Java Virtual Machine

- “Generate Java GC Log for SAP Convergent Charging” SAP Note [1950168](#) documentation

4.1.14.3 Description

The architecture of SAP Convergent Charging relies on a set of Java-based applications whose execution require a Java Runtime Environment (JRE) that can be configured to fit specific requirements.

You can use this procedure to determine the different Java Virtual Machine (JVM) options that must be configured within the startup configuration files of each instance of the Core Server system.

Note

For further information on how to configure the startup configuration file, refer to the [Startup Configuration Files \[page 208\]](#) section of this documentation.

4.1.14.4 Configuration Options

The following table contains the list of JVM⁵⁹ options you can configure:

JVM Option	Description
JVM Settings for Garbage Collection	
<code>-Xlog:gc</code>	Enables/disables the basic GC logging mode, which consists in recording 1 line for every Young Generation GC and for every Full GC
<code>-Xlog:gc:*</code>	Enables/disables the detailed GC logging mode, whose content depends on the algorithm used for garbage collection
<code>-Xlog:gc:<FULL_PATH></code>	Defines the path and name of the logging file. Setting this option implicitly sets the <code>-Xlog:gc</code> and <code>-Xlog:gc:*</code> options.
<code>-XX:LogGcMaxFileSize=<SIZE></code>	Defines the maximum size of a GC log file, expressed in bytes. If the log file exceeds this size, a new log file is created. A number of "old" log files are kept, according to the value of the <code>-XX:LogGcMaxFileCount</code> option
<code>-XX:LogGcMaxFileCount=<NUMBER></code>	The maximum number of files to use for the GC log. A new GC log file is created when the JVM is restarted or when the log file size exceeds the size given by the <code>-XX:LogGcMaxFileSize</code> option
<code>-Xlog:age*=level</code>	Prints/hides tenuring age information
<code>-Xlog:gc+promotion=debug</code>	Prints/hides additional diagnostic information about promotion failure
<code>-Xlog:gc*:time</code>	Prints/hides additional information about the fragmentation of the heap memory
JVM Settings for Garbage Collection and History	

⁵⁹ Java Virtual Machine

JVM Option	Description
<code>-XX:StartFlightRecording, filename=<FULL_PATH>, settings=<CONFIGURATION_FILE>, compress=<LEVEL>, max size=<SIZE></code>	<ul style="list-style-type: none"> Enables the garbage collection history, defines the path and name of the file to be used to save the recording, defines the settings/configuration file (for example: <code>gc_details.jfc</code>), sets the compression level for garbage collection history files (from 0 to 9, 0 meaning no compression and 9 the maximum possible compression), sets the maximum size of a file containing information related to garbage collection history, expressed in bytes.
JVM Settings for Performance and Stability	
<code>-Xmn<SIZE ></code>	Defines the size of the heap memory for the young generation, expressed in bytes. Append the letter k or K to indicate kilobytes, or m or M to indicate megabytes
<code>-Xms<SIZE ></code>	Defines the initial size of the heap memory, expressed in bytes. This value must be a multiple of 1024 greater than 1MB. Append the letter k or K to indicate kilobytes, or m or M to indicate megabytes. The default value is 2MB
<code>-Xmx<SIZE ></code>	Defines the maximum size of the heap memory, expressed in bytes. This value must be a multiple of 1024 greater than 2MB. Append the letter k or K to indicate kilobytes, or m or M to indicate megabytes. The default value is 64MB
<code>-Xss<SIZE ></code>	Defines the size of the Java thread stack, expressed in bytes. Append the letter k or K to indicate KB, m or M to indicate MB, g or G to indicate GB. The default value depends on the virtual memory
<code>-XX: {+-}UseParallelGC</code>	Enables the use of the parallel compacting collector algorithm for GCs operations. Enabling this option implicitly enables the former <code>-XX:+UseParallelOldGC</code> option
<code>-XX:MaxDirectMemorySize=<SIZE ></code>	Defines the maximum total size (in bytes) of the New I/O (the <code>java.nio</code> package) direct-buffer allocations. Append the letter k or K to indicate kilobytes, m or M to indicate megabytes, g or G to indicate gigabytes. By default, the size is set to 0, which means that the JVM chooses automatically the size for NIO direct-buffer allocations
<code>-XX:CompileThreshold=<NUMBER></code>	<p>Defines the number of interpreted method invocations before compilation. By default:</p> <ul style="list-style-type: none"> On server side, the JIT compiler performs 10000 method invocations to gather information for efficient compilation On client side, the default setting is 1500 invocations
<code>-XX:SurvivorRatio=<RATIO></code>	Defines the initial survivor space ratio that is used by the throughput garbage collector (which is enabled by the <code>-XX:+UseParallelGC</code> option). By default, the initial survivor space ratio is set to 16
<code>-XX:ConcGCThreads=<NUMBER></code>	Defines the number of threads used for concurrent GC. The default value depends on the number of CPUs that are available for the JVM

JVM Option	Description
<code>-XX:ParallelGCThreads=<NUMBER></code>	Defines the number of threads used for parallel garbage collection in the young and old generations. The default value depends on the number of CPUs that are available for the JVM
<code>-XX:TargetSurvivorRatio=<NUMBER></code>	Defines the desired percentage of survivor space (from 0 to 100) used after young garbage collection. By default, this option is set to 90%
<code>-XX:{+-}ScavengeBeforeFullGC</code>	Enables garbage collection of the young generation before each full GC. This option is enabled by default and it is not recommended to disable it, as scavenging young generation before a full GC can reduce the number of objects reachable from the old generation space into the young generation space
<code>-XX:{+-}UseAdaptiveSizePolicy</code>	Enables the automatic sizing of the young generation and selection of an optimum survivor ratio to maximize performance during parallel GC
<code>-XX:PromotedPadding=<NUMBER></code>	Defines the size of the buffer used for promotion failures
<code>-XX:{+-}DisableExplicitGC</code>	Disables the processing of calls to <code>System.gc()</code> . SAP SE recommends that you disable this option for updaters and dispatchers
<code>-XX:{+-}TieredCompilation</code>	Enables the tiered compilation
Other JVM Settings	
<code>-Dsapcc.home</code>	File path and name of the SAP CC Working Directory
<code>-Dboot.config=<FULL_PATH></code>	File path and name of the <code>boot.config</code> file
<code>-Dfile.encoding</code>	Encoding settings. Must be set to UTF-8
<code>-Dsun.nio.ch.useIPv6Stack</code>	Only required for MS Windows landscapes using IPv6
<code>-Dcom.sap.jvm.xerces.disallowDocTypeDecl.failEarly</code>	Must be set to <code>true</code>

4.1.14.5 Enabling the Generation of Java GC Logs

Performance issues or timeout issues for one instance of your SAP Convergent Charging system may relate to a performance issue with the execution of the Java garbage collection (GC) process that is executed by the Java Virtual Machine (JVM) that runs an SAP CC system instance composing the SAP system.

To track any Java garbage collection performance issue, your support specialists can inspect detailed information available in recorded Java GC logs:

- Basic logs (Java GC history log)
- Advanced logs (Java verbose GC log)

Check the space for the Java GC logs in the file system (SAN, disks).

Complete the procedures detailed in SAP Note [1950168](#) .

Related Information

[Log Files of the Java Garbage Collection \(GC\) \[page 349\]](#)

4.1.15 JCo Destinations

[Keywords \[page 143\]](#)

[Preliminary Notes \[page 143\]](#)

[Description \[page 143\]](#)

[Configuration Settings for JCo \[page 144\]](#)

[Creating JCo Destinations \[page 147\]](#)

[Maintaining a JCo Destination \[page 147\]](#)

[Setting Up the ERP Reference System \[page 148\]](#)

4.1.15.1 Keywords

JCo⁶⁰ destination, RFC⁶¹ over TCP/IP⁶², SAP ERP reference, SAP CRM, SAP ERP/FI-CA

4.1.15.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- SAP JCo documentation available on SAP Help Portal
- [Installing and Executing Setup Tool](#) and [Securing the RFC over TCP/IP Communications](#) sections of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation

4.1.15.3 Description

SAP Convergent Charging uses the SAP Java Connector (SAP JCo)⁶³ technology to communicate with the SAP CRM and SAP ERP/FI-CA systems, through the Remote Function Calls (RFCs) protocol provided by SAP.

⁶⁰ Java Connector

⁶¹ Remote Function Call

⁶² Transmission Control Protocol/Internet Protocol

⁶³ Java Connector

You can use this procedure to manage the different JCo destinations in your SAP system landscapes.

4.1.15.4 Configuration Settings for JCo

The following table contains the list of configuration settings that you can [change \[page 147\]](#), grouped into the following categories:

- JCo⁶⁴ server settings
- JCo client settings
- Tuning settings
- Security settings
- Load-balancing connections

Setting	Values
JCo Server Settings	
<code>jco.client.ashost</code> Host name or IP address of the SAP Application Server (or SAP Netweaver Gateway)	By default, no value is set. You must set the value that corresponds to the targeted host.
→ Remember This property is disallowed when using load balancing features.	
<code>jco.client.sysnr</code> SAP System Number used to determine the gateway service	By default, no value is set. The system number corresponds to the last two numbers of the port the targeted SAP System runs on.
→ Remember This property is disallowed when using load balancing features.	
JCo Client Settings	
<code>jco.client.client</code> Name of the SAP login client	By default, no value is set. You can set any 3-digit value that corresponds to the targeted SAP System (preserving the leading zeros in case they appear in the number).
<code>jco.client.user</code> Login used for authenticating on the remote SAP System	By default, no value is set. You must specify a service user that relates to a communication channel between SAP CC and an SAP system (SAP ERP, SAP CRM) that is available in your SAP system landscape.

⁶⁴ Java Connector

Setting	Values
<p><code>jco.client.passwd</code></p> <p>Password of the previously specified logon, used for authenticating on the remote SAP System</p>	<p>By default, no value is set. You must set a password that respects the SAP password policy.</p>
<p><code>jco.client.lang</code></p> <p>Language of the remote SAP System</p>	<p>The default value is set to: en</p> <p>You can set any ISO two-character language code or SAP-specific single-character language code.</p>
Tuning Settings	
<p><code>jco.destination.peak_limit</code></p> <p>Maximum number of active connections that can be simultaneously created for a JCo destination</p>	<p>The default value is set to: 10</p> <p>You can set any positive value.</p>
<p><code>jco.destination.pool_capacity</code></p> <p>Maximum number of idle connections kept open by the JCo destination</p>	<p>The default value is set to: 3</p> <p>You can set any positive value. Setting this parameter to 0 disables the pooling of connections.</p>
Security Settings	
<p><code>jco.client.snc_mode</code></p> <p>Enables/disables the use of Secured Network Communications (SNC)</p>	<p>The default value is set to: 0</p> <p>Possible values are:</p> <ul style="list-style-type: none"> 0: Not activated 1: Activated
<p><code>jco.client.snc_lib</code></p> <p>Absolute path of the SAP Cryptographic Library that provides secured network connections</p>	<p>By default, no value is set. You must set a value that corresponds to the absolute path of the targeted library, such as:</p> <ul style="list-style-type: none"> For MS Windows operating systems: <code>C:\usr\sap\<SID>\SYS\exe\uc\<OS>\sapcrypto.dll</code> For Linux, HP-UX and Solaris operating systems: <code>/usr/sap/<SID>/SYS/exe/uc/<OS>/libsapcrypto.so</code> For AIX operating systems: <code>/usr/sap/<SID>/SYS/exe/uc/<OS>/libsapcrypto.o</code> <p>Where:</p> <ul style="list-style-type: none"> <SID> corresponds to the system identifier of the concerned Core Server system <OS> corresponds to the relevant operating system

Setting	Values
<p><code>jco.client.snc_qop</code></p> <p>Security level of the secured network connections</p>	<p>The default value is set to: 3</p> <p>Possible values are:</p> <ul style="list-style-type: none"> • 1: Authentication only • 2: Integrity protection • 3: Privacy protection • 8: Use the value from <code>snc/data_protection/use</code> on the SAP Application Server
<p><code>jco.client.snc_myname</code></p> <p>Name of the secured network connection, that overrides the default secure network connection partner</p>	<p>By default, no value is set. You must set a value that corresponds to the SNC name for SAP Convergent Charging, such as: p:CN=SAPCC, O=<MyCompany>, C=US</p> <div style="border: 1px solid #ccc; background-color: #f9f9f9; padding: 10px; margin-top: 10px;"> <p>Note</p> <ul style="list-style-type: none"> • Although this parameter is optional, SAP SE recommends that you set this value in order to ensure that a correct SNC name is used for the connection • The SNC name does not correspond to the Distinguished Name you used when creating the Personal Security Environment. The SNC name has the following syntax: p:<Distinguished_Name>. </div>
<p><code>jco.client.snc_partnername</code></p> <p>SNC name of the Application Server, that acts as the SNC partner</p>	<p>By default, no value is set. You can find the Application Server's SNC name in the profile parameter named <code>snc/identity/as</code></p>
<p><code>jco.client.snc_sso</code></p> <p>Single Sign-On protocol</p>	<p>The default value is set to: 1</p> <p>Possible values are:</p> <ul style="list-style-type: none"> • 0: Single Sign-On protocol disabled • 1: Single Sign-On protocol enabled <p>Set the value to 0 as of JCo 3.0.9</p>
<p>Load-Balancing Connections</p>	
<p><code>jco.client.mshost</code></p> <p>Host name or IP address of the message server</p>	<p>By default, no value is set. You must set the value that corresponds to the targeted host.</p>
<p><code>jco.client.msserv</code></p> <p>Port number or logical name of the message server</p>	<p>The default value is set to: sapms<sysid></p>
<p><code>jco.client.r3name</code></p> <p>SID of the system</p>	<p>By default, no value is set.</p> <p>Corresponds to the three-letter system ID of your backend system.</p> <p>This option is ignored if <code>jco.client.msserv</code> is set.</p>

Setting	Values
<code>jco.client.group</code>	The default value is set to: PUBLIC
Name of the logon group of the messaging server (optional)	

→ Remember

SAP Convergent Charging considers all JCo standard parameters. Consult the SAP Java Connector documentation for any other specific one: <https://support.sap.com/en/product/connectors/jco.html>

4.1.15.5 Creating JCo Destinations

To create a JCo⁶⁵ destination in the Core Server system, execute the following procedure:

1. In your SAP CC system landscape, connect to the host where a dispatcher instance is installed.
2. On this host, copy the `jco.destination.sk` file available in the `config/sapci` folder of the dispatcher instance in a new `jco.destination` file.
3. Edit this newly created file and modify the relevant settings to fit the targeted SAP system.

For further information about the available configuration settings, refer to the [Configuration Settings for JCo \[page 144\]](#) section.

4. In the [Setup Tool](#) user interface, execute the `jcodestination import` command to import these settings in the Core Database system.
5. Restart the dispatcher and the bulkloader instances in the Core Server system.
6. Verify if you must restart the rater instances in your Core Server system.

If the system parameter `JCO_CONNECTION_COUNT` is set to 1 or more, then do restart all these rater instances.

Related Information

[jcodestination import](#)

4.1.15.6 Maintaining a JCo Destination

To maintain a JCo destination, still [using](#) the Setup Tool user interface:

1. List the existing JCo destinations by executing the `jcodestination list` command.

⁶⁵ Java Connector

2. Export these JCo destinations settings by executing the `jcodestination export` command.
3. Edit the retrieved file and modify the relevant settings depending on your business or technical requirements.
4. Import the modified JCo destinations by executing the `jcodestination import` command.
5. To apply your changes, restart the dispatcher and the bulkloader instances in the Core Server system.
6. Verify if you must restart the rater instances in your Core Server system.

If the system parameter `JCO_CONNECTION_COUNT` is set to 1 or more, then do restart all these rater instances.

Related Information

[jcodestination list](#)
[jcodestination export](#)
[jcodestination import](#)

4.1.15.7 Setting Up the ERP Reference System

SAP Convergent Charging communicates with a particular SAP ERP system in your landscape to synchronize some business or technical data (such as currencies, billable item (BIT) classes or consumption item classes). This reference ERP system corresponds to a JCo destination that is set at installation time by the SAP installer (in case of integrated installation scenario). In case you need to modify this initial configuration or refer to a new SAP ERP system, execute the following procedure:

1. In the [Setup Tool](#), execute the `jcodestination list` command to retrieve the list of all the JCo destinations that are available in the Core Database system.
2. If the targeted SAP ERP system corresponds to one of the previously retrieved JCo destinations, execute the `jcodestination export` command to ensure that the configuration of this JCo destination is correct. If the targeted SAP ERP system does not correspond to one of the previously retrieved JCo destinations, or if the exported configuration does not fit, you must create the relevant JCo destination using the [Creating JCo Destinations \[page 147\]](#) section above.
3. Once the relevant JCo destination has been located or created, execute the `erpreferencesystem setJCoDestination` command, specifying the name of the JCo destination that must be used to communicate with the SAP ERP system.
4. Restart the dispatcher and bulkloader instances of the Core Server system.

4.1.16 Logging and Tracing

[Keywords \[page 149\]](#)

[Preliminary Notes \[page 149\]](#)

[Description \[page 149\]](#)

[Configuration Options \[page 150\]](#)

[Modifying the Logging and Tracing Policy \[page 152\]](#)

[Integrating SAP CC Logs and Traces with Your Java Application \[page 158\]](#)

4.1.16.1 Keywords

Log, trace, category, severity, domain, threshold, troubleshoot

4.1.16.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [Installing and Launching Admin+](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation
- [Installing and Executing Config Tool](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation
- [Starting and Stopping the Server Systems](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation
- [Enhanced Logging and Tracing Framework](#) section of the [SAP CC 2023 Application Help](#) documentation
- “Troubleshooting: Logs and Traces” group in the [SAP CC 2023 System Parameter Reference](#) documentation
- [Startup Configuration Files \[page 208\]](#) configuration section of this documentation

This procedure uses the following variables:

- `<SAPCC_SYSADM_USERNAME>` and `<SAPCC_SYSADM_PASSWORD>`, which corresponds to the name and password of the administrator of your Core Server system ("admin" by default)
- `<INSTANCE_ID>`, which corresponds to the identifier of a concerned instance
- `<LEVEL>`, which corresponds to a possible level (DEBUG, PATH, INFO, WARNING, ERROR or FATAL)
- `<XML_FILE_PATH>`, which corresponds to an XML file containing the exported configuration of the Core Server system

4.1.16.3 Description

As described in the [SAP CC 2023 Application Help](#) documentation, SAP Convergent Charging provides logging and tracing features that give the possibility to generate log messages (for system administrators) and trace messages (for support specialists):

- According to defined levels such as severity, thresholds, domains, categories

- Using different output formats
- In multiple output destinations
- That can be viewed and analyzed in the [SAP Management Console](#) or [SAP Microsoft Management Console](#) applications

Mainly addressed to SAP CC administrators and support specialists, the generation of these log and trace messages can be configured in order to fit specific needs such as landscape monitoring, performance tracing, issue troubleshooting, and so on.

You use the following procedures to configure the logging and tracing capabilities of your Core Server system and thus fit your specific needs.

Related Information

[Enhanced Logging and Tracing Framework](#)

4.1.16.4 Configuration Options

Logging and tracing features can be configured:

- Through SAP CC system parameters
- Through dedicated options of the JVM⁶⁶

The following table contains the list of available settings, including the correspondence between Core Server system parameters and JVM options (when exists):

Settings	Description	System Parameter	JVM Option
Logs	Severity threshold for logs	LS_APP_SEVERITY	<code>ls.app.severity</code>
(business processing)	Identifier(s) of the destination(s)	LS_APP_DESTINATION	<code>ls.app.destination</code>
Logs	Severity threshold for logs	LS_SYS_SEVERITY	<code>ls.sys.severity</code>
(system processing)	Identifier(s) of the destination(s)	LS_SYS_DESTINATION	<code>ls.sys.destination</code>
Traces	Severity threshold for traces	LS_TRC_SEVERITY	<code>ls.trc.severity</code>
	Identifier(s) of the destination(s)	LS_TRC_DESTINATION	<code>ls.trc.destination</code>
	Domain(s) for traces	LS_TRC_DOMAIN	<code>ls.trc.domain</code>
Console Destination	Enable/Disable	LDC_ENABLED	<code>ld.console.enabled</code>

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Settings	Description	System Parameter	JVM Option
	Output format	LDC_FORMATTER	ld.console.formatter
Fileset Destination #1	Enable/Disable	LDF1_ENABLED	ld.file1.enabled
	Output format	LDF1_FORMATTER	ld.file1.formatter
	Number of files available for the rotation	LDF1_FILESET_SIZE	ld.file1.setsize
	Maximum file size before rotation	LDF1_FILE_SIZE	ld.file1.size
	File path, name, and extension	LDF1_FILE_NAME	ld.file1.name
Fileset Destination #2	Enable/Disable	LDF2_ENABLED	ld.file2.enabled
	Output format	LDF2_FORMATTER	ld.file2.formatter
	Number of files available for the rotation	LDF2_FILESET_SIZE	ld.file2.setsize
	Maximum file size before rotation	LDF2_FILE_SIZE	ld.file2.size
	File path, name, and extension	LDF2_FILE_NAME	ld.file2.name
Fileset Destination #3	Enable/Disable	LDF3_ENABLED	ld.file3.enabled
	Output format	LDF3_FORMATTER	ld.file3.formatter
	Number of files available for the rotation	LDF3_FILESET_SIZE	ld.file3.setsize
	Maximum file size before rotation	LDF3_FILE_SIZE	ld.file3.size
	File path, name, and extension	LDF3_FILE_NAME	ld.file3.name
Fileset Destination #4	Enable/Disable	LDF4_ENABLED	ld.file4.enabled
	Output format	LDF4_FORMATTER	ld.file4.formatter
	Number of files available for the rotation	LDF4_FILESET_SIZE	ld.file4.setsize
	Maximum file size before rotation	LDF4_FILE_SIZE	ld.file4.size
	File path, name, and extension	LDF4_FILE_NAME	ld.file4.name
Fileset Destination #5	Enable/Disable	LDF5_ENABLED	ld.file5.enabled
	Output format	LDF5_FORMATTER	ld.file5.formatter

Settings	Description	System Parameter	JVM Option
	Number of files available for the rotation	LDF5_FILESET_SIZE	ld.file5.setsize
	Maximum file size before rotation	LDF5_FILE_SIZE	ld.file5.size
	File path, name, and extension	LDF5_FILE_NAME	ld.file5.name
JCo ⁶⁷ traces	Level of JCo traces, from 0 to 10	JCO_TRACE_LEVEL	N/A
(integrated landscape)	Level of JCo CPIC traces, from 0 to 3	JCO_CPIC_TRACE_LEVEL	N/A
	Enable/Disable JCo RFC ⁶⁸ traces	JCO_JRFC_TRACE_LEVEL	N/A
	Path of the folder used to write trace files	JCO_TRACE_PATH	N/A

By default, logging and tracing features are configured to fit a productive landscape, which corresponds to the following configuration:

- The logging feature is enabled, with severity thresholds set to INFO
- The tracing feature is enabled, with severity thresholds set to ERROR
- Log and trace messages are generated in different files, that are available in the [SAP Management Console](#) or [SAP Microsoft Management Console](#) applications
- Generated files are stored in the working directory of each concerned instance
- File rotation is enabled

4.1.16.5 Modifying the Logging and Tracing Policy

To fit specific needs, you can modify the default configuration of the *Logging and Tracing* features for targeted instances. Regarding to this feature, some configuration settings can be immediate whereas some are not immediate and require a restart.

According to the modifications, you can perform:

- **Immediate** modifications:
 - Which do not need a restart of the targeted instances
 - Which can be temporary or permanent
 - Which can only be performed using:
 - The app Manage SAP CC System Parameters (in the SAP CC Cockpit user interface)
 - Or the Admin+ user interface
 - And which only concern severity thresholds and domains associated to:
 - A given instance
 - All instances of a given type
 - All instances of the Core Server system

⁶⁷ Java Connector

⁶⁸ Remote Function Call

- **Deferred** modifications:
 - Which need a restart of the targeted instances
 - Which are permanent
 - Which can be performed using:
 - The app Manage SAP CC System Parameters (in the SAP CC Cockpit user interface)
 - The Admin+ user interface (recommended in case of a few changes)
 - The Config Tool user interface (recommended in case of mass changes)
- For changes relating to destinations, storage location, file rotation rules, and format, SAP SE recommends that you update the startup configuration files. See [Startup Configuration Files \[page 208\]](#).

[Immediate or Deferred Modifications Using Manage SAP CC System Parameters \[page 153\]](#)

[Immediate Modifications Using Admin+ \[page 154\]](#)

In order to debug your SAP Convergent Charging system (Core Server), use this procedure to tune the generation and recording of trace messages by the system or by specific instances in the system.

[Deferred Modifications Using Admin+ \[page 156\]](#)

[Deferred Modifications Using Config Tool \[page 156\]](#)

[Deferred Modifications Using the Startup Configuration Files \[page 158\]](#)

Related Information

[Configuration Options \[page 150\]](#)

4.1.16.5.1 Immediate or Deferred Modifications Using Manage SAP CC System Parameters

With the app Manage SAP CC System Parameters of the SAP CC Cockpit, you can search for and view some system parameter values that are defined in a running SAP CC Core Server system. You quickly and efficiently inspect and change the persistent values and the runtime values.

For more information, refer to the [Manage SAP CC System Parameters](#) section of the [SAP CC 2023 Primary Help for Cockpit](#) documentation.

4.1.16.5.2 Immediate Modifications Using Admin+

In order to debug your SAP Convergent Charging system (Core Server), use this procedure to tune the generation and recording of trace messages by the system or by specific instances in the system.

Procedure

⚠ Caution

In a live production system, contact your SAP Support Team for troubleshooting instructions and supervision.

📌 Note

When tuning the trace generation, **change the tracing domains first, the trace severity threshold second.**

At the end, always reset the severity threshold to its default value for the trace messages: ERROR.

To perform immediate modification of the severity level threshold for traces and recorded tracing domains, complete the following procedure:

1. [Launch](#) the [Admin+ user interface](#) and identify as the system administrator of the Core Server system.
2. Depending on your troubleshooting investigation, determine and configure the tracing domains for either the system or specific instances in the system.

→ Remember

In a production system landscape, SAP Support Team provides you with the relevant domains.

Modify the runtime values of the [LS_TRC_DOMAIN](#) system parameter using the `set` command with the `memory` scope:

Typical Technical Operation	Procedure
Change the selection of tracing domains for all the instances of the same type in the system. For example, all the bulkloader instances.	<pre>set LS_TRC_DOMAIN JCO memory bulkloader</pre>
Change the selection of tracing domains for one specific instance in the system. For example, <code>rater#1</code> .	<pre>set LS_TRC_DOMAIN CACHE,MSG memory rater#1</pre>

Typical Technical Operation	Procedure
Change the selection of tracing domains for two (or more) specific instances in the system.	<pre>set LS_TRC_DOMAIN MSG,JCO memory rater#3 bulkLoader#3</pre>
For example, <code>rater#3</code> and <code>bulkLoader#3</code> .	

Change the selection of tracing domains for the complete system .	<pre>set LS_TRC_DOMAIN SQL memory</pre>
--	---

→ Tip

With the `set` command, you can specify a group of system instances by entering their instance IDs and instance types. See the primary help for more information.

3. Enable the generation and recording of debug trace messages in the selected instance, complete system, or specific instances.

By default, the threshold is set to ERROR (only the trace messages associated to errors are generated). In SAP Convergent Charging, the DEBUG threshold for traces is essential for the cause analysis by the SAP Support Team organization and our SAP labs.

Modify the values of the [LS_TRC_SEVERITY](#) system parameter with the `memory` scope:

Typical Technical Operation	Procedure
Change the trace severity threshold for all the instances of the same type in the system.	<pre>set LS_TRC_SEVERITY DEBUG memory bulkloader</pre>
For example, all the <code>bulkloader</code> instances.	
Change the trace severity threshold for one specific instance in the system .	<pre>set LS_TRC_SEVERITY DEBUG memory rater#1</pre>
For example, <code>rater#1</code> .	
Change the trace severity threshold for two (or more) specific instances in the system.	<pre>set LS_TRC_SEVERITY DEBUG memory rater#3 bulkLoader#3</pre>
For example, <code>rater#3</code> and <code>bulkLoader#3</code> .	
Change the trace severity threshold for the complete system .	<pre>set LS_TRC_SEVERITY DEBUG memory</pre>

4. The reconfigured instances generate and record trace messages accordingly.
5. Monitor the traces and continue your troubleshooting. For example, try to reproduce an issue.
6. **As soon as possible, stop this debug mode.** Important trace messages may be lost or erased in case of rotating trace files.

Reset the trace severity threshold to the default value for all instances in your Core Server system, enter the following command:

```
reset LS_TRC_SEVERITY all
```

Otherwise, you can use the `set` command:

```
set LS_TRC_SEVERITY ERROR all
```

⚠ Caution

Do not forget to reset the trace severity threshold to its default value: ERROR.

For more information, refer to the [SAP CC 2023 Primary Help for Admin+](#) documentation.

4.1.16.5.3 Deferred Modifications Using Admin+

To perform deferred modification of a given setting related to logging and tracing features, execute the following procedure:

1. [Launch](#) the Admin+ user interface and identify as the administrator of the Core Server system.
2. Modify the configuration of logs and/or traces, using the `set` command with the `persistent` scope. See [Configuration Options \[page 150\]](#) for the list of system parameters.
3. Restart the concerned instances of the Core Server system.

🔗 Example

- To permanently increase the severity of traces to DEBUG for a given instance of the Core Server system, enter the following command:

```
set LS_TRC_SEVERITY DEBUG persistent <INSTANCE_ID>
```
- To change the number of files generated in destination#1 and apply this modification to all the instances of the Core Server system, enter the following command:

```
set LDF_FILESET_SIZE <NB_FILE> persistent all
```

4.1.16.5.4 Deferred Modifications Using Config Tool

📌 Note

As of the release 4.1 of SAP CC, the configuration of the logging and tracing mechanism relating to the Core Server system has changed. It is now possible to write all logging and tracing information in the same location (before and after connecting to the back-end database).

For backward compatibility reasons, the existing logging and tracing configuration is not modified during the upgrade process. You must use the procedure below to benefit from this enhancement.

To perform deferred modification of a given setting related to logging and tracing features, execute the following procedure:

1. **Launch** the Config Tool user interface using the configuration export command in order to export the whole configuration of your SAP CC Core Server system into an XML file:
`config configuration export <XML_FILE_PATH> all`
2. Open the newly created XML file, and for each instance type (rater, updater, guider, bulkloader, taxer, dispatcher), mark down the values of each parameter that relate to the configuration of the logging and tracing features. For a complete list of parameters to analyze, refer to the [Configuration Options \[page 150\]](#) section above.
3. For each analyzed system parameter:
 - Set the corresponding JVM⁶⁹ option to the same retrieved value
 - Remove the `value` XML attribute of the system parameter from the configuration file
4. Update the following JVM options:
 - `-Dls.trc.severity=PATH`
 - `-Dls.trc.domain=SQL,NET,HB`
5. Remove the following JVM option:
 - `-Dld.console.enabled=true`
6. Edit the Startup Configuration File of each concerned instance and set the previously determined values for the different JVM options. For further information, refer to the [Startup Configuration Files \[page 208\]](#) section
7. Execute the `configuration import` command in order to import the content of the XML file containing the modified configuration of your Core Server system:
`config configuration import <XML_FILE_PATH>`
8. Restart the concerned instances of the Core Server system

❖ Example

Considering the following list of system parameters for a given instance type:

- `LDF1_ENABLED = true`
- `LDF1_FILE_NAME = work/log/@INSTANCE_ID@.log`
- `LDF1_FILE_SIZE 4`
- `LDF1_FILESET_SIZE 200M`
- `LDF1_FORMATTER LIST`
- `LS_APP_DESTINATION LDF1`
- `LS_SYS_DESTINATION LDF1`
- `LS_TRC_DESTINATION LDF2`

The corresponding JVM options to set are:

- `-Dld.file1.enabled=true`
- `-Dld.file1.name=work/log/@INSTANCE_ID@.log`
- `-Dld.file1.size=4`
- `-Dld.file1.setsize=200M`
- `-Dld.file1.formatter=LIST`
- `-Dls.app.destination=LDF1`

⁶⁹ Java Virtual Machine

- `-Dls.sys.destination=LDF1`
- `-Dls.trc.destination=LDF2`
- `-Dls.trc.severity=PATH`
- `-Dls.trc.domain=SQL,NET,HB`

4.1.16.5.5 Deferred Modifications Using the Startup Configuration Files

To perform deferred modification of a given setting related to logging and tracing features, complete the following procedure:

1. [Edit the startup configuration file \[page 210\]](#) of each concerned SAP CC system instance. For more information, refer to the [Startup Configuration Files \[page 208\]](#) section.
2. Update the value of each JVM option determined using the list of parameters available in the [Configuration Options \[page 150\]](#) section.
3. Restart the concerned instances in your Core Server system.

Related Information

[Modifying a Startup Configuration File \[page 210\]](#)

4.1.16.6 Integrating SAP CC Logs and Traces with Your Java Application

In case you need to interface your Java-based application to the SAP CC logging and tracing framework, you need to fulfill the following requirements:

- You must use the SAP JVM⁷⁰
- Your source code interacts with the `sap.com~trc~logging~java.jar` SAP CC library, that needs to be included in the classpath of your application
- Your source code interacts with the `core_client.jar` SAP CC library, that contains public APIs⁷¹ you can use within your application, in particular the following packages:
 - `com.highdeal.cnd.message`, used for communications with SAP CC performed over the Messages over TCP/IP⁷² communication channel
 - `com.highdeal.hci.http`, used for communications with SAP CC performed over the XML⁷³ over HTTP⁷⁴ communication channel

⁷⁰ Java Virtual Machine

⁷¹ Application Programming Interface

⁷² Transmission Control Protocol/Internet Protocol

- Your client application contains a configuration file that defines the relevant system parameters of SAP CC as defined in the [Configuration Options \[page 150\]](#) section above

4.1.17 Master Data Management

[Keywords \[page 159\]](#)

[Preliminary Notes \[page 159\]](#)

[Description \[page 159\]](#)

[Configuring Master Data for the Service Provider \[page 160\]](#)

[Configuring Master Data for the Customer of the Service Provider \[page 184\]](#)

4.1.17.1 Keywords

[Product Modeling](#), [chargeable item class](#), [refill item class](#), [charged item class](#), [Refill Record Class](#), [refill logic](#), [reusable charge](#), [counter name dictionary](#), [spending status description](#), [charge plan](#), [refill plan](#), [monitoring plan](#), [shared counters](#), [provider contract](#), [subscription](#), [access](#), [batch rating group assignment](#), [subscriber account](#), [subscriber mapping table](#), [subscriber range table](#), [offer](#)

4.1.17.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [Master Data](#) section of the [SAP CC 2023 Application Help](#) documentation
- [Installing and Launching Core Tool](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation
- “Roles and Authorizations” section of the [SAP CC 2023 Security Guide](#) documentation

4.1.17.3 Description

As described in the [SAP CC 2023 Application Help](#), SAP Convergent Charging manages different sets of master data whose availability depends on the implemented model that can be:

- **Provider contracts and subscriptions**, that corresponds to the initial model which was based on subscriptions, but that is no more supported except in upgraded landscapes containing related master data

⁷³ eXtended Markup Language

⁷⁴ HyperText Transfer Protocol

- **Provider contracts only**, that corresponds to a new model designed to facilitate the integration with the SAP ERP/FI-CA component of the SAP Business Suite, within which commercial products are configured through charging units available from SAP CC [charge plans](#).

For a complete list of master data associated to each available model, refer to the [Master Data](#) section of the [SAP CC 2023 Application Help](#) documentation. You can use the following procedure to configure the different master data related to the service provider and thus fit your specific business needs.

4.1.17.4 Configuring Master Data for the Service Provider

To configure the master data related to the service provider and its chargeable services, execute the following procedure:

1. Launch the Core Tool user interface and identify as an SAP CC user granted the "Marketing" role.
2. As a pricing specialist, you configure the service pricing.

Create a pricing catalog that suits your business needs, design, and modeling.

3. Configure the necessary pricing elements in this catalog. Set up the relevant master data according to your needs, using the following information:

Master Data	Description
(reusable) Charge	<p>Core Tool menu: ► File ► New ► Charge ►</p> <p>Charges are used to manage fees related to the use of a customer service. Each charge applies to a chargeable item class, and includes:</p> <ul style="list-style-type: none"> • A price plan • A charge plan
Charge Plan	<p>Core Tool menu: ► File ► New ► Charge Plan ►</p> <p>Charge plans represent the charging conditions for accessing or consuming goods or services of a service provider. Each charge plan consists of :</p> <ul style="list-style-type: none"> • One or multiple charges • A set of parameters used to configure the charge(s) • A release status
Chargeable Item Class	<p>Core Tool menu: ► File ► New ► Chargeable Item Class ►</p> <p>Chargeable items are sent to SAP CC by network elements for charging purpose. Each chargeable item represents a set of properties used:</p> <ul style="list-style-type: none"> • During the execution of the price plan that is associated to the different charges related to the class of the chargeable item. • By a third-party billing system during billing and invoicing operations

Master Data

Description

Charged Item Class

Core Tool menu: ▶ [File](#) > [New](#) > [Charged Item Class](#) ▶

Charged items represents items generated by SAP CC during charging operations. Each charged item is associated to a class that defines the properties to output, whose values can be generated by price plans or on-the-fly computed. The following table contains the list of properties that can be generated by SAP CC, that you can also use when configuring:

- A charge customized in a charge plan or in an offer
- An allowance logic customized in an allowance plan

Property	Description
Account Type Code	Type of account charged by SAP CC. Possible values are: <ul style="list-style-type: none"> • 0: Prepaid account • 1: External (postpaid) account
Account Type Is Prepaid	Boolean used to indicate that the account charged by SAP CC is a prepaid account
Account Type Name	Textual representation of the type of account charged by SAP CC. Possible values are: <ul style="list-style-type: none"> • "prepaid" • "postpaid"
Allowance Context	Type of event performed on the allowance and that generated the charged item. Possible values are: <ul style="list-style-type: none"> • "C", when the event corresponds to a one-shot trigger performed on an allowance creation event • "U" otherwise
Allowance Event Class Name	Class name of the allowance event that was sent to the allowance.
<div style="border: 1px solid #ccc; background-color: #f0f0f0; padding: 5px; margin-bottom: 10px;"> <p>Note</p> <p>This property is empty for one-shot and recurring triggers.</p> </div>	
Allowance Share Identifier	Unique identifier used to group and access to shared allowances.
Allowance Unique Identifier	Unique identifier of the allowance.
Allowance Validity Start Date	Start date of the validity period of the allowance
Allowance Validity End Date	End date of the validity period of the allowance

**Master
Data**

Description

Property	Description
Amount (Excluding Tax)	<p>Amount of the charged item computed by SAP CC during the charging operation, without any tax amount.</p> <div style="border: 1px solid #ccc; background-color: #f9f9f9; padding: 5px;"> <p>Note</p> <p>This amount equals to the base amount when the charge customized in a charge plan (or in an offer) is configured to deal with a net amount.</p> </div>
Base Amount	<p>Reference amount of the charged transaction used by SAP CC to compute the tax amount and generate the final amounts (amount excluding tax, total amount including tax). This amount can be net or gross, according to the configuration of the charge customized in a charge plan (or in an offer) that has been triggered during the charging operation.</p> <div style="border: 1px solid #ccc; background-color: #f9f9f9; padding: 5px;"> <p>Note</p> <ul style="list-style-type: none"> To manage tax in an external system, consider the <i>VAT Transaction Gross Price Flag</i> and the <i>Tax Is Included</i> fields In case the EZtax tax system is selected, SAP CC considers the net amount </div>
Base Rated Amount	<p>Reference amount, computed during the execution of a price plan of a <u>master</u> charge, and used by SAP CC during the execution of the price plan of a <u>dependent</u> charge (when exists).</p>
Chargeable Items Are Exported	<p>Boolean used to inform whether the operation which generated the charged item was also configured to generate chargeable items, or not</p>
Charge Activation Cancellation Date	<p>Cancellation date of the subscription, only available for cancelling a one-shot rate within a charge</p>
Charge Activation Code	<p>Identifier of the activated charge in a provider contract or subscription.</p> <div style="border: 1px solid #ccc; background-color: #f9f9f9; padding: 5px;"> <p>Note</p> <p>This identifier can also correspond to the identifier of the refill logic in a provider contract</p> </div>
Charge Activation Effective Date	<p>Creation date of the subscription, only available for one-shot rates containing an activation event</p>

**Master
Data****Description**

Property	Description
Charge Component Name	Type of the rate component that is activated in the price plan, that can be: <ul style="list-style-type: none">• Usage Rates• Recurring Rates• One-Shot Rates
Charge Date	Date of the charged event (usage, recurring or one-shot) or refill event
Charge Reference	In case the charging operation was based on an external reference, this property corresponds to the identifier of this external reference
Charge Reference Name	In case the charging operation was based on an external reference, this property corresponds to the name of this external reference, set in the charging plan of the activated charge
Charge Type Code	Numerical code used to identify the charge. Possible values are: <ul style="list-style-type: none">• 0: Closing• 1: Refill charge• 2: Internal charge• 3: External charge• 4: Not charged
Charge Type Name	Textual representation of the type of charge charged by SAP CC. Possible values are: <ul style="list-style-type: none">• "closing"• "refillCharge"• "internalCharge"• "externalCharge"• "notCharged"
Chargeable Item Class Name	Class name of the chargeable item that was charged by SAP CC, only available for usage charging operations
Charged Amount is a Credit	Boolean used to indicate whether the amount of the charged transaction is a credit amount, or not
Charged Amount is a Debit	Boolean used to indicate whether the amount of the charged transaction is a debit amount, or not

Master Data

Description

Property	Description
Charged Item Set Identifier or Refill Record Set Identifier	<p>Identifier of a set of charged items or refill records generated by SAP CC.</p> <div style="border: 1px solid #ccc; background-color: #f9f9f9; padding: 10px; margin-top: 10px;"> <p>Note</p> <p>A charged item set represents a charged item coming from a master charge plus charged items possibly coming from the dependent charges.</p> </div>
Charged Tax Amount	Tax amount of the charged transaction, that is an alias of the Tax Amount property
Charged Tax Code	Tax code of the charged transaction, that is an alias of the Tax Code property
Charged Tax Detail	
Charged Tax Status Code	<p>Deprecated (use Tax Status Code instead)</p> <p>Textual representation of the tax status of the charged transaction, that is an alias of the Tax Status Code property.</p> <p>Possible values are:</p> <ul style="list-style-type: none"> • "tsNoTax": No tax was applied • "tsForInfo": The computed tax information is given for information purpose • "tsApplied": The tax was applied • "tsTaxExempted": Tax exemption • "tsBuyerSubjectToPay": The buyer is responsible for reversing the tax to the tax authority <p>Deprecated values:</p> <ul style="list-style-type: none"> • "tsTaxMissedForInfo": Information is missing for the data related to the tax • "tsTaxMissedForApply": The tax information was missing to apply the tax • "tsUnknown": The tax status is unknown
Charged Tax Status Identifier	<p>Deprecated (use Tax Status Identifier instead)</p> <p>Numerical code of the tax status of the charged transaction, that is an alias of the Tax Status Identifier property.</p>

**Master
Data**

Description

Property	Description
	<p>Possible values are:</p> <ul style="list-style-type: none"> • 0: No tax was applied • 1: The computed tax information is given for information purpose • 2: The tax was applied • 3: Tax exemption • 4: The buyer is responsible for reversing the tax to the tax authority <p>Deprecated values:</p> <ul style="list-style-type: none"> • -1: Information is missing for the data related to the tax • -2: The tax information was missing to apply the tax • -3: The tax status is unknown
Charged Total Amount (incl. Tax)	<p>Deprecated (use Total Amount instead)</p> <p>Total amount of the charged transaction, including tax</p>
Charged Transaction is a Prepaid Debit	<p>Boolean used to indicate whether the charged transaction concerns a charging operation related to a prepaid account, or not</p>
Charged Transaction is a Prepaid Refill	<p>Boolean used to indicate whether the charged transaction concerns a refilling operation related to a prepaid account, or not</p>
Charging Component Name	<p>Name of the charging component</p>
Charging Detail Field	
Contract Identifier	<p>Identifier of the provider contract, whose value depends on the context:</p> <ul style="list-style-type: none"> • In a charge plan, this identifier corresponds to the identifier of the provider contract which generated the charged item • In an allowance plan, this identifier corresponds to the identifier of the provider contract owning the allowance which generated the charged item
Contract Item External Identifier	<p>External identifier set by an external system (or by the SAP CRM system in case of integrated scenario), retrieved from the external code set in a contract item stored within SAP CC</p>

**Master
Data****Description**

Property	Description
Contract Item Identifier	Identifier set by an external system (or by the SAP CRM system in case of integrated scenario), retrieved from the name (or code) set in a contract item stored within SAP CC
Contract Type	Type of contract which generated the charged item. Possible values are: <ul style="list-style-type: none">• "P", for provider contracts• "S", for subscriptions
Currency	ISO 4217 (three-letter) code of the charged transaction currency
End of Rating Recurring Period	End date of the period related to a recurring rate, that can be different from the End of Rating Reference Recurring Period property that is used when the recurring rate is prorated
End of Rating Reference Recurring Period	End date of the reference period related to a recurring charge
Event Date	Date of the rated event, that equals to the consumption date of a usage rate or to the triggering date of the recurring rates or one-shot rates
Event Processing Date	Date when the event which generated the charged item was processed by SAP CC
Excluded Last Day of the Rating Recurring Period	
External Account Code	Identifier of the postpaid account to be charged, that is set in the external account of the related subscriber account
External System Code	Identifier of the external system to be charged (in case of postpaid account), that is set in the external account of the related subscriber account
First Dispatch Code	Dispatch code #1, which corresponds to the name of the property chosen as the first criteria when filtering External Account transactions
Name of Rate Component Used	
Offer Code	Identifier (name) of the activated offer concerned by the charging operation
Overrun From	Identifier of the prepaid account which called the overrun, that is: <ul style="list-style-type: none">• Empty for the first overrun

**Master
Data**

Description

Property	Description
	<ul style="list-style-type: none"> Only available in the context of prepaid account overrun
Overrun To	Identifier of the prepaid account from which the overrun is called, that is: <ul style="list-style-type: none"> Empty for the last overrun Only available in the context of prepaid account overrun
Prepaid Balance Amount	Current amount of the prepaid account balance selected determined during the charging operation
Prepaid or External Account Code	Identifier of the account (prepaid or external post-paid) to charge
Prerating Reservation Identifier	Deprecated Identifier of the reservation in case of a prerating operation
Price Plan Name	Identifier (name) of the executed price plan of a charge
Produced by a Master Charge Component	Type of the charge (customized in a charge plan or in an offer) that contains the price plan triggered during the charging operation. Possible values are: <ul style="list-style-type: none"> 1: Master charge 2: Dependent charge
Produced by an Allowance	Boolean used to indicate whether the charged item was generated by an allowance, or not
Rated Amount	Amount of the rated transaction, before tax computation. This raw amount is computed by SAP CC when executing the price plan of a charge customized in a charge plan (or in an offer), and equals to the <code>Base Amount</code> property when no overrun exists.
	<div style="border: 1px solid #ccc; background-color: #f0f0f0; padding: 5px;"> <p>Note</p> <p>Do not use this field to set up the generation of charged transactions or charged items.</p> </div>
Rated Amount is Prorated	Boolean used to indicate whether the amount is prorated, or not
Rated Amount is Refunded	Boolean used to indicate whether the amount concerns a refund, or not

**Master
Data**

Description

Property	Description
Rated Boolean	
Rated Date	
Rated Number	
Rated String	
Rated Tax Amount	<p>Deprecated (use Base Amount instead)</p> <p>Tax amount computed during the execution of a (net) price plan, that is available in the rated transaction.</p> <div style="background-color: #f0f0f0; padding: 5px;"> <p>Note</p> <ul style="list-style-type: none"> Do not use this property when the price plan is gross Do not use this field to set up the generation of charged transactions or charged items </div>
Rated Tax Code	Code of the tax
Rated Tax Status Code	Deprecated (use Tax Status Code instead)
Rated Tax Status Identifier	Deprecated (use Tax Status Identifier instead)
Rated Total Amount	<p>Deprecated (use Rated Amount instead)</p> <p>Total amount, including tax, computed during the execution of a (net) price plan.</p> <div style="background-color: #f0f0f0; padding: 5px;"> <p>Note</p> <ul style="list-style-type: none"> Do not use this property when the price plan is gross Do not use this field to set up the generation of charged transactions or charged items </div>
Rating Activation Date	Date when the recurring charge has been triggered during a charging operation
Rating Consumption Date	Consumption date of the chargeable item related to a usage charging operation
Rating Event Origin	Type of charged event.

**Master
Data**

Description

Property	Description
	<p>Possible values are:</p> <ul style="list-style-type: none"> "U" (Usage): The event corresponds to the usage of the consumed service, that is configured within usage rates or refills in the pricing logic "R" (Recurring): The event corresponds to a periodic fee, that is configured within recurring rates or refills in the pricing logic "O" (One-shot): The event corresponds to a one-off fee, that is configured within one-shot rates or refills in the pricing logic
Refill Amount	
Refill Currency	
Refill Date	
Refill ISO Currency	
Sender Job Identifier	Identifier of the sender that sent a job of charging operations to SAP CC (for example, job identifiers are used in case of mass charging operations when SAP CI sends one or more jobs of charging operations to SAP CC)
Second Dispatch Code	Dispatch code #2, which corresponds to the name of the property chosen as the second criteria when filtering External Account transactions
Service Identifier	Identifier of the consumed customer service provided by a service provider, that is only available for usage charging operations
Service Provider Name	Identifier of the service provider, that corresponds to the name of the catalog of the service provider
Service Provider Country Code	ISO 3166 country code of the service provider according to the tax settings of the charge customized in a charge plan (or in an offer) executed at runtime
Session Rating Reservation Identifier	Identifier of the session reservation, that is only available for session-based charging operations
Start of Rating Recurring Period	Start date of the period related to a recurring rate, that can be different from the Start of Rating Reference Recurring Period used when a recurring charge is prorated

**Master
Data****Description**

Property	Description
Start of Rating Reference Recurring Period	Start date of the reference period related to a recurring rate
Subscriber Account Code	Identifier of the subscriber account
Subscriber Account Reference	Reference of the subscriber account
Subscriber Consumes Service (Client)	Boolean used to inform about the relationship between the subscriber and the customer service. When this property is set to "true", the business transaction relates to a client relationship, which means that the subscriber consumed the service provided directly by the service provider
Subscriber Provides Service (Partner)	Boolean used to inform about the relationship between the subscriber and the customer service. When this property is set to "true", the business transaction relates to a partner relationship, which means that the subscriber consumed the service provided by a partner of the service provider
Subscription Code	Identifier of the triggered subscription
Subscription Commitment Expiration Date	Commitment date of the subscription
Subscription Resumption Date	Resumption date of the subscription
Subscription Suspension Date	Suspension date of the subscription
Tax Amount	Amount of tax applied and adjusted to a charged transaction, that is associated to the Currency property which contains the related currency
Tax Code	<p>String representation of the tax code of a charged transaction (or charged item) assigned to a prepaid or external postpaid account.</p> <p>Possible values are:</p> <ul style="list-style-type: none">"/<COUNTRY_CODE>/<VAT_RATE_LEVEL>#<timestamp>", for the VAT tax system, where:<ul style="list-style-type: none"><COUNTRY_CODE> is an ISO 3166 country code (2-digit)<VAT_RATE_LEVEL> is a value from 0 to 5"/RAW/<RATE_ID>", for the Flat tax system, where <RATE_ID> is the identifier of the flat tax rate defined in the charge

**Master
Data**

Description

Property	Description
	<ul style="list-style-type: none">• "NO_TAX", when no tax system is defined in the charge or in the subscriber account, or when the system configuration is erroneous• "EZTAXED", for the EZtax tax system used for U.S telco taxes
Tax Determination Type	<p>Information about the tax, used by the billing system.</p> <p>Possible values, that depends on the tax status, are:</p> <ul style="list-style-type: none">• "00", default value available when the tax status is "BUYER_SUBJECT_TO_PAY", "TAX_EXEMPTED" or "NO_TAX" to inform that the tax status is applied and must not be calculated by the billing system• "01", available when the tax status is "FOR_INFO" to inform that the tax system is VAT, or Flat• "04", available when the tax status is "FOR_INFO" to inform that the tax system is EZtax
Tax is Included in Total Amount	<p>Boolean used to inform whether the tax amount is included in the total amount, or not. This property is set to "true" when the tax status is set to "APPLIED" or "FOR_INFO"</p>
Tax Status Code	<p>Textual representation of the tax status.</p> <p>Possible values are:</p> <ul style="list-style-type: none">• "tsNoTax": No tax was applied• "tsForInfo": The computed tax information is given for information purpose• "tsApplied": The tax was applied• "tsTaxExempted": Tax exemption• "tsBuyerSubjectToPay": The buyer is responsible for reversing the tax to the tax authority <p>Deprecated values:</p> <ul style="list-style-type: none">• "tsTaxMissedForInfo": Information is missing for the data related to the tax• "tsTaxMissedForApply": The tax information was missing to apply the tax

**Master
Data**

Description

Property	Description
	<ul style="list-style-type: none">• "tsUnknown": The tax status is unknown
Tax Status Identifier	<p>Numerical code of the tax status.</p> <p>Possible values are:</p> <ul style="list-style-type: none">• 0: No tax was applied• 1: The computed tax information is given for information purpose• 2: The tax was applied• 3: Tax exemption• 4: The buyer is responsible for reversing the tax to the tax authority <p>Deprecated values:</p> <ul style="list-style-type: none">• -1: Information is missing for the data related to the tax• -2: The tax information was missing to apply the tax• -3: The tax status is unknown
Third Dispatch Code	Dispatch code #3, which corresponds to the name of the property chosen as the third criteria when filtering External Account transactions
Total Amount (Including Tax)	<p>Total amount of the charged transaction, tax included. This amount is used by SAP CC to debit the balance of the concerned prepaid account, or charge the concerned external postpaid account.</p> <div><p>Note</p><p>The total amount equals to the base amount when the charge customized in a charge plan (or in an offer) is configured to gross.</p></div>
Triggering Contract Identifier	<p>Identifier of the provider contract which triggered the generation of the charged item via an allowance. The value of this property depends on the type of trigger:</p> <ul style="list-style-type: none">• For a one-shot trigger or a recurring trigger, the value corresponds to the identifier of the provider contract which owns the allowance• For an event-based trigger, the value corresponds to the identifier of the provider contract which sent an event to the allowance

**Master
Data**

Description

Property	Description
Triggering Contract Item External Identifier	External identifier of the provider contract item which sent an event to the allowance generating the billable items through an Event-Based Trigger component. Otherwise, this property contains the external identifier of the parent provider contract item of the allowance
Unrounded Rated Amount	Amount computed by the charges, having up to 6 decimal places before being rounded according to the TRANSACTION_PRECISION system parameter. Note This property is required for the tax framework but may not be used in the charged item mapping.
User Service Identifier	Identifier of the end customer related to the usage of the consumed service
VAT Business Entity	Boolean used to inform about the business category (B2B or B2C) of the subscriber account relating to the charged account (prepaid or external postpaid). Possible values are: <ul style="list-style-type: none">• "true", to inform the business category is B2B• "false", to inform the business category is B2C
VAT Place of Taxation	
VAT Transaction Gross Price Flag	Boolean used to inform whether prices computed during the execution of a price plan are net, or gross. Possible values are: <ul style="list-style-type: none">• "true", for gross prices• "false", for net prices
VAT Transaction Rate Code	Code of the tax rate level, that is configured in the charge customized in a charge plan (or in an offer) when the invoicing tax system is EU VAT. Possible values are: <ul style="list-style-type: none">• "0": Normal• "1": Intermediary

**Master
Data**

Description

Property	Description
	<ul style="list-style-type: none">• "2": Reduced• "3": Super reduced• "4": Zero• "5": Special• "-1": No tax
VAT Transaction Raw Rate	Flat tax rate configured in the charge customized in a charge plan (or in an offer), that is only available when the customized charge is configured to use the "Flat" tax system
VAT Transaction Raw Rate ID	Identifier of the flat tax rate as configured in the charge customized in a charge plan or in an offer, that is only available when the customized charge is configured to use the "Flat" tax system.

Note

Some properties can be used both in charge plans and allowance plans, while other properties can only be used in charge plans or in allowance plans.

The following properties can only be used in allowance plans:

- Allowance Event Class Name
- Allowance Unique Identifier
- Allowance Validity Start Date
- Allowance Validity End Date
- Triggering Contract Identifier

The following properties can be used in both charge plans and allowance plans:

- Account Type Code
- Account Type Name
- Account Type is Prepaid
- Chargeable Item Unique Identifier
- Chargeable Item Unique Identifier Type
- Charged Item or Refill Record Set Identifier
- Charged Item or Refill Record Set Identifier Type
- Charged Item or Refill Record Set identifier
- Contract Identifier
- Contract Type
- Currency
- End of Rating Recurring Period

Master Data	Description
	<ul style="list-style-type: none"> • Event Date • Event Processing Date • External Account Code • External Account Name • ISO Currency • Prepaid Account Name • Prepaid or External Account Code • Produced by an Allowance • Sender Job Identifier • Session Rating reservation Identifier • Start of Rating Recurring Period • Subscriber Account Code <p>The other properties can only be used in charge plans</p>

(shared) Counters represent numeric variables that you can define and declare within a reusable charge, and reuse within other master data. SAP CC provides you with 2 types of counters:

- Persistent counters, that are saved in the Core Database
- Transient counters, that are only stored in memory

If you want to share a counter between several items in a provider contract, you may need to set up some specific configurations in the catalog of the service provider. By default, such a shared counter is initialized with the zero value. If you want to design other initial values, you must create a logic that will initialize the counter with the value of a parameter redefined in each provider contract. To initialize such shared counters, you can:

- Create and set up a dedicated charge plan containing a customized charge that includes a **recurring rate** component charged at the start of the period
- Create and set up a dedicated charge plan containing a customized charge that includes a **one-shot rate** component triggered by an Activation event (at the creation of the related contract item)
- Configure the refill logic of an existing refill plan with a customized charge that includes a **recurring refill** component
- Configure the refill logic of an existing refill plan with a customized charge that includes a **one-shot refill** component triggered by an Activation event (at the creation of the contract item associated to this refill plan)

Counter Name Dictionary	<p>Core Tool menu: Tools > Counter Dictionary > Edit</p> <p>The counter name dictionary defines a set of counter names that can be used in other master data such as charge plans or refill plans, when declaring counters</p>
-------------------------	---

Master Data	Description
Monitoring Plan	<p>Core Tool menu: ▶ <i>File</i> > <i>New</i> > <i>Monitoring Plan</i> ▶</p> <p>Monitoring plans represents the generation policy of spending statuses, that include:</p> <ul style="list-style-type: none"><li>• A list of spending status identifiers<li>• The counters to monitor<li>• A list of rules used to determine the relevant labels

**Master
Data****Description**

Refill Item Class **Core Tool menu:** ▶ [File](#) ▶ [New](#) ▶ [Refill Item Package](#) ▶

Refill items are sent to SAP CC by network elements for refilling purpose. Each refill item represents a set of properties used during the execution of a refill logic.

The following table contains the list of properties you must add to the Refill Item Class, according to the data received from the SAP ERP system:

Property	Description
Refill Date	Date of the refill request
Refill Amount	Amount of the refill
Refill Currency	Currency of the refill
BKVID	Bank details ID
CRDID	Payment card ID
CGUID	Key for payment card supplement
CNTU1	Number executed (component 1)
CNTU2	Number executed (component 2)
CNTU3	Number executed (component 3)
CRDRS	Reason for free increase of prepaid balance
PPDOC	Posting document for prepaid account in the SAP ERP system
PPNOT	
PPRSN	Reason for balance change on prepaid account
PREPR	Reference number used for the refill
REFPK	Reference of the refill package
RFPCN	Number of refill packages
TULOC	Point of sale for prepaid credit
TUMTH	Refill method
TUSE1	Refillable unit (component 1)
TUSE2	Refillable unit (component 2)
TUSE3	Refillable unit (component 3)
XRVERF	Decrease of prepaid credit or units

Note

Consult the customizing of the SAP ERP system to determine if other fields are present in the refill items sent to SAP CC to trigger the refills.

Master Data

Description

Refill Logic

Core Tool menu: ▶ [File](#) > [New](#) > [Refill Logic](#) ▶

Refill logic is used by SAP CC to manage refill operations related to the use of a customer service. This master data can be customized at refill plan level.

Note

- For a request for refill, you must add two `Usage Refill` components in the refill logic
- For an automated periodic refill, you must define some `Recurring Refill` components in the refill logic
- For an automated initial refill, you must define a `One-Shot Refill` component in the refill logic

A refill logic requires the creation of counters and a translation table both dedicated to the refill management based on refill packages. The following table contains the list of properties that can be generated by SAP CC:

Property	Description
computed_TUSE1	
computed_TUSE2	Refillable unit ID
computed_TUSE3	
computed_CNTU1	
computed_CNTU2	Refillable unit value
computed_CNTU3	
computed_CNTU1_REQ	
computed_CNTU2_REQ	Requested number
computed_CNTU3_REQ	
computed_PPAMOUNT_REQ	Requested change of credit
computed_CRDRS	Reason for free increase of prepaid balance
computed_PPRSN	Reason for balance change onj prepaid account
BASE AMOUNT	Final value of the prepaid balance

Refill Plan **Core Tool menu:** ▶ [File](#) > [New](#) > [Refill Plan](#) ▶

Refill plans are used to credit the prepaid accounts of customers. Each refill plan consists of:

- A refill logic
- A set of parameters used to configure the refill logic
- A release status

**Master
Data****Description**Refill Re-
cord
Class**Core Tool menu:** ▶ [File](#) > [New](#) > [Refill Record Class](#) ▶

A refill record class represents a list of properties that must be included in each refill record output by SAP CC during refilling operations. The following table contains the list of properties that can be generated by SAP CC and can be expected by SAP ERP/FI-CA:

Property	Description
SRCTYPE	Constant (default value: CCCIT)
SRCTAID	Default property calculated by SAP CC
SUBPROCESS	Node
BITTYPE	Node
PREPAID	Account type is prepaid
PPREFILL	Charged transaction is a prepaid refill
VKONT	External account Name in SAP CC (postpaid)
GPART	External account ID or Prepaid account ID in SAP CC
VTREF	Provider contract ID in SAP CC
VTPOS	
SUBAP	Contract type
PPACC	Prepaid account ID in SAP CC
BILL_BASEDATE	
BILL_FIRST	
BITDATE	Default property calculated by SAP CC
BITTIME	Default property calculated by SAP CC
BITDATE_FROM	Start date of refill recurring period
BITDATE_TO	Stop date of refill recurring period
BIT_AMOUNT	Final refill amount computed by the execution of the relevant refill logic
BIT_CURR	Currency of the refill
TAX_INCLUDED	Tax is included in total amount
TAX_DET_TYPE	Constant (default value: 01)
EXT_TAX_DATE	
EXT_TAX_ID	VAT ⁷⁵ transaction rate code

⁷⁵ Value Added Tax

**Master
Data****Description**

Property	Description
BITREF32	
PY_GROUP	
BITTEXT50	Property from input data (refill item)
BKVID	Property from input data (refill item)
CNTU1	Particular property computed during the execution of the refill logic
CNTU1_REQ	Particular property computed during the execution of the refill logic
CNTU2	Particular property computed during the execution of the refill logic
CNTU2_REQ	Particular property computed during the execution of the refill logic
CNTU3	Particular property computed during the execution of the refill logic
CNTU3_REQ	Particular property computed during the execution of the refill logic
CRDID	Payment card ID
CRDRS	Particular property computed during the execution of the refill logic
PCARD_GUID32	Property from input data (refill item)
PPAMOUNT_REQ	Particular property computed during the execution of the refill logic
PPDOC	Posting document for prepaid account in the SAP ERP system
PPRSN	Reason for balance change on prepaid account
PREPR	Reference number used for the refill
REFPK	Reference of the refill package
RFPCN	Number of refill packages
TULOC	Point of sale for prepaid credit
TUMTH	Refill method
TUSE1	Refillable unit (component 1)
TUSE2	Refillable unit (component 2)
TUSE3	Refillable unit (component 3)
XRVERF	Decrease of prepaid credit or units

**Master
Data**

Description

Once the refill record class is configured, you must associate it to a billable item mapping.

Billable
Item Map-
ping

Core Tool menu: ▶ [File](#) > [New](#) > [Billable Item Mapping](#) ▶

The billable item mapping consists in mapping charged item classes or refill record classes onto billable item classes defined in a particular SAP ERP/FI-CA system that is the ERP reference system in the SAP system landscape (SAP CI).

Note

After the billable item class is assigned to the `released as productive` status, you can change it in SAP Convergent Invoicing by adding optional fields at the end of the structure. In some business cases, it is necessary to take these changes into account to allow SAP CC to generate the new version of billable items.

Master Data**Description**

Spending Status Description

Core Tool menu: ► [File](#) ► [New](#) ► [Spending Status Description](#) ►

A spending status description represents a list of named labels that are used when modeling monitoring plans, each spending status being exposed to an external policy control or monitoring system.

You can manage it by configuring in parallel a [Spending Status Monitoring](#). The following table contains the list of parameters [that can be handled \[page 22\]](#) by SAP CC:

System Parameter	Description
SPENDING_STATUS_REPORT_SEND_TIMEOUT	Sets up the maximum time (in ms) to be used by the rater instance for sending the spending status report
SPENDING_STATUS_REPORT_RESEND_ATTEMPTS	Sets up the maximum number of resend attempts of the spending status report
SPENDING_STATUS_REPORT_RESEND_INTERVAL	Sets up the minimum time interval (in seconds) between two resend attempts of the spending status report
MULTICAST_SERVER_THREAD_COUNT	Sets up the number of threads reserved for processing the multicast service requests
STATEFUL_SERVICE_THREAD_COUNT	Sets up the number of threads allocated to the handling of stateful operations
STATELESS_SERVICE_THREAD_COUNT	Sets up the number of threads reserved for the Stateless Message Service (support of the online stateless rating services)
BATCH_SERVICE_THREAD_COUNT	Sets up the number of threads reserved for processing the Batch Message Service of a rater instance
STATEFUL_SERVICE_SQL_UPDATE_POOL_SIZE	Sets up the size of the pool allocated to modification operations and data files generation related to stateful requests
CACHE_WARMUP_THREAD_COUNT	Sets up the number of threads reserved for processing the cache warm-up
RENEW_RESERVATION_RESEND_THREAD_COUNT	Sets up the number of processing threads dedicated to resending renew reservation notifications
ACTIVATION_THREAD_COUNT	Sets up the number of threads reserved for performing the activation process in rater instance (see recurring and one-shot rate activation)
CLEANUP_THREAD_COUNT	Sets up the number of threads reserved for performing the cleanup process into each rater instance
SPENDING_STATUS_REPORT_RESEND_THREAD_COUNT	Sets up the number of processing threads dedicated to resending spending status report notifications

Master Data	Description
Offer	<p>Core Tool menu: ▶ File > New > Offer ▶</p> <p>Offers are master data that belong to the old data model, and that represent set of charges customers can subscribe to. SAP CC provides you with 2 types of offers:</p> <ul style="list-style-type: none"> • Simple offers, that contain one or multiple charges • Complex offers, that contains one or multiple suboffers with the addition of zero, one or multiple charges

📘 Note

Master data related to the service provider are grouped within a pricing catalog that can be transported to another landscape. For further information, refer to the [Catalog Transport \[page 47\]](#) dedicated section available in this documentation.

4.1.17.4.1 Removing the References to the Chargeable Item Packages of Chargeable Item Classes

⚠️ Caution

As of release 4.0 for SAP Convergent Charging, the chargeable item packages are revoked.

As an application administrator you must prepare the removal of this master data in the system. Then you remove the links between chargeable item packages and chargeable item classes. Contact the SAP CC pricing specialists who configure and maintain pricing catalogs for some chargeable services to monetize.

Because this step requires restarting some instances in the SAP system, we strongly recommend that you perform this procedure when the workload of the SAP Convergent Charging system is the lowest.

Task

Remove the references to the chargeable item packages of chargeable item classes. It ensures that the identifiers of the chargeable item classes are unique between all the chargeable item classes of the system.

Procedure

1. Generate the chargeable item package migration report.

1. As an application administrator, execute the command with the [Setup Tool](#) user interface. in an Operating System (OS) console:

```
./setup migration generateCIPackageReport ./report.xml
```

2. In this system console, enter your administrator logon and password at the prompt.
3. Check on the console that the report has been successfully exported.

ⓘ Note

If the report cannot be exported because some invalid charges (aka `charge components`) have been found, first fix the listed charges with the relevant SAP CC pricing specialists, and start the generation of the report again. In master data, several pricing catalogs may be impacted for different pricing specialists. Contact your SAP Support Team when needed.

2. Copy the final report, for example `report.to.execute.xml`
3. Open the copied report with a text editor (an XML editor is recommended) and, as described in the header of the XML file, provide the name of the new chargeable item classes when requested.
4. Save your changes.
5. Stop the updater instances in the running SAP CC system (Core Server).
6. Execute the modified report with Setup Tool.
 1. In a system console, execute the following command:

```
./setup migration executeCIPackageReport ./report.to.execute.xml
```

2. Enter your administrator logon and password at the prompt.
3. Check on the console that the report has been successfully exported.

ⓘ Note

If the report cannot be executed, read the error message displayed on the console, try to fix the problem, and then execute again the report. Contact your SAP Support Team.

7. Restart the updater instances in the SAP CC system.

4.1.17.5 Configuring Master Data for the Customer of the Service Provider

To configure the master data related to the customers of the service provider, execute the following procedure:

1. Launch the Core Tool user interface and identify as a user granted the "CSR" role
2. Set up the relevant master data according to your needs, using the following information:

Master Data Description

Access	Core Tool menu: ▶ File > New > Access ▶
	Accesses are used to grant end customers the access and use of services provided by the service provider. Each access includes: <ul style="list-style-type: none">• The technical identifier of the consumed service (Service ID)• The technical identifier under which an end customer consumes the service (User Service ID)

Provider contract	Core Tool menu: ▶ File > New > Provider Contract ▶
	Web Service: contractProvisioning
	Provider contracts represent the business agreement between the service provider and a given customer, taking into account some specific conditions. Each provider contract refers to a unique subscriber account, and contains all the information that is necessary to execute charging (or refilling) operations on this account.

Note

- Necessary accesses are automatically created by SAP CC in background
- For development, test, or training purposes, you can manually create a provider contract via the Core Tool user interface. In case of an integrated landscape with the SAP CRM system, SAP SE recommends that you use the dedicated Web Service to synchronize this master data with all the relevant systems
- If you installed the BART Server system within your landscape to manage batch charging operations, you can modify the default policy related to batch rating group assignment in order to fit your specific needs. For further information, refer to the [Implementing the Batch Rating Group Assignment Mechanism \[page 186\]](#) dedicated procedure afterwards

Subscriber account	Core Tool menu: ▶ File > New > Subscriber Account ▶
	Web Service: suacProvisioning

Subscriber accounts are used to store the information related to the account and balance of each customer of the service provider.

Note

For development, test, or training purposes, you can manually create a subscriber account via the Core Tool user interface. In case of an integrated landscape with the SAP CRM system, SAP SE recommends that you use the dedicated Web Service to synchronize this master data with all the relevant systems.

Master Data Description

Subscriber mapping table

Core Tool menu: ▶ *File* > *New* > *Subscriber Mapping Table* ▶**Web Service:** subscriberMappingTableManagement

Subscriber mapping tables are part of the subscriber accounts, and contain specific data related to customers and represented as mapping tables.

Note

- Subscriber mapping tables are not available in subscriptions
- A contract item can link several subscriber mapping tables
- A given subscriber mapping table can be reused within different contract items in different provider contracts
- For development, test, or training purposes, you can manually create a subscriber mapping table via the Core Tool user interface. In case of an integrated landscape with the SAP CRM system, SAP SE recommends that you use the dedicated Web Service to synchronize this master data with all the relevant systems

Subscriber range table

Core Tool menu: ▶ *File* > *New* > *Subscriber Range Table* ▶**Web Service:** subscriberRangeTableManagement**Note**

- Subscriber range tables are not available in subscriptions
- A contract item can link several subscriber range tables
- A given subscriber range table can be reused within different contract items in different provider contracts
- For development, test, or training purposes, you can manually create a subscriber range table via the Core Tool user interface. In case of an integrated landscape with the SAP CRM system, SAP SE recommends that you use the dedicated Web Service to synchronize this master data with all the relevant systems

Subscription **Core Tool menu:** ▶ *File* > *New* > *Subscription* ▶

Subscriptions represent the charging agreement conditions between the service provider and a given customer, taking into account some specific conditions. Each subscription can be:

- **Online**, which means that they can be charged in real-time mode
 - **Offline**, which means that they can only be charged in batch mode
 - **Hybrid**, which means that they can be charged in both batch or real-time mode according to the consumed service
-

4.1.17.5.1 Implementing the Batch Rating Group Assignment Mechanism

When the BART Server is deployed in a landscape, the created provider contracts dedicated to offline charging operations are by default balanced on the defined batch rating groups. In case this assignment policy does

not fit your business requirements, you can use the following procedure to modify this default behavior by developing a Java class that implements your own assignment policy:

1. Develop your specific Java class by using the `com.highdeal.batchgroup.contract` package available in the Core SDK and:
 - Implementing the `IContractBatchRatingGroupAssignmentPolicy` interface
 - Overriding the `getBatchRatingGroupAssignment(...)` method
2. Create a JAR file containing this newly created single class, and copy this JAR file to the `exe/uc/<OS>/CC_CORE_SERVER/jars/` subfolder of the SP Central Repository, where `<OS>` correspond to the operating system of the Core Server
3. Launch your [favorite user interface \[page 22\]](#) and identify as a user granted the "CSR" role
4. Modify the value of the `BATCH_RATING_GROUP_ASSIGNMENT_POLICY_CLASS` system parameter for each updater instance, specifying the name of your own Java class that must be used when assigning batch rating groups, using the following syntax: `<package_name>.<class_name>`
For further information about this system parameter, refer to its dedicated documentation available in the [SAP CC 2023 System Parameter Reference](#) documentation.
5. Update the startup configuration file of each updater instance by adding the created JAR file to the classpath. For further information, refer to the [Startup Configuration Files \[page 208\]](#) dedicated procedure afterwards.
6. Restart the updater instances of the Core Server system.

Note

To test that your modifications have been correctly taken into account, you can trigger the creation of a provider contract from the SAP CRM system or from the Core Tool user interface and check the assigned batch rating group.

4.1.17.5.2 Enabling the Optimization of Provider Contracts

The provider contracts in master data are optimized to reduce their memory footprint and improve performances. Some versions of the provider contracts are merged or removed to decrease the number of versions. To optimize the master data management, execute the following procedure:

1. Launch your [favorite user interface \[page 22\]](#) and identify as the administrator of the Core Server system
2. For each updater instance, modify the value of the `CONTRACT_PACKING_ENABLED` system parameter to `true`
3. Restart all the instances of the Core Server system

4.1.18 Notifications

[Keywords \[page 188\]](#)

[Preliminary Notes \[page 188\]](#)

[Description \[page 188\]](#)

[Available Notifications \[page 189\]](#)

[Configuring the Notification Policy \[page 192\]](#)

[Enabling the Notification Policy \[page 198\]](#)

You want to enable the notification policy for your SAP system (a policy for the rater instances and another policy for the bulkloader instances).

[Handling SAP CC Notification in your Java Application \[page 199\]](#)

[Enabling Sending of NO_ACCESS Notifications to the Network \[page 200\]](#)

[Disabling Sending of NO_ACCESS Notifications to the Network \[page 201\]](#)

If not required by your implementation and integration project, you can limit the traffic of the NO_ACCESS notifications published by SAP CC.

4.1.18.1 Keywords

Notification group, notification policy, monitoring, alert

4.1.18.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [SAP CC 2023 Notification Reference](#) documentation
- `com.highdeal.notification` Java package and `NotifBook` API descriptions, available in the [Java/XML API Reference \(Core Library\)](#) documentation

4.1.18.3 Description

For monitoring and alerting purposes, SAP Convergent Charging (SAP CC) gives the possibility to generate notifications at business and administrative levels. These notifications are organized into notification groups, and rely on a dedicated framework you can integrate with your client application/system.

You can use the following procedures to configure the management of notifications within your SAP CC landscape and thus fit your specific needs:

- [Configuring the Notification Policy \[page 192\]](#)
- [Enabling the Notification Policy \[page 198\]](#)
- [Handling SAP CC Notification in your Java Application \[page 199\]](#)

4.1.18.4 Available Notifications

Notifications are organized into the following groups:

- **ABM** group, which contains the notifications triggered during the charging operations when:
 - The balance of a prepaid account or of a credit limit goes below a specified threshold
 - An alert has been configured in the price plan or charging plan of a charge that has been activated within a provider contract or a subscription
 - A prepaid account has expired
- **Administrative** group, which contains the notifications related to the connections between the different running elements (instances, databases, and so on)

The following table contains the list of available notifications, including their belonging group:

Notification			Group	
ID	Level	Name, Pretty Name, and Description	ABM	Admin.
0	inform	<p>AMOUNT_ALERT (amountAlert)</p> <p>Sent when a prepaid account or a credit limit balance goes below the amount threshold of the alert, this notification provides the following information:</p> <ul style="list-style-type: none"> • The service provider of the subscriber account. It is an ID of the pricing catalog of the service provider company. • The identifier of the subscriber account • The related balance type (prepaid or credit limit) • The identifier of the balance for which an amount alert has been triggered • The current amount of the balance with its currency • The message of the alert as configured in the subscriber account • The amount threshold of the alert <p>These alerts are configured for each subscriber account by the external CRM⁷⁶ or the provisioning system during the customer data provisioning process (in an integrated installation scenario).</p>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

⁷⁶ Customer Relationship Management

Notification			Group	
ID	Level	Name, Pretty Name, and Description	ABM	Admin.
1	inform	<p>EXPIRATION_ALERT (expirationAlert)</p> <p>Sent when the expiration alert of a prepaid account is triggered, this notification provides the following information:</p> <ul style="list-style-type: none"> • The service provider of the subscriber account • The identifier of the subscriber account • The identifier of the balance for which an amount alert has been triggered • The message of the alert as configured in the subscriber account • The state related to the alert • The date when the state change occurs • The period when the alert is triggered around the change date <p>These alerts are configured for each subscriber account by the external CRM or the provisioning system during the customer data provisioning process (in an integrated installation scenario).</p>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2	inform	<p>INSTANCE_UP (instanceUp)</p> <p>The instance of the Core Server is running.</p>	<input type="checkbox"/>	
3	inform	<p>INSTANCE_DOWN (instanceDown)</p> <p>The instance of the Core Server has been manually stopped.</p> <div style="background-color: #f0f0f0; padding: 5px; border: 1px solid #ccc;"> <p>Note</p> <p>This notification may not be sent in case of instance failure.</p> </div>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
4	failure	<p>DB_LINK_DOWN (dbLinkDown)</p> <p>The instance of the Core Server has lost its connection with the database, due to the following possible reasons:</p> <ul style="list-style-type: none"> • The database is stopped (accidentally or voluntarily) • The network interface is down • The instance cannot contact the database host because of a network problem (such as a firewall configuration) <div style="background-color: #f0f0f0; padding: 5px; border: 1px solid #ccc;"> <p>Note</p> <p>This notification is not sent when the instance cannot contact the database because of a wrong configuration.</p> </div>	<input type="checkbox"/>	
5	inform	<p>DB_LINK_UP (dbLinkUp)</p> <p>The instance of the Core Server has opened new database connections.</p>	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Notification			Group	
ID	Level	Name, Pretty Name, and Description	ABM	Admin.
6	failure	<p>DB_FAILURE (dbFailure)</p> <p>The database returned a failure exception. See the "message" argument of the notification for further details about the reason of the problem.</p>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7	fatal	<p>OUT_OF_MEMORY (outOfMemory)</p> <p>The instance of the Core Server has been stopped because its JVM has thrown an OutOfMemory exception.</p> <div style="border: 1px solid #ccc; background-color: #f0f0f0; padding: 5px; margin-top: 10px;"> <p>Note</p> <p>This notification may not be sent in case of insufficient JVM⁷⁷ memory.</p> </div>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
8	inform	<p>PNR_SCHEDULER_WAKESUP (pnrSchedulerWakesUp)</p> <p>The scheduler of the updater instance wakes up and starts a new activation cycle.</p>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
9	inform	<p>PNR_SCHEDULER_SLEEPS (pnrSchedulerSleeps)</p> <p>The scheduler of the updater instance is sleeping and may be waiting for its next activation cycle.</p>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
10	warn	<p>PNR_SCHEDULER_INTERRUPTED (pnrSchedulerInterrupted)</p> <p>The execution of the scheduler of the updater instance has been interrupted. The environment of the instance prevents the scheduler to complete its cycle (the activation failed, a problem occurred at memory level, and so on), according to a reason available in the notification details.</p>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
11	security	<p>AUTHENTICATION_FAILURE (authenticationFailure)</p> <p>Sent when an XML⁷⁸ message has been received without a valid authentication (unknown login or wrong password), this notification provides the following information:</p> <ul style="list-style-type: none"> • The specified login (or "no login" when no login is specified) • The reason of the authentication failure (unknown login or wrong password) 	<input type="checkbox"/>	<input checked="" type="checkbox"/>

⁷⁷ Java Virtual Machine

⁷⁸ eXtended Markup Language

Notification			Group	
ID	Level	Name, Pretty Name, and Description	ABM	Admin.
12	inform	<p>USER_ALERT (userAlert)</p> <p>Sent when a user defined alert is triggered, this notification provides the following information:</p> <ul style="list-style-type: none"> The code that identifies the user alert The message describing the user alert The service provider of the subscriber account The code of the subscriber account A list of properties that gives additional information about the user alert Use the Core Tool user interface to configure your own alerts by using the Alert Triggering Operator in a reusable charge defined for the service provider. Use the Cockpit user interface to configure your own alerts by using the Notification Triggering Operator in a reusable charge defined for the service provider. 	■	<input type="checkbox"/>
13	inform	<p>RENEW_RESERVATION (renewReservation)</p> <p>For internal use only.</p>	■	<input type="checkbox"/>
14	inform	<p>SPENDING_STATUS_REPORT (spendingStatusReport)</p> <p>For internal use only.</p>	■	<input type="checkbox"/>
15	inform	<p>NO_ACCESS (noAccess)</p> <p>Sent when the No Access Function component is triggered, this notification provides the following information:</p> <ul style="list-style-type: none"> The values of each property selected in the No Access Function component The message defined in the No Access Function component 	■	<input type="checkbox"/>

4.1.18.5 Configuring the Notification Policy

To fit specific needs, it is possible to define a notification policy that relies on XML-formatted configuration files that include a sequence of notification publishers. Each notification publisher gives the possibility to filter a subset of notifications that must be sent to a given output destination.

→ Remember

This section is dedicated to **implementers** who are members of the implementation and integration project team. In this [Customizing](#) activity, you design, configure, and test the notification management provided by SAP Convergent Charging (SAP CC).

→ Tip

To ease the configurations, you can export the current settings from your SAP system or use the delivered templates (`notification_policy.rater.xml.sk` and `notification_policy.bulkloader.xml.sk`). View these *.sk skeleton files and do your settings.

Configure the XML Files

Design the notification policy that suits your business and technical needs. When required, design a policy for the rater instances in your SAP system and another policy for the bulkloader instances.

Create your XML configuration files with the `notificationPolicy` XML element as the root element. Open your files. Add the expected notification publishers as previously designed.

Filters

To configure the filtering of notifications by the SAP system, you can use one of the following XML elements:

XML Element	Nested XML Element	XML Attribute	Description
filters	all	accept	Optional attribute used to enable or disable all notifications Possible values are: "true" or "false"
	range	lower	Lower identifier of a range of notifications
		upper	Upper identifier of a range of notifications
	set	id	Identifier of a notification
	name	pattern	Regular expression that defines the list of notifications
	prettyName	pattern	Regular expression that defines the list of notifications
	level	lowerLevel	Lower level of notifications to send Possible values are: "quiet", "inform", "warn", "security", "alert", "failure", or "fatal"
nameFilter		pattern	Regular expression that defines the list of notifications to filter according to their name
argumentFilter		name	Name of the argument available in the notification, that must be used as a filter
		pattern	Regular expression that defines the value of the argument

❁ Example

The following XML file defines a notification policy that filters the `USER_ALERT` and `NO_ACCESS` notifications:

```
<?xml version="1.0" encoding="UTF-8"?>
<notificationPolicy>
  <filters>
    <set id="12"/>
    <set id="15"/>
  </filters>
</notificationPolicy>
```

❁ Example

The following XML file defines a notification policy that filters the notifications whose ID is in the range [2,6], which means:

- `INSTANCE_UP`
- `INSTANCE_DOWN`
- `DB_LINK_UP`
- `DB_LINK_DOWN`
- `DB_FAILURE`

```
<?xml version="1.0" encoding="UTF-8"?>
<notificationPolicy>
  <filters>
    <range lower="2" upper="6"/>
  </filters>
</notificationPolicy>
```

❁ Example

The following XML file defines a notification policy that filters all notifications:

- Containing a "sample" argument whose value is "value"
- Containing a "sample2" argument whose value is "value2"

```
<?xml version="1.0" encoding="UTF-8"?>
<notificationPolicy>
  <sequence>
    <argumentFilter name="sample" pattern="value" />
    <argumentFilter name="sample2" pattern="value2" />
  </sequence>
</notificationPolicy>
```

Output Locations

Once filters have been defined, it is then necessary to define output locations, that can be:

- The **network layer**, used to publish notifications to one or many custom client applications (or systems), that you must implement using our Java API⁷⁹ (refer to the [SAP CC 2023 Web Services Documentation \(SOAP\)](#) documentation).

→ Remember

USER_ALERT notifications cannot be received by JCo⁸⁰ destinations, so the `network` attribute is the only way to handle them.

- **JCo destinations**, used to publish AMOUNT_ALERT and EXPIRATION_ALERT notifications to a JCo destination.
- **Customer Management Areas (CMAs)**, used to send notifications to the relevant SAP CRM or SAP ERP system according to information available in the concerned subscriber account.

The following table contains the possible XML elements that you can use to specify output locations:

XML Element	XML Attribute	Description
network	groups	This optional attribute gives the possibility to specify a group containing a subset of notifications to send on the network. When not specified, all previously filtered notifications are sent. Possible values are: "abm", "admin", or "abm.admin"
JCo	destination	Name of the JCo destination defined in the system
	function	Name of the JCo function to use
multiJCoDestination	selectedApplication	SAP system to use for sending notifications
customerManagementAreaRouting	selectedApplication	SAP system to use for sending notifications

❁ Example

The following XML files both define a notification policy that:

- Filters the INSTANCE_UP and INSTANCE_DOWN notifications.
- Sends these notifications on the network.

```
<?xml version="1.0" encoding="UTF-8"?>
<notificationPolicy>
  <filters>
    <set id="2" />
    <set id="3" />
  </filters>
  <network />
</notificationPolicy>
```

```
<?xml version="1.0" encoding="UTF-8"?>
<notificationPolicy>
  <sequence>
    <nameFilter pattern="INSTANCE_UP">
      <network />
    </nameFilter>
    <nameFilter pattern="INSTANCE_DOWN">
      <network />
    </nameFilter>
  </sequence>
```

⁷⁹ Application Programming Interface

⁸⁰ Java Connector

```
</notificationPolicy>
```

❁ Example

The following XML files both define a notification policy that:

- Filters the AMOUNT_ALERT (whose property "sample" is set to "value") and EXPIRATION_ALERT notifications.
- Sends the AMOUNT_ALERT notifications on the network.
- Sends the EXPIRATION_ALERT notifications:
 - On the network
 - To the "FCT" function of the "dest" JCo destination, writing possible errors into dedicated files according to a given policy defined within a bulkWriter element

You set up two configuration files as the following samples.

Notification policy for the rater instances:

```
<?xml version="1.0" encoding="UTF-8"?>
<notificationPolicy>
  <sequence>
    <nameFilter pattern="AMOUNT_ALERT">
      <argumentFilter name="sample" pattern="value">
        <network />
      </argumentFilter>
    </nameFilter>
    <nameFilter pattern="EXPIRATION_ALERT">
      <sequence>
        <JCo destination="dest" function="FCT">
          <bulkWriter
            adminParameterPrefixName="NOTIF_WRITER"
            rootPath="SAPCC_NOTIF/ERROR/Instance#@INSTANCE_ID@/
@JCO_DESTINATION_NAME@"
            channelCount="4"
            timeBasedFileRolloverPolicy="HOURLY"
            maxSizeBasedFileRolloverPolicy="1M"
            deflate="false"
            fileVersion="2"
            fileSequenceId="NOTIF_WRITER_EXCEPTION"
          />
        </JCo>
        <network />
      </sequence>
    </nameFilter>
  </sequence>
</notificationPolicy>
```

Notification policy for the bulkloader instances:

```
<?xml version="1.0" encoding="UTF-8"?>
<notificationPolicy>
  <nameFilter pattern="AMOUNT_ALERT">
    <argumentFilter name="sample" pattern="value">
      <network />
    </argumentFilter>
  <nameFilter pattern="EXPIRATION_ALERT">
    <sequence>
      <JCo destination="dest" function="FCT">
        <bulkWriter
          adminParameterPrefixName="NOTIF_WRITER"
          rootPath="SAPCC_NOTIF/ERROR/Instance#@INSTANCE_ID@/
@JCO_DESTINATION_NAME@"
        />
      </JCo>
    </sequence>
  </nameFilter>
</notificationPolicy>
```

```

        channelCount="4"
        timeBasedFileRolloverPolicy="HOURLY"
        maxSizeBasedFileRolloverPolicy="1M"
        deflate="false"
        fileVersion="2"
        fileSequenceId="NOTIF_WRITER_EXCEPTION"
    />
</JCo>
<network />
</sequence>
</nameFilter>
</nameFilter>
</notificationPolicy>

```

❁ Example

For the bulkloader instances, you can set up the following notification policy:

```

<?xml version="1.0" encoding="UTF-8"?>
<notificationPolicy>
  <nameFilter pattern="^AMOUNT_ALERT$|^EXPIRATION_ALERT$" >
    <multiJCoDestination>
      <JCo destination="@JCO_DESTINATION_NAME@" >
        <bulkWriter
          adminParameterPrefixName="NOTIF_WRITER"
          rootPath="SAPCC_NOTIF/ERROR/Instance#@INSTANCE_ID@/
@JCO_DESTINATION_NAME@"
          channelCount="4"
          timeBasedFileRolloverPolicy="HOURLY"
          maxSizeBasedFileRolloverPolicy="1M"
          deflate="false"
          fileVersion="2"
          fileSequenceId="NOTIF_WRITER_EXCEPTION"
        />
      </JCo>
    </multiJCoDestination>
  </nameFilter>
</notificationPolicy>

```

Next Steps

Enable the feature [\[page 198\]](#) in SAP CC and implement the reception of the SAP CC notifications by your client application or system. See [Handling SAP CC Notification in your Java Application \[page 199\]](#).

4.1.18.6 Enabling the Notification Policy

You want to enable the notification policy for your SAP system (a policy for the rater instances and another policy for the bulkloader instances).

Prerequisites

Your notification policy is designed and a few XML files are configured. For example, a first file for the rater instances and a second file for the bulkloader instances. See [Configuring the Notification Policy \[page 192\]](#).

Procedure

To enable your specific notification policy defined within an XML configuration file, complete the following procedure:

1. Open a system console in the directory that contains the executable of the Setup Tool user interface.
2. Execute the `notificationpolicy import` command, specifying the absolute path of the XML configuration file containing your notification policy for the rater instances.
3. Restart the rater instances of the Core Server system.
4. If SAP CC must publish the NO_ACCESS notifications, then modify the values of the NO_ACCESS_NOTIFICATIONS_ENABLED system parameters of the rater instances in your running SAP CC system. See [Enabling Sending of NO_ACCESS Notifications to the Network \[page 200\]](#).
5. Execute the `notificationpolicy import` command, specifying the absolute path of the XML configuration file containing your notification policy for the bulkloader instances.
6. Restart the bulkloader instances of the Core Server system.

Next Step

See [Handling SAP CC Notification in your Java Application \[page 199\]](#).

Related Information

[notificationpolicy import](#)
[Setup Tool](#)

4.1.18.7 Handling SAP CC Notification in your Java Application

If you developed a Java client application within which you want to handle the notifications generated by your Core Server system, you need to use the `com.highdeal.notification` package available in the Core SDK in order to:

- Implement the `NotificationHandler` Java interface
- Instantiate the `NotificationServiceClient` object

4.1.18.7.1 Implementing the NotificationHandler Java Interface

As described in the [Java/XML API Reference \(Core Library\)](#) documentation, the `NotificationHandler` interface always invokes the `handleNotification` method that provides the following information:

- **systemName**, that corresponds to the SID that contains the instance which sent the notification
- **instanceID**, that corresponds to the identifier of the instance which sent the notification
- **timestamp**, that corresponds to the date when the notification has been sent
- **uid**, that corresponds to the unique identifier of the notification class
- **args**, that corresponds to the arguments of the notification

To retrieve information related to an handled notification, consider the following sample code that you can adapt to fit your business requirements:

```
public void handleNotification
(String sid, InstanceId iid, long timestamp, int uid, String... args) {
    NotificationDescription desc = NotifBook.searchNotificationDescription(uid);
    if (desc == null) {
        // Should never occur
        System.out.println("Unknown notification");
        return;
    }
    String notifName = desc.getName();
    String notifPrettyName = desc.getPrettyName();
    NotificationLevel notifLevel = desc.getSeverityLevel();
    String[] notifArgName = desc.getAdditionalInfoKeys();
    ...
}
```

⚠ Caution

The thread invoking the handler is the thread that listens to the socket. As a consequence, this thread must be quickly freed to avoid losing further notifications.

4.1.18.7.2 Implementing the NotificationServiceClient Object

Once you implemented the NotificationHandler interface, it is necessary to perform the following operations within your Java application:

- Instantiate an InstanceMap object using the searchInstanceMap method of the NotificationServiceClient class
- Instantiate a NotificationServiceClient object and:
 - Initialize this object using the setNotificationHandler method
 - Prepare the connection to the relevant SAP CC system using the addAllConnections method
 - Connect this object to start receiving notifications from the relevant SAP CC system

To receive and handle notifications within your Java application, consider the following sample code that you can adapt to fit your business requirements:

```
NotificationHandler handler = <YOUR_NOTIFICATIONHANDLER_IMPLEMENTATION>
InstanceMap map = NotificationServiceClient.searchInstanceMap(serverUrl, login,
password);
client = new NotificationServiceClient();
client.setNotificationHandler(handler);
client.addAllConnections(map);
client.connect(null, 10000);
```

4.1.18.8 Enabling Sending of NO_ACCESS Notifications to the Network

As of SAP CC 2022 FPS 2 Patch Level 1 (see SAP Note [3341574](#)), you can enable the sent of NO_ACCESS notifications to the network.

By default, this feature is not enabled when you implement a patch, update the SAP software, or upgrade to a newer release.

Procedure

To enable the feature, check the current notification policy (see [Enabling the Notification Policy \[page 198\]](#) and [Configuring the Notification Policy \[page 192\]](#)). Set up the NO_ACCESS_NOTIFICATIONS_ENABLED system parameter to true.

4.1.18.9 Disabling Sending of NO_ACCESS Notifications to the Network

If not required by your implementation and integration project, you can limit the traffic of the NO_ACCESS notifications published by SAP CC.

As of SAP CC 2022 FPS 2 Patch Level 1 (see SAP Note [3341574](#)), you can enable the sent of NO_ACCESS notifications to the network.

By default, this feature is not enabled when you implement a patch, update the SAP software, or upgrade to a newer release but is enabled for a first-time installation.

As an implementer, check that you do not need these NO_ACCESS notifications and ask the system administrators to modify the values of the NO_ACCESS_NOTIFICATIONS_ENABLED system parameter.

Procedure

To disable the feature, check the current notification policy (see [Enabling the Notification Policy \[page 198\]](#) and [Configuring the Notification Policy \[page 192\]](#)). Set up the NO_ACCESS_NOTIFICATIONS_ENABLED system parameter to false.

4.1.19 Partition Distribution Using the Smart Mode

[Keywords \[page 201\]](#)

[Preliminary Notes \[page 202\]](#)

[Description \[page 202\]](#)

[Activating the Smart Distribution Mode \[page 202\]](#)

[Fine-Tuning the Smart Distribution Mode \[page 205\]](#)

[Protecting Raters and Guiders Against Warm-Up Overloading \[page 206\]](#)

4.1.19.1 Keywords

cache, warm-up, distribution, partition, smart mode, online stateful, primary dispatcher, rater, guider, burst protection

4.1.19.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [Partitions Mapping Reorganization](#) section of the [SAP CC 2023 Application Help](#) documentation
- [Cache Warm-Up](#) section of the [SAP CC 2023 Application Help](#) documentation
- [Partitions Distribution and Warm-Up Settings](#) group in the [SAP CC 2023 System Parameter Reference](#) documentation

4.1.19.3 Description

To increase the reactivity of the running Core Server system, rater and guider instances handle data within dedicated cached structures.

To avoid latency, a cache warm-up mechanism can be activated in order to retrieve this data from the Core Database and Session Database, and preload them into these cached structures. When this warm-up mechanism is activated, it is possible to configure the Core Server system in order to activate a smart execution mode for the partitions distribution operations performed by the primary dispatcher instance. This execution mode gives the possibility to control the warm-up operations performed by the targeted instances during these partitions distribution operations (executed when guider or rater instances start, shut-down, or fail), and thus to control the overall impact of warm-up operations on the online stateful charging operations.

4.1.19.4 Activating the Smart Distribution Mode

If the cache warm-up mechanism is activated in your SAP system, you configure the technical settings for the system instances:

- Rater
- Guider

Activate the Smart Distribution Mode for the Rater Instances

If the [CACHE_WARMUP_THREAD_COUNT](#) system parameter has been set to a positive value, the cache warm-up mechanism is activated. In this case, the primary dispatcher instance distributes partitions using the smart execution mode as soon as the number of running instances is greater than or equals the value of the [RATER_PARTITION_SWITCH_MIN_INSTANCE_COUNT](#) system parameter.

As the system administrator, you complete the procedure:

1. Tune and configure the following system parameters:
 1. [RATER_PARTITION_SWITCH_WARMUP_TIMEOUT](#), which defines the maximum duration allocated to a partition warm-up operation performed by a rater instance in a smart distribution context.

SAP SE recommends you to set up a value that corresponds to twice the average duration of the partition warm-up operations, that can be retrieved from the dedicated Introscope probes.

2. [RATER_PARTITION_SWITCH_CONCURRENT_PARTITIONS](#), which defines the maximum number of not-yet warmed partitions that can be simultaneously assigned to a rater for warming purpose.

🔗 Example

Considering a Core Server system containing 4 rater instances. Setting the [RATER_PARTITION_SWITCH_CONCURRENT_PARTITIONS](#) system parameter to 3 implies that a maximum of 12 partitions can be simultaneously assigned by the primary dispatcher to the running rater instances for warming purpose.

3. [RATER_PARTITION_SWITCH_DB_INSTANCE_CONCURRENT_PARTITIONS](#), which defines the maximum number of partitions per database instance that can be simultaneously assigned to the running rater instances for warming purpose.

🔗 Example

Considering a landscape containing a Core Database made up with 3 database instances. Setting the [RATER_PARTITION_SWITCH_DB_INSTANCE_CONCURRENT_PARTITIONS](#) system parameter to 3 implies that a maximum of 9 partitions can be simultaneously assigned by the primary dispatcher to the running rater instances for warming purpose, whatever the number of running rater instances is.

📌 Note

In case both [RATER_PARTITION_SWITCH_CONCURRENT_PARTITIONS](#) and [RATER_PARTITION_SWITCH_DB_INSTANCE_CONCURRENT_PARTITIONS](#) are defined, the minimum of the 2 corresponding number of partitions is used by the primary dispatcher when assigning partitions for warming purpose.

🔗 Example

Considering:

- A Core Server system containing 5 raters, 1 of these raters shutting down
- A Core Database made up with 3 database instances
- The [RATER_PARTITION_SWITCH_CONCURRENT_PARTITIONS](#) system parameter set to 3
- The [RATER_PARTITION_SWITCH_DB_INSTANCE_CONCURRENT_PARTITIONS](#) system parameter set to 3

Then the number of partitions that can be simultaneously assigned by the primary dispatcher to the 4 running rater instances for warming purpose is: $\min((5-1) \times 3, 3 \times 3) = 9$ partitions.

2. Fine-tune the smart distribution mode for the Rater instances.
See [Fine-Tuning the Smart Distribution Mode \[page 205\]](#)
3. Protect the Guider instances against warm-up overloading.
See [Protecting Raters and Guiders Against Warm-Up Overloading \[page 206\]](#).

→ Remember

If the cache warm-up mechanism is not activated, no warm-up operation is performed by rater instances, which leads to additional latency that impacts the online stateful charging operations.

Activate the Smart Distribution Mode for the Guider Instances

If the `CACHE_WARMUP_THREAD_COUNT` system parameter has been set to a positive value, the cache warm-up mechanism is activated. In this case, the primary dispatcher instance distributes partitions using the smart execution mode as soon as the number of running instances is greater than or equals the value of the `GUIDER_PARTITION_SWITCH_MIN_INSTANCE_COUNT` system parameter.

As the system administrator, you complete the procedure:

1. Tune and configure the following system parameters:
 1. `GUIDER_PARTITION_SWITCH_WARMUP_TIMEOUT`, which defines the maximum duration allocated to a partition warm-up operation performed by a guider instance in a smart distribution context. SAP SE recommends you to set up a value that corresponds to twice the average duration of the partition warm-up operations, that can be retrieved from the dedicated Introscope probes.
 2. `GUIDER_PARTITION_SWITCH_CONCURRENT_PARTITIONS`, which defines the maximum number of not-yet warmed partitions that can be simultaneously assigned to a guider for warming purpose.

❁ Example

Considering a Core Server system containing 4 guider instances. Setting the `GUIDER_PARTITION_SWITCH_CONCURRENT_PARTITIONS` system parameter to 3 implies that a maximum of 12 partitions can be simultaneously assigned by the primary dispatcher to the running guider instances for warming purpose.

3. `GUIDER_PARTITION_SWITCH_DB_INSTANCE_CONCURRENT_PARTITIONS`, which defines the maximum number of partitions per database instance that can be simultaneously assigned to the running guider instances for warming purpose.

❁ Example

Considering a landscape containing a Core Database made up with 3 database instances. Setting the `GUIDER_PARTITION_SWITCH_DB_INSTANCE_CONCURRENT_PARTITIONS` system parameter to 3 implies that a maximum of 9 partitions can be simultaneously assigned by the primary dispatcher to the running guider instances for warming purpose, whatever the number of running guider instances is.

📄 Note

In case both `GUIDER_PARTITION_SWITCH_CONCURRENT_PARTITIONS` and `GUIDER_PARTITION_SWITCH_DB_INSTANCE_CONCURRENT_PARTITIONS` are defined, the minimum of the 2 corresponding number of partitions is used by the primary dispatcher when assigning partitions for warming purpose.

❁ Example

Considering:

- A Core Server system containing 4 running guiders
- A Core Database made up with 3 database instances
- The `GUIDER_PARTITION_SWITCH_CONCURRENT_PARTITIONS` system parameter set to 2
- The `GUIDER_PARTITION_SWITCH_DB_INSTANCE_CONCURRENT_PARTITIONS` system parameter set to 3

Then the number of partitions that can be simultaneously assigned by the primary dispatcher to the running guider instances for warming purpose is: $\min(4 \times 2, 3 \times 3) = 8$ partitions.

2. Fine-tune the smart distribution mode for the Guider instances.
See [Fine-Tuning the Smart Distribution Mode \[page 205\]](#)
3. Protect the Guider instances against warm-up overloading.
See [Protecting Raters and Guiders Against Warm-Up Overloading \[page 206\]](#).

→ Remember

If the cache warm-up mechanism is not activated, no warm-up operation is performed by guider instances, which leads to additional latency that impacts the online stateful charging operations.

4.1.19.5 Fine-Tuning the Smart Distribution Mode

Fine-Tune the Smart Distribution Mode for the Guider Instances

As the system administrator, you complete the following procedure:

1. SAP SE recommends you to consider the following configuration as the minimum possible configuration:
 - `GUIDER_PARTITION_SWITCH_CONCURRENT_PARTITIONS = 1`
 - `GUIDER_PARTITION_SWITCH_DB_INSTANCE_CONCURRENT_PARTITIONS = 1`
 - `GUIDER_PARTITION_SWITCH_MIN_INSTANCE_COUNT = (total number of running instances) - (acceptable number of down instances at a given time) + 1`

❖ Example

Considering:

- A Core Server system containing 4 guider instances deployed on 2 hosts
- An acceptable number of 1 host failure, similar to 2 guider instances failure

Then the `GUIDER_PARTITION_SWITCH_MIN_INSTANCE_COUNT` system parameter can be set to $(4-2)+1=3$, which means that the smart execution mode will be used by the primary dispatcher:

- Until more than 2 guider instances remain running
- When a third guider will start

2. Then, you need to tune the values of both `GUIDER_PARTITION_SWITCH_CONCURRENT_PARTITIONS` and `GUIDER_PARTITION_SWITCH_DB_INSTANCE_CONCURRENT_PARTITIONS` system parameters according to the previously explained behavior.

The objective is to determine the values that give the best ratio between:

- The duration of a guider instance startup or shutdown operation
- The impact of warm-up operations on the online stateful charging operations

These values can be determined by analyzing the following performance and health metrics of the guider instances of the Core Server system:

- [SAP CC | Warm-Up | Partition Count](#), which shows the number of partitions assigned to a given instance
- [SAP CC | Warm-Up | Partition Count](#), which shows the number of warmed partitions of a given instance

Fine-Tune the Smart Distribution Mode for the Rater Instances

As the system administrator, you complete the following procedure:

1. SAP SE recommends you to consider the following configuration as the minimum possible configuration:
 - `RATER_PARTITION_SWITCH_CONCURRENT_PARTITIONS = 1`
 - `RATER_PARTITION_SWITCH_DB_INSTANCE_CONCURRENT_PARTITIONS = 1`
 - `RATER_PARTITION_SWITCH_MIN_INSTANCE_COUNT = (total number of running instances) - (acceptable number of down instances at a given time) + 1`

❖ Example

Considering:

- A Core Server system containing 6 rater instances deployed on 3 hosts
- An acceptable number of 1 host failure, similar to 2 rater instances failure

Then the `RATER_PARTITION_SWITCH_MIN_INSTANCE_COUNT` system parameter can be set to $(6-2)+1=4$, which means that the smart execution mode will be used by the primary dispatcher:

- Until more than 4 rater instances remain running
- When a fifth rater will start

2. Then, you need to tune the values of both `RATER_PARTITION_SWITCH_CONCURRENT_PARTITIONS` and `RATER_PARTITION_SWITCH_DB_INSTANCE_CONCURRENT_PARTITIONS` system parameters according to the previously explained behavior.

The objective is to determine the values that give the best ratio between:

- The duration of a rater instance startup or shutdown operation
- The impact of warm-up operations on the online stateful charging operations

These values can be determined by analyzing the following performance and health metrics of the rater instances of the Core Server system:

- [SAP CC | Warm-Up | Partition Count](#), which shows the number of partitions assigned to a given instance
- [SAP CC | Warm-Up | Partition Count](#), which shows the number of warmed partitions of a given instance

4.1.19.6 Protecting Raters and Guiders Against Warm-Up Overloading

In case a rater or guider instance is added or removed from the list of running instances in the SAP system, the primary dispatcher instance redistributes the data partitions among the list of running raters and guiders

for warming purposes. When the smart execution mode has been activated, it is also possible to configure the following system parameters in order to protect the raters and guiders against possible overloading due to warm-up operations:

- [RATER_PARTITION_SWITCH_BURST_PROTECTION_INITIAL_DELAY](#), which defines the minimum delay (in seconds) between the first and second assignments of partition to each rater instance during a smart warm-up operation
- [RATER_PARTITION_SWITCH_BURST_PROTECTION_DELAY](#), which defines the minimum delay (in seconds) between the assignment of partitions to each rater instance during a smart warm-up operation
- [GUIDER_PARTITION_SWITCH_BURST_PROTECTION_INITIAL_DELAY](#), which defines the minimum delay (in seconds) between the first and second assignments of partition to each guider instance during a smart warm-up operation
- [GUIDER_PARTITION_SWITCH_BURST_PROTECTION_DELAY](#), which defines the minimum delay (in seconds) between the assignment of partitions to each guider instance during a smart warm-up operation

As the Java Virtual Machine (JVM) is more solicited on startup due to additional internal operations, SAP SE recommends that you set an initial delay that is bigger than the delay used for the subsequent assignments.

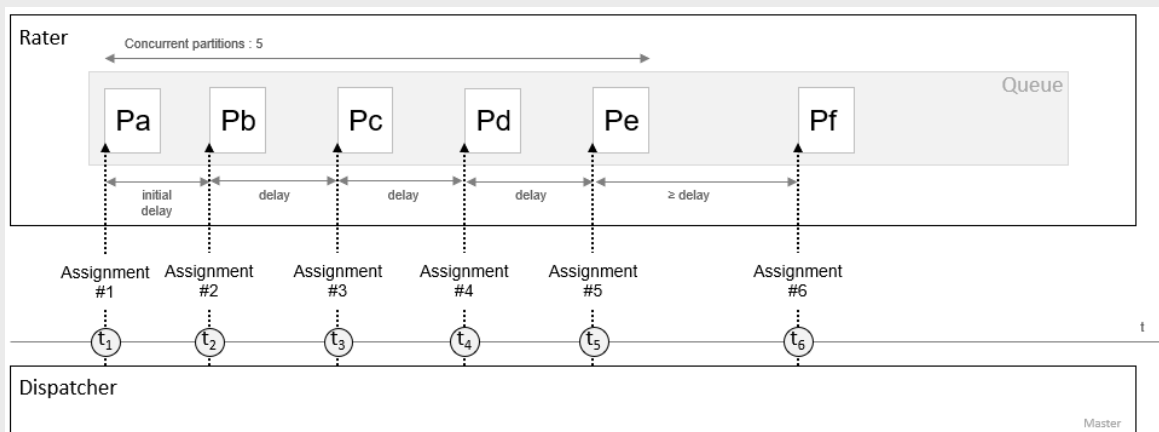
As the system administrator, you configure your SAP system (rater and guider instances).

❖ Example

Considering a configuration where:

- 1 rater instance is starting
- 6 partitions (Pa to Pf) must be assigned by the primary dispatcher instance to this starting rater instance
- `RATER_PARTITION_SWITCH_CONCURRENT_PARTITIONS=5`, which means that a maximum of 5 partitions can be simultaneously assigned to this rater for warming purpose

The following schema shows how this list of partitions are assigned to the rater instance using delays for protection purpose:



- At t_1 , the primary dispatcher instance assigns the partition **Pa** to the rater instance, which represents the first partition assignment. The rater puts **Pa** in its dedicated queue and starts warming up this partition.
- At t_2 , the primary dispatcher assigns the partition **Pb** to the rater, which represents the second partition assignment, delayed using the value of the

RATER_PARTITION_SWITCH_BURST_PROTECTION_INITIAL_DELAY system parameter. The rater puts **Pb** in its dedicated queue and starts warming up this partition.

- At **t3**, the primary dispatcher assigns the partition **Pc** to the rater, which represents the third partition assignment, delayed at least with the value of the RATER_PARTITION_SWITCH_BURST_PROTECTION_DELAY system parameter. The rater puts **Pc** in its dedicated queue and starts warming up this partition.
- At **t4**, the primary dispatcher assigns the partition **Pd** to the rater, which presents the fourth partition assignment, delayed at least with the value of the RATER_PARTITION_SWITCH_BURST_PROTECTION_DELAY system parameter. The rater puts **Pd** in its dedicated queue and starts warming up this partition.
- At **t5**, the primary dispatcher assigns the partition **Pe** to the rater, which represents the fifth partition assignment, delayed at least with the value of the RATER_PARTITION_SWITCH_BURST_PROTECTION_DELAY system parameter. The rater puts **Pe** in its dedicated queue and starts warming up this partition.
- At **t6**, which corresponds to an undefined time but that is greater than the value specified in the RATER_PARTITION_SWITCH_BURST_PROTECTION_DELAY system parameter, the rater successfully warmed up one of the previously assigned partitions (Pa to Pe). The primary dispatcher then assigns the partition **Pf** to the rater. The rater puts **Pf** in its dedicated queue and starts warming up this partition.

Note

In case the smart execution mode has not been activated, all the 6 partitions (Pa to Pf) would be simultaneously assigned to the rater instance by the primary dispatcher instance, which could decrease the performance of the rater regarding the warm-up operations.

4.1.20 Startup Configuration Files

[Keywords \[page 208\]](#)

[Preliminary Notes \[page 209\]](#)

[Description \[page 209\]](#)

[Configuration Options \[page 209\]](#)

[Modifying a Startup Configuration File \[page 210\]](#)

4.1.20.1 Keywords

startup, jstart, instance, JVM⁸¹ option, classpath, libpath

⁸¹ Java Virtual Machine

4.1.20.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [Document Definitions](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation

This procedure uses the following variables:

- `<SYSTEM_ID>`, which corresponds to the identifier of your system
- `<INSTANCE_NUMBER>`, which corresponds to the global number of the concerned instance, which is different from the identifier of the instance (such as "Dispatcher#1")
- `<INSTANCE_NAME>`, which corresponds to the name of the concerned instance
- `<INSTANCE_DIRECTORY>`, which corresponds to the directory of an SAP CC instance (CC<D/U/G/R/B/T><INSTANCE_NUMBER>)
- `<HOSTNAME>`, which corresponds to the name of the host containing the concerned instance

4.1.20.3 Description

In the environment of SAP Convergent Charging(SAP CC), each instance of the Core Server system uses a startup configuration file to initiate its startup process. These configuration files are:

- Stored in the SAP Profile Folder in the [SAP Central Repository](#) of an SAP system.
- Copied from the SAP Profile Folder to the `config` folder of each deployed instance during the instance startup phase.

You configure the startup configuration file of each instance that is available in your SAP CC system and thus fit your specific needs.

References

[Configuration Options \[page 209\]](#)

Technical Operations

[Modifying a Startup Configuration File \[page 210\]](#)

4.1.20.4 Configuration Options

The following table contains the list of settings that can be configured within startup configuration files:

Settings	Parameter	Description
JVM Options	<INSTANCE_NAME>.javaParameters	This parameter includes all the JVM options used by the JRE ⁸² to execute an SAP CC Instance. For further information, refer to the Java Virtual Machine [page 139] section of this documentation. Each option has the same prefix: -D or -X
Java class path of customized functions	<INSTANCE_NAME>.classPath	This parameter is used to specify all the specific Java classes that must be loaded by the instance on startup.
Library path of customized functions	<INSTANCE_NAME>.libPath	This parameter is only relevant when the .classPath parameter is modified and when the related Java classes require native libraries.

⚠ Caution

Do not modify other parameters.

4.1.20.5 Modifying a Startup Configuration File

To modify the startup configuration file of a given instance composing your SAP Convergent Charging system (Core Server), complete the following procedure:

1. Edit the `jstart.config` file of the concerned instance, that is located in the following subdirectory of the [SAP Central Repository](#): `profile/jstart/<SYSTEM_ID>_<INSTANCE_DIRECTORY>_<HOSTNAME>`

🔗 Example

For example, the directory name of a **dispatcher** instance with the SAP instance number **03** is "CCD03".

→ Recommendation

SAP SE strongly recommends that you back up the `jstart.config` file before editing its content.

2. Modify the relevant settings according to your needs.
3. Save your modifications.
4. Restart the concerned instance of the Core Server system to apply your modifications.
During the startup phase of the instance, the modified `jstart.config` file is copied from the **SAP Profile Folder** to the **local config** folder of the instance, overwriting the existing `local config/jstart.config` file.

→ Recommendation

SAP SE recommends that you check the content of the `jstart.config` file located in the **local config** folder of the instance, to ensure that your modifications have correctly been reflected.

⁸² Java Runtime Environment

4.1.21 Schedulers

- [Configuring the Allowances Purge Mechanism and Its Scheduler \[page 132\]](#)
- [Configuring the File Metadata Purge Mechanism and Its Scheduler \[page 134\]](#)
- [Configuring the Product Usage Purge Mechanism and Its Scheduler \[page 136\]](#)
- [Configuring the Internal Schedulers \[page 211\]](#)

4.1.21.1 Configuring the Internal Schedulers

Using Admin+

Use the [set](#) command to set up the subsets of system parameters that relate to schedulers.

Consider the schedulers that are available in your environment. See [Configuring the Schedulers with Admin+](#).

4.1.22 System and Data Auditing

[Keywords \[page 211\]](#)

[Preliminary Notes \[page 211\]](#)

[Description \[page 212\]](#)

[Measuring Product Usage \[page 212\]](#)

[Data Object Auditing \[page 214\]](#)

4.1.22.1 Keywords

Auditing, recording, usage measurement, usage metric, change log, snapshot, user operation

4.1.22.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [System and Data Auditing](#) section of the [SAP CC 2023 Application Help](#) documentation
- "System and Data Auditing: Product Usage Measurement Settings" and "System and Data Auditing: Data and Operation Auditing Settings" groups in the [SAP CC 2023 System Parameter Reference](#) documentation
- `metriclist`, `purge_object_change_logs` and `purge_user_operations` commands of the [SAP CC 2023 Primary Help for Admin+](#) documentation
- [Installing and Launching Admin+](#) and [Installing and Launching Core Tool](#) sections of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation
- "Installation of Diagnostics Agents" SAP Note [1365123](#) documentation

4.1.22.3 Description

For system control purpose, SAP Convergent Charging provides detailed information about the usage of the SAP CC product and the tracking of modifications performed on master data and related user operations.

You can use the following procedures to configure the product usage measurement and master data auditing mechanisms available within your SAP CC landscape and thus fit your specific needs:

- [Recording SAP Product Usage Metrics \[page 212\]](#)
- [Measuring Customer Usage in SAP Solution Manager \[page 213\]](#)
- [User Operation Auditing \[page 214\]](#)
- [Object Snapshot Recording \[page 215\]](#)

4.1.22.4 Measuring Product Usage

In terms of product usage measurement, the SAP CC Core Server system gives the possibility to:

- Record metrics dedicated to the business usage of the SAP CC product
- Provide some customer usage information to SAP Solution Manager

[Recording SAP Product Usage Metrics \[page 212\]](#)

[Measuring Customer Usage in SAP Solution Manager \[page 213\]](#)

4.1.22.4.1 Recording SAP Product Usage Metrics

SAP Convergent Charging (SAP CC) is delivered with a set of metrics dedicated to the measurement of its business usage, providing information such as:

- The volume of master data configured within the system
- The volume of transactional data generated by the system during business operations

These metrics are recorded in the Core Database system by a dedicated scheduler whose execution depends on a policy that you can modify to fit specific needs.

Note

This scheduler is also responsible for purging out-of-date data on a daily basis. As this scheduler is executed once a day, 1 day of recorded metrics are deleted at each automated purge operation.

To modify the behavior of the scheduler in charge of recording metrics related to business usage, execute the following procedure:

1. Launch your [favorite user interface \[page 22\]](#) and identify as the administrator of the Core Server system.
2. Modify the value of the following system parameters for each **updater** instance of the Core Server system:
 - [METRIC_RECORDING_SCHEDULER_ENABLED](#), which gives the possibility to enable or disable the scheduler
 - [METRIC_RECORDING_DAY_TIME](#), which defines the time when the metrics are recorded
 - [METRIC_RECORD_TIME_WINDOW](#), which defines the retention period for recorded metrics. Once this period is reached, the scheduler in charge of recording metrics deletes the recorded metrics that are older than this period.

As this scheduler is executed once a day, 1 day of recorded metrics are deleted at each purge operation.

For further information about these system parameters, refer to their dedicated documentation available in the [SAP CC 2023 System Parameter Reference](#) documentation.

Note

The recorded business usage metrics can be browsed using:

- The [Display Usage Metrics](#) app provided by the Cockpit user interface
- The [Metrics view](#) available in the Core Tool user interface

4.1.22.4.2 Measuring Customer Usage in SAP Solution Manager

In an integrated scenario with SAP Solution Manager, SAP CC can communicate with the SAP SMD Agent to provide information related to customer usage. The following procedures give the possibility to configure both SAP Convergent Charging and SAP Solution Manager for customer usage measuring purpose.

Configuring SAP CC for customer usage measurement

To communicate with SAP Solution Manager, SAP CC must fulfill the following requirements:

- SAP Solution Manager must be installed within your landscape
- SAP CC must be registered in SAP Solution Manager as a technical system. For further information, refer to the “Managed Systems” section of the SAP Solution Manager documentation: <http://support.sap.com/solutionmanager>
- An SMD Agent must be installed on each machine hosting a Core Server system. For further information, refer to the dedicated SAP Note [1365123](#) documentation

Once these requirements are fulfilled, execute the following procedure:

1. Enable the scheduler in charge of recording metrics related to business usage. For further information, refer to the [Recording SAP Product Usage Metrics \[page 212\]](#) dedicated procedure described above
2. Launch the Core Tool user interface and log in with an individual user granted the "User Administrator" role
3. Create a technical user named **SM_COLL_<SID>**, where **<SID>** corresponds to the SID of the concerned Core Server system. This user must not be granted any role. The password of this user will be used afterwards when configuring the SAP Solution Manager side

Configuring SAP Solution Manager for customer usage measurement

To communicate with SAP CC, execute the following procedure:

1. Launch the SMD Agent Administration user interface and identify as an administrator
2. Click the *Application Configuration* tab
3. Select **Agent Applications > com.sap.smd.agent.application.global.configuration**
4. For each updater of the concerned Core Server system:
 - Fill the *Select scope* field with the name of the machine hosting the updater
 - Click the *Edit* button
 - Add the **<SID>/sapj2ee/com/user** property
 - Fill this property with the name of the **SM_COLL_<SID>** user created in Step 1
 - Add the **<SID>/sapj2ee/com/pwd** property
 - Fill this property with the password of the **SM_COLL_<SID>** user created in Step 1
 - Add the **<SID>/sapj2ee/msgserver/httpport** property
 - Fill this property with the HTTP⁸³ port number of the updater
5. Save your modifications

4.1.22.5 Data Object Auditing

SAP Convergent Charging (SAP CC) gives the possibility to track and view the changes that are performed on master data everytime a user operation is executed. **Enabled by default**, this *Data Object Auditing* feature **cannot be deactivated** in your SAP Convergent Charging system landscape.

In terms of master data and user operations' audit, the SAP CC Core Server system gives the possibility to [record the operations \[page 214\]](#) that are executed by the SAP CC users, and the [resulting modifications on the associated master data \[page 215\]](#).

[User Operation Auditing \[page 214\]](#)

[Object Snapshot Recording \[page 215\]](#)

4.1.22.5.1 User Operation Auditing

SAP Convergent Charging (SAP CC) gives the possibility to track and view some user operations requested by the SAP CC users and performed on the SOAP over HTTP and XML over HTTP communication channels.

⁸³ HyperText Transfer Protocol

Enabled by default with all available domains activated, SAP SE recommends that you do not disable this *User Operation Auditing* feature which enriches the auditing capabilities in your SAP Convergent Charging system landscape.

⚠ Caution

This feature increases the volume of data that is stored in the `USER_OPERATION` table of the Core Database, which may significantly impact the performance of the whole Core Server system.

SAP SE recommends that you regularly perform purge operations to maintain your Core Server system optimally.

For further information about such purge operations, refer to the `purge_user_operations` command of the Admin+ user interface. See [Manually purge_user_operations \[page 433\]](#).

To modify the behavior of the User Operation Auditing feature, [change the value of the following system parameters \[page 22\]](#) for all the dispatcher, updater, guider, rater, bulkloader and taxer instances of the Core Server system:

- `AUDIT_DOMAIN`, which gives the possibility to specify a subset of user operations domains to audit
- `AUDIT_ACTIVATION`, which gives the possibility to enable or disable the recording of user operations

For further information about these system parameters, refer to their dedicated documentation available in the [SAP CC 2023 System Parameter Reference](#) documentation.

ℹ Note

- Enabling the User Operation Auditing feature requires a restart of the concerned instances.
- Disabling the feature does not necessary require a restart of the concerned instances, depending whether permanent and/or runtime values are modified.
- If the runtime values are set to false, the feature is immediately disabled, but the pending mass operations continue to be audited until they end.

→ Tip

Find the complete list of auditable operations [here](#).

Audit of user operations is now possible with some conditions/restrictions defined by the concepts of SAP CC. See [Viewing Audited Users Operations \[page 411\]](#).

Monitor the volume of data and manage necessary purges. See [Manually purge_user_operations \[page 433\]](#).

4.1.22.5.2 Object Snapshot Recording

To get additional details about the modifications made on master data, SAP Convergent Charging provides an Object Snapshot Recording feature that is **enabled by default with all available domains activated** and that gives the possibility to record snapshots of the modified master data.

⚠ Caution

This feature increases the volume of data that is stored in the `OBJECT_SNAPSHOT` table of the Core Database, which may significantly impact the performance of the whole Core Server system. SAP

SE recommends that you regularly perform purge operations to optimally maintain your Core Server system. For further information about such purge operations, refer to the `purge_object_change_logs` command of the Admin+ user interface.

To modify the behavior of the Object Snapshot Recording feature, [modify the value of the following system parameters \[page 22\]](#) for each updater instance:

- [AUDIT_OBJECT_DOMAIN](#), which gives the possibility to specify a subset of user operations domains to audit
- [AUDIT_OBJECT_ACTIVATION](#), which gives the possibility to enable or disable the recording of user operations

For further information about these system parameters, refer to their dedicated documentation available in the [SAP CC 2023 System Parameter Reference](#) documentation.

Note

Enabling the Object Snapshot Recording feature requires a restart of the updaters. Disabling the feature does not necessary require a restart of the updaters, depending whether permanent and/or runtime values are modified. If the runtime values are set to false, the feature is immediately disabled.

4.1.23 Thread Dump Files Generation

[Keywords \[page 216\]](#)

[Preliminary Notes \[page 216\]](#)

[Description \[page 217\]](#)

[Configuration Options \[page 217\]](#)

[Enabling the Generation of Thread Dump Files \[page 218\]](#)

4.1.23.1 Keywords

Thread dump, troubleshoot

4.1.23.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [Installing and Launching Admin+](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation
- `dump` command of the [SAP CC 2023 Primary Help for Admin+](#) documentation

- [Thread Dump File Generation Troubleshooting Settings](#) group in the SAP CC 2023 System Parameter Reference documentation

4.1.23.3 Description

In addition to logging and tracing capabilities, SAP Convergent Charging gives the possibility to generate thread dump files, which contain information about the execution context of the different threads that are executed by the instances of the Core Server system.

In case a problem occurs during the execution of a business or technical operation, or if the execution exceeds some defined thresholds, the related instance generates these dump files automatically.

→ Tip

Mainly addressed to support specialists, the generation of these thread dump files can be configured in order to fit specific needs mainly related to issue troubleshooting.

You can use this [procedure \[page 218\]](#) to configure the generation of thread dump files in your running SAP CC system and thus fit your specific needs.

4.1.23.4 Configuration Options

The following table lists the SAP CC system parameters that you can use to configure the generation of thread dump files by an instance in the SAP CC Core Server system:

System Parameter	Description
Function Enablement	
THREAD_DUMP_ENABLED	Enables/disables the generation of thread dump files
Function Options	
THREAD_DUMP_MINIMUM_INTERVAL	Minimum time interval (in seconds) between the generation of two thread dump files
THREAD_DUMP_OUTPUT_PATH	Storage location of the thread dump files
THREAD_DUMP_RETENTION_PERIOD	Retention period (in days) for thread dump files
Function Triggers	
THREAD_DUMP_THRESHOLD_CPU_TIME	Threshold (in ms) relating to CPU ⁸⁴ time above which a thread dump file must be generated
THREAD_DUMP_THRESHOLD_OUTPUT_ITEMS	Threshold relating to the number of output items generated by a thread above which a thread dump file must be generated

⁸⁴ Central Processing Unit

System Parameter	Description
THREAD_DUMP_THRESHOLD_RATING_CONTEXTS	Threshold relating to the number of rating contexts used by a thread above which a thread dump file must be generated
THREAD_DUMP_THRESHOLD_RFC_TIME	The threshold (in milliseconds) relating to the duration of an RFC executed within a thread above which a thread dump file must be generated
THREAD_DUMP_THRESHOLD_SQL_TIME	Threshold (in ms) relating to the duration of an SQL ⁸⁵ query executed within a thread above which a thread dump file must be generated
THREAD_DUMP_TRIGGER_PERIOD	Period (in seconds) used by the scheduled trigger after which a thread dump file must be generated

4.1.23.5 Enabling the Generation of Thread Dump Files

To enable the thread dump files mechanism for a set of instances of the Core Server system, execute the following procedure:

1. For each concerned instance, [set up the value \[page 22\]](#) of the [THREAD_DUMP_ENABLED](#) system parameter to `true`.
2. For each concerned instance, modify the value of the other [configuration options \[page 217\]](#) according to your business or technical needs.

4.1.24 Third-Party Integration

[Keywords \[page 218\]](#)

[Preliminary Notes \[page 219\]](#)

[Description \[page 219\]](#)

[Modifying the SAP SLD Connection Settings \[page 219\]](#)

[Modifying the Introscope Agent Settings \(Agent Profile\) \[page 219\]](#)

4.1.24.1 Keywords

SLD⁸⁶, payload

⁸⁵ Structured Query Language

⁸⁶ System Landscape Directory

4.1.24.2 Preliminary Notes

For further information, refer to the following SAP CC documentation:

- "Update of SAP System Component Repository in SLD" SAP Note [669669](#)  documentation

4.1.24.3 Description

The Core Server system can be integrated with third-party applications.

You can use the following procedure to configure the settings related to the integration with the SAP System Landscape Directory system.

4.1.24.4 Modifying the SAP SLD Connection Settings

To send payload information to the SAP System Landscape Directory (SLD) system, it is necessary to configure some settings related to the integration with third-party systems. To modify this configuration, execute the following procedure:

1. Launch your [favorite user interface \[page 22\]](#) and identify as the administrator of the Core Server system
2. For each dispatcher instance, modify the values of the following system parameters:
 - **SLD_URL**, which corresponds to the URL⁸⁷ of the SLD Data Supplier Service in the SAP SLD system, that must respect the following format: `http://<SLD_HOST>:<SLD_PORT>/sld/ds`
 - **SLD_USER**, which gives the possibility to specify the name (or identifier) of the SAP SLD user that must be used by the Core Server system to log on the SAP SLD system
 - **SLD_PASSWORD**, which corresponds to the password of the specified SAP SLD user
 - **SLD_SCHEDULER_ENABLED**, which gives the possibility to enable or disable the scheduler in charge of sending information to the SAP SLD system
 - **SLD_SCHEDULER_RECURRENCE**, which gives the possibility to modify the recurrence of the scheduler, configured by default to send information to the SAP SLD system every day at 1:00 AM

For further information about these system parameters, refer to their dedicated documentation available in the [SAP CC 2023 System Parameter Reference](#).

4.1.24.5 Modifying the Introscope Agent Settings (Agent Profile)

SAP installer always preinstalls the CA APM Introscope Java Bytecode Instrumentation Agent in each SAP CC Core Server system.

⁸⁷ Uniform Resource Locator

You can modify the configurations of the Introscope Agent according to your needs by consulting the SAP Note [1453216](#).

Note

If you implement some customizations, do not forget to manage the backups of these configurations as part of the backup and restore strategy for SAP Convergent Charging.

Your custom settings relate to the *Software Configuration* category. Back up the corresponding files.

Related Information

[Making a Backup Copy of the Software Configurations for the Introscope Agents Backup and Restore \[page 368\]](#)

4.1.25 Users and User Management

[Keywords \[page 220\]](#)

[Preliminary Notes \[page 221\]](#)

[Description \[page 221\]](#)

[Separating Service and Individual Users \[page 221\]](#)

[Configuring the Security Policy for User Passwords \[page 223\]](#)

[Managing User Sessions within User Interfaces \[page 226\]](#)

[Creating User Accounts for SAP CC Users \[page 227\]](#)

[Granting Roles to SAP CC User Accounts \[page 228\]](#)

[Creating Permissions on Tables for SAP CC Users \[page 228\]](#)

For SAP CC users granted the *Pricing Specialist for Price Data* role who want to view or edit some price data in a given mapping or range table, you need to create and maintain the necessary permissions on subsets of tables for these particular SAP CC users.

[Resetting the Emergency User \[page 229\]](#)

In some given emergency situations, you must reset the emergency user of SAP Convergent Charging (SAP CC).

[Users Management via External Systems \[page 229\]](#)

4.1.25.1 Keywords

User, password, security policy, user isolation, user session, concurrent edition, role, right, SCIM⁸⁸.

4.1.25.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [User Administration and Authentication](#) section of the [SAP CC 2023 Security Guide](#) documentation
- [User Session Management](#) section of the [SAP CC 2023 Application Help](#) documentation
- [Installing and Launching Admin+](#) and [Installing and Launching Core Tool](#) sections of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation
- "Security Management Settings" and "User Management Settings" groups in the [SAP CC 2023 System Parameter Reference](#) documentation
- [Users](#) section of the [SAP CC 2023 Primary Help for Core Tool](#) documentation
- `list_clients`, `disconnect_client`, `purge_object_change_logs` and `purge_user_operations` commands of the [SAP CC 2023 Primary Help for Admin+](#) documentation
- [SCIM](#)⁸⁸ API documentation

4.1.25.3 Description

SAP Convergent Charging provides proprietary mechanisms to manage users and associated concepts such as password policy, user roles, working sessions, and so on.

You can use the following procedures to configure the management of users within your SAP CC landscape and thus fit your specific needs:

- [Separating Service and Individual Users \[page 221\]](#)
- [Configuring the Security Policy for User Passwords \[page 223\]](#)
- [Managing User Sessions within User Interfaces \[page 226\]](#)
- [Creating User Accounts for SAP CC Users \[page 227\]](#)
- [Resetting the Emergency User \[page 229\]](#)
- [Users Management via External Systems \[page 229\]](#)

4.1.25.4 Separating Service and Individual Users

As described in the [SAP CC 2023 Security Guide](#) documentation, SAP Convergent Charging (SAP CC) defines two types of users:

- **Individual users**, whose passwords are encrypted and must be regularly changed.
- **Service users**, whose passwords are encrypted (with possible lower encryption level for performance reasons) and never expire.

SAP Convergent Charging gives the possibility to **isolate service users from individual users**. When this *User Isolation* mechanism is enabled:

⁸⁸ System for Cross-domain Identity Management

- Only **service** users can use the operations provided by the Web Services (WS) and the Message Client technical interfaces.

ⓘ Note

As of SAP Convergent Charging 2023 FPS 0, for security reasons, password-based authentication of technical users for the Web Services interface is strongly not recommended. Refer to the [WS_PASSWORD_BASED_AUTHENTICATION_ENABLED](#) parameter system for more information.

- Only **individual** users can use the SAP CC user interfaces and the operations provided by the HCI⁸⁹ technical interface.

ⓘ Note

As of SAP CC 4.1 SP1, the *User Isolation* mechanism is enabled by default at installation time for security reasons. It is the recommended system configuration and you need to consider how to turn it on.

→ Recommendation

When you update your SAP system landscape from SAP CC 4.1 SP0 or when you upgrade from a previous release (4.0, 3.0, or 2.0), consider improving the security by implementing the user isolation as a new security measure and test and complete this procedure: [Separating Service and Individual Users \[page 221\]](#).

See also: [User Isolation](#)

Procedure

To enable or disable the isolation between individual users and service users, complete the following procedure:

1. Launch your [favorite user interface \[page 22\]](#) and identify as the administrator of the Core Server system.
2. For each updater instance of the Core Server system, modify the value of the [USER_ISOLATION_ENABLED](#) system parameter in order to enable or disable the isolation of users.
3. Change both the persistent and runtime values so you do not need to restart the updater instances in your running system.

→ Tip

In a development system landscape, you can disable the user isolation to simplify your developments and integration activities.

⁸⁹ HTTP Communication Interface

4.1.25.5 Configuring the Security Policy for User Passwords

Every SAP CC user defined in your SAP CC system landscape is protected by a password. The *Password Management Policy* feature allows you to configure your security policy for the user passwords to fit specific security requirements.

When the password management policy is enabled (default installation), SAP CC also gives the possibility to modify the following options that make up this securing policy:

Policy Option	Description
Minimum length	<p>The PASSWORD_MANAGEMENT_MINIMUM_LENGTH system parameter specifies the minimum length for passwords.</p> <p>⚠ Caution Setting this system parameter to 0 means that no minimum length is required for passwords.</p>
Complexity	<p>The PASSWORD_MANAGEMENT_COMPLEXITY system parameter specifies the complexity rules that passwords must respect.</p>
Maximum duration	<p>The PASSWORD_MANAGEMENT_EXPIRATION_DELAY system parameter specifies the number of days after which the password of an individual user expires and must be changed.</p> <p>⚠ Caution Setting this system parameter to 0 means that passwords never expire.</p>
Maximum idle duration	<p>The PASSWORD_MANAGEMENT_MAX_IDLE_DELAY system parameter specifies the maximum number of days until which a user must logon before being automatically locked.</p> <p>Setting this system parameter to 0 means that users are not locked even if they never logon.</p>
Reuse cycle	<p>The PASSWORD_MANAGEMENT_REUSE_CYCLE system parameter specifies the number of different values that must be used for password before reusing a given value.</p> <p>Setting this system parameter to 0 means that there is no limit regarding the reuse of passwords.</p>
Reuse delay	<p>The PASSWORD_MANAGEMENT_REUSE_DELAY system parameter specifies the number of days until which a previously used password can be reused.</p> <p>Setting this system parameter to 0 means that previously used passwords can be reused.</p>
Modification interval	<p>The PASSWORD_MANAGEMENT_CHANGE_DELAY system parameter specifies the minimum number of days between 2 password modifications.</p> <p>Setting this system parameter to 0 means that passwords can be changed whenever you want.</p>
Failed login attempts	<p>The PASSWORD_MANAGEMENT_FAIL_LIMIT system parameter specifies the number of successive failed logon attempts until which the user is automatically locked.</p> <p>Setting this system parameter to 0 means that logon attempts are not limited.</p>

Policy Option	Description
SHA-256 hash rounds	<p>Gives the possibility to configure the complexity of encryption applied to passwords by specifying the number of steps of the algorithm that is applied to hash passwords before storing them in the Core Database.</p> <p>The PASSWORD_HASH_ROUNDS_FOR_INDIVIDUAL_USERS and PASSWORD_HASH_ROUNDS_FOR_SERVICE_USERS system parameters specify the number of hash rounds applied to password hashing for respectively individual users and service users.</p> <div style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;"> <p>⚠ Caution</p> <p>This number of steps has a performance impact on communications with SAP CC, during which passwords are hashed using the same number of steps as the number used for storing passwords in the database.</p> <p>By default, this number of steps is set to 10.000 for both individual and service users. This value ensures a good protection for passwords of individual users, but increase the latency on the Web Services (WS) and HCI technical interfaces by 10 milliseconds approximately.</p> <p>To reduce this performance impact, SAP SE recommends using a lower value for service users (PASSWORD_HASH_ROUNDS_FOR_SERVICE_USERS) such as 1.000 rounds or 100 rounds:</p> <ul style="list-style-type: none"> • For 1.000 rounds, the latency is expected to increase of 1 ms approximately. • For 100 rounds, the increase of latency is nonmeasurable. <p>Fine-tune the values of the PASSWORD_HASH_ROUNDS_FOR_SERVICE_USERS system parameter to optimize the security and performance of the communications with external systems.</p> </div> <div style="border: 1px solid #ccc; padding: 10px; margin: 10px 0;"> <p>📄 Note</p> <p>Changing the value of these parameters is not taken into account immediately. It only affects the users when their password is modified.</p> </div>

Modify the Password Management Policy

At any time, you can change the options for the password management policy.

To modify the password management policy for your SAP Convergent Charging system landscape, complete the following procedure:

1. Launch the Cockpit or Admin+ user interface and identify as the system administrator of the SAP CC Core Server system.
2. For each updater instance composing the Core Server system, check that the value of the [PASSWORD_MANAGEMENT_ENABLED](#) system parameter is set to `TRUE`.
3. For each updater instance, modify the value of the system parameters that correspond to the policy options you need to modify.
For further information about the possible system parameters, refer to their dedicated documentation available in the [SAP CC 2023 System Parameter Reference](#) documentation and user assistance.
4. Restart these instances of the running Core Server system.

Disable the Password Management Policy

To disable the password management policy, complete the following procedure:

1. Launch the [Admin+](#) or the [Cockpit](#) user interface and identify as the administrator of the Core Server system.
2. For each updater instance composing your Core Server system, modify the value of the [PASSWORD_MANAGEMENT_ENABLED](#) system parameter in order to disable the password management policy. Set up the values to `FALSE`.
3. Restart these instances of the running Core Server system.
4. After the restarts, your changes are available for all the instances of this system and for all the user interfaces, other systems, applications, and solutions that communicate with this Core Server system.

Enable the Password Management Policy Again

In this situation, you previously disabled the password management policy in your SAP system and want to enable it again.

Note

When the password management policy is enabled again, every individual user whose password has been modified will have to modify again this password, by himself at the next logon to an SAP CC user interface.

1. As a first step, configure the options.
2. Then enable the function in your SAP system again.
For each updater instance composing the Core Server system, set up the value of the [PASSWORD_MANAGEMENT_ENABLED](#) system parameter to `TRUE`.

4.1.25.5.1 Fine-Tuning the Password Encryption Mechanism

Depending on your security level requirements, expected performance for communications with SAP Convergent Charging, and capacities of your SAP system, you optimize the processing of the encryption of user passwords.

Determine the values that are relevant for your implementation scenario:

- [PASSWORD_HASH_ROUNDS_FOR_INDIVIDUAL_USERS](#)
- [PASSWORD_HASH_ROUNDS_FOR_SERVICE_USERS](#)

See details here: [Configuring the Security Policy for User Passwords \[page 223\]](#)

4.1.25.6 Managing User Sessions within User Interfaces

User sessions within the Core Tool and BART Tool user interfaces of SAP Convergent Charging (SAP CC) can be controlled in terms of:

- Concurrent edition within the Core Tool, used to prevent multiple SAP CC users working on the same master data
- Multiple accesses to a given user interface by a given individual user
- Security regarding inactivity between the user interface and the Core Server system

To enable or disable the management of user sessions within user interfaces, execute the following procedure:

1. Launch your [favorite user interface \[page 22\]](#) and identify as the administrator of the Core Server system.
2. For each updater instance, modify the value of the [USER_SESSION_ENABLED](#) system parameter in order to enable or disable the management of user sessions.
For further information about this system parameter, refer to its dedicated documentation available in the [SAP CC 2023 System Parameter Reference](#) documentation.
3. Restart the updater instances of the Core Server system.

When the management of user sessions is enabled, SAP CC also gives the possibility to modify the following options that make up this management policy:

Policy Option	Description
Simultaneous connections	<p>The USER_SESSION_SESSION_LIMIT_PER_USER_AND_TOOL system parameter specifies the maximum number of simultaneous connections that a given user can make on a given GUI⁹⁰.</p> <p>When this limit is reached, further connections are refused.</p> <div><p>Note</p><p>Setting this system parameter to 0 means that a given user can connect as many times as he wants to a given GUI.</p></div>
Inactivity period	<p>The USER_SESSION_VALIDITY_PERIOD system parameter specifies the maximum period during which a user session can be left inactive, which means that there is no interaction between the GUI and Core Server.</p> <div><p>Note</p><p>Setting this system parameter to 0 means that user sessions never expire.</p></div> <div><p>→ Recommendation</p><p>The objects being edited in the Core Tool user interface are not protected against concurrent edition any longer when the session expires.</p><p>SAP SE recommends that you increase the value of this parameter if SAP CC users need to work on the same objects without saving them for a long time.</p></div>

⁹⁰ Graphical User Interface

→ Tip

In case of user session failure, you can use the `search_user_session` and `delete_user_session` commands of the [Admin+](#) user interface. When a session is deleted, the objects opened in "edition" mode during this user session are released and can be modified within another session.

See: [SAP CC 2023 Primary Help for Admin+](#)

Modify the Management Policy for User Sessions

At any time, you can change the options of the management policy for user sessions.

To modify the management policy for user sessions, execute the following procedure:

1. Launch your [favorite user interface \[page 22\]](#) and identify as the administrator of the Core Server system.
2. For each updater instance in the system, modify the value of the system parameters that correspond to the policy options you need to modify.
For further information about the concerned system parameters, refer to their dedicated documentation available in the [SAP CC 2023 System Parameter Reference](#) documentation.
3. Restart the updater instances of the Core Server system.

4.1.25.7 Creating User Accounts for SAP CC Users

Both individual users and service users defined in SAP Convergent Charging are:

- Protected by a password that respects a security policy you can configure to fit specific needs. For further information, refer to the [Configuring the Security Policy for User Passwords \[page 223\]](#) dedicated section above
- Assigned to roles that represent access rights to sets of master data domains

📌 Note

If your SAP Convergent Charging system is interfaced with a SCIM-based system, you can manage the creation (provision) of your individual users in this connected system. If you need to manage some permissions on objects for users, you used the Cockpit user interface.

Using Core Tool

As a user administrator, use the Core Tool user interface to create and maintain your SAP CC users and their user accounts.

To create users within your SAP Convergent Charging system landscape, complete the following procedure:

1. Launch the Core Tool user interface and log on as the administrator of the Core Server system or as a user granted the "User Administrator" role.

2. Create the relevant users, assigning them the adequate roles.
See also: [Creating a User for SAP CC](#)
3. If needed for your business, create the necessary permissions on a subset of tables for some SAP CC users who need to be able to view or modify some price data in mapping or range tables. See [Creating Permissions on Tables for SAP CC Users \[page 228\]](#).

4.1.25.8 Granting Roles to SAP CC User Accounts

Using Core Tool

As a user administrator or a system administrator, use the Core Tool user interface to grant roles to SAP CC user accounts.

See [Granting Roles to a User](#).

4.1.25.9 Creating Permissions on Tables for SAP CC Users

For SAP CC users granted the *Pricing Specialist for Price Data* role who want to view or edit some price data in a given mapping or range table, you need to create and maintain the necessary permissions on subsets of tables for these particular SAP CC users.

Prerequisites

- The expected SAP CC users exist.
- The SAP CC pricing specialist who requested the creation of some permissions for SAP CC users, has designed the pricing configurations.
The model must specify the SAP CC users to consider, the target precise sets of mapping and range tables, and the names and values of the additional information items that must be set in these tables to enable the effective access control.

Note

The existence of the expected mapping and range tables is not a prerequisite. The pricing specialist can configure these tables later on, after the creation of the permissions.

Creating a Few Permissions with Cockpit

See [Creating Permissions](#).

4.1.25.10 Resetting the Emergency User

In some given emergency situations, you must reset the emergency user of SAP Convergent Charging (SAP CC).

⚠ Caution

In case you created users in an incorrect way that prevents you from logging on to any SAP CC user interface, you can reset the emergency user. This user corresponds to the first super administrator user created at installation time, with whom you will be able to log on again and perform adequate modifications.

For more information, refer to the dedicated SAP Note [1890952](#). **This documentation is released for SAP Customers and SAP Partners. This emergency recovery procedure is confidential.**

⚠ Caution

This user account must be temporary.

As soon as the emergency user is reset, do manage all the relevant SAP CC user accounts and **delete this emergency user**. This security measure is fundamental.

4.1.25.11 Users Management via External Systems

External systems can **provision individual users** in SAP Convergent Charging (SAP CC) with the implementation of the System for Cross-domain Identity Management (SCIM) API of SAP Convergent Charging.

🔗 Example

See [SCIM](#).

If you are using a third-party SCIM-compliant identity management system, please refer to its official documentation for details on its use.

To check if your running SAP Convergent Charging system provides SCIM services, get the values of the [SCIM_MANAGEMENT_ENABLED](#) system parameter in the updaters instances that compose the system.



User Provisioning

Consult the official documentation of the SCIM-based system that can create your individual SAP CC users.

SCIM API and Specifications

The SAP Convergent Charging SCIM API enables you to manage users and their group assignments. If the SAP CC users are centrally managed in an external system, such as SAP Identity Authentication Service, this API can be used to integrate with the external system for user provisioning.

The SCIM 2.0 version at least is required, which is defined by two RFCs:

- [RFC 7643](#) , which defines the core schema related to models used by SCIM 2.0
- [RFC 7644](#) , which defines the (HTTP-based) protocol used by SCIM 2.0

Caution

To use the SCIM services in SAP Convergent Charging, a service user must be previously created with the role ADMIN USER. This user must be present in each REST request header with an *Authentication* field set to `Basic Authentication`.

For more information about authentication, refer to the [User Administration and Authentication](#) section in the [SAP CC 2023 Security Guide](#).

For a matter of security, the `SCIM_MANAGEMENT_ENABLED` system parameter must be set to `true`.

→ Remember

- This system parameter cannot be modified while SAP Convergent Charging is running.
- The default value is false.
- A TLS/SSL connection for Web Services is mandatory between the client and the updater, because without TLS, the updater ignores the updater system parameter and just logs a message about it. Then, the updater runs normally, but all SCIM endpoints just return 404, without any explanation.

Supported SCIM Resources

SAP Convergent Charging supports the following SCIM resources:

- User
- Group

User Attributes

The following table describes the mapping between SCIM User Attributes and SAP CC User Attributes:

SCIM User Attributes	SAP CC User Attributes
SCIM Common Attributes	
id	oid
externalId	login
active	<ul style="list-style-type: none"> non locked system date between validFrom and validTo
<p>Note</p> <p>For the read requests and creation/replace responses, this attribute is always returned with a value computed at the current system date/time of the SAP CC Core Server system.</p>	
meta.created	operation date
SCIM Core Attributes	
username	login
groups	permissions

Note

- SAP CC users created via SCIM are individual users.
- SAP CC users are created with an access to all pricing catalogs for chargeable services and products.
- SAP CC user IDs are case sensitive.

Groups and Group Attributes

To implement the SCIM groups, new groups are defined and are mapped onto SAP CC roles as follows:

SCIM User Group Name	SAP CC User Role
pricing_specialist	MARKETING + CSR
pricing_specialist_price_data	PRICING SPECIALIST-PRICE DATA (as of version 2023 FPS 1)
<p>Note</p> <p>As of version SAP CC 2023 FPS 1</p>	
technical_support	REMOTE SUPPORT
system_administrator	ADMIN + BARTADMIN
user_administrator	USER_ADMIN
process_manager	PROCESS_MANAGER

The following table shows the settings of the group attributes:

SCIM Group Attributes

SAP CC Supported Values

SCIM Common Attributes

id	<ul style="list-style-type: none"> pricing_specialist pricing_specialist_price_data technical_support system_administrator pricing_specialist_price_data process_manager
----	--

externalId	<ul style="list-style-type: none"> pricing_specialist pricing_specialist_price_data technical_support system_administrator pricing_specialist_price_data process_manager
------------	--

meta.created	epoch(s)
--------------	----------

SCIM Core Attributes

displayName	<ul style="list-style-type: none"> pricing_specialist pricing_specialist_price_data technical_support system_administrator user_administrator process_manager
-------------	---

→ Remember

The authentication method is **Basic** or **OAuth 2.0** standard.

Operations

Only Users and Groups are proposed as resources by the SCIM API of SAP Convergent Charging (SAP CC). The following operations are available:

SCIM 2.0 Operation	REST HTTP Method / URI	User	Group
Create	POST https://<HOST_NAME>:<HOST_PORT>/rest/scim/v2/ <resource>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Delete	DELETE https://<HOST_NAME>:<HOST_PORT>/rest/scim/v2/ <resource>/<id>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

SCIM 2.0 Operation	REST HTTP Method / URI	User	Group
Read	GET https://<HOST_NAME>:<HOST_PORT>/rest/scim/v2/ <resource>/<id>	■	■
Replace	REPLACE https://<HOST_NAME>:<HOST_PORT>/rest/scim/v2/ <resource>/<id>	■	□
Search (ReadAll)	GET https://<HOST_NAME>:<HOST_PORT>/rest/scim/v2/ <resource>	■	■

■: Available □: Unavailable

Where:

- <HOST_NAME> is the name or IP address (IPv4 or IPv6) of the machine that hosts an updater instance of the SAP CC system (default: localhost)
- <HOST_PORT> is the communication port number of the machine that hosts the updater instance of the SAP CC system (default: 9080)

Note

Only individual users are visible.

Therefore:

- If an ID corresponding to a service user in SAP CC results from a getting / searching operation, a 404 NOT FOUND message is returned.
- If an ID already exists as a service user in SAP CC, the same ID for an individual user is not supported by a creating / replacing / deleting operation. In such a case, a 403 FORBIDDEN message is returned.

User Validity Period

As of SAP CC 2020 FPS 1, the SCIM API of SAP CC is enhanced with the IPSUser custom schema allowing to define a validity period for each individual user.

This schema is available at the following location:

```
https://<HOST_NAME>:<HOST_PORT>/rest/scim/v2/Schemas/  
urn:sap:cloud:scim:schemas:extension:custom:2.0:IPSUser
```

Where:

- <HOST_NAME> is the name or IP address (IPv4 or IPv6) of the machine that hosts an updater instance of the SAP CC system (default: localhost)
- <HOST_PORT> is the communication port number of the machine that hosts the updater instance of the SAP CC system for the Web Services (default: 9080)

❁ Example

```
{
  "schemas": [
    "urn:sap:cloud:scim:schemas:extension:custom:2.0:IPUser",
    "urn:ietf:params:scim:schemas:core:2.0:User"
  ],
  "externalId": "demo",
  "userName": "demo",
  "password": "foobar",
  "active": true,
  "groups": [
    {
      "value": "pricing_specialist"
    }
  ],
  "urn:sap:cloud:scim:schemas:extension:custom:2.0:IPUser": {
    "validFrom": "2020-10-01T00:00:00Z",
    "validTo": "2021-01-01T00:00:00Z"
  }
}
```

Configuration Endpoints

The following table summarizes the service provider configuration endpoints:

Endpoint	REST HTTP Method / URI
/	GET
ServiceProviderConfig	<a href="https://<HOST_NAME>:<HOST_PORT>/rest/scim/v2/ServiceProviderConfig">https://<HOST_NAME>:<HOST_PORT>/rest/scim/v2/ServiceProviderConfig
/Schemas	GET <a href="https://<HOST_NAME>:<HOST_PORT>/rest/scim/v2/Schemas">https://<HOST_NAME>:<HOST_PORT>/rest/scim/v2/Schemas
ResourceTypes	GET <a href="https://<HOST_NAME>:<HOST_PORT>/rest/scim/v2/ResourceTypes">https://<HOST_NAME>:<HOST_PORT>/rest/scim/v2/ResourceTypes

Where:

- [<HOST_NAME>](#) is the name or IP address (IPv4 or IPv6) of the machine that hosts an updater instance of the SAP CC system (default: localhost)
- [<HOST_PORT>](#) is the communication port number of the machine that hosts the updater instance of the SAP CC system for Web Services (default: 9080)

4.1.26 WS Destinations

[Keywords \[page 235\]](#)

[Preliminary Notes \[page 235\]](#)

[Description \[page 235\]](#)

[Configuration Options \[page 235\]](#)

[Creating WS Destinations \[page 236\]](#)

4.1.26.1 Keywords

WS⁹¹ destination, SOAP⁹² over HTTP⁹³, SAP S/4HANA Cloud Public Edition for Contract Accounting and Invoicing, BIT⁹⁴, Billable Item

4.1.26.2 Preliminary Notes

For further information, refer to the following SAP CC documentation:

- [Installing and Executing Setup Tool](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation

4.1.26.3 Description

SAP Convergent Charging SOAP⁹⁵ over HTTP⁹⁶ communication channel to send billable items to SAP S/4HANA Cloud Public Edition.

You can use this procedure to manage the different WS⁹⁷ destinations within your landscape.

4.1.26.4 Configuration Options

The following table contains the list of parameters that you can change:

⁹¹ Web Services

⁹² Simple Object Access Protocol

⁹³ HyperText Transfer Protocol

⁹⁴ Billable Item

⁹⁵ Simple Object Access Protocol

⁹⁶ HyperText Transfer Protocol

⁹⁷ Web Services

Parameter	Values
<code>service.url</code> The URL ⁹⁸ of the "Convergent Invoicing Billable Items - Create - Request (Single)" web service used to create billable items	You must set the valid HTTPS URL that corresponds to the targeted web service
<code>service.certentry.alias</code> The alias of the certificate entry containing the TLS ⁹⁹ certificate used by the web service	This parameter is optional. You can set a valid alias of a certificate entry imported using the "certentry" target of the Setup Tool user interface
<code>auth.http.basic.login</code> The login used to authenticate to the web service	You must set a valid login accepted by the web service
<code>auth.http.basic.password</code> The password used to authenticate to the web service	You must set a valid password accepted by the web service
<code>auth.keyentry.alias</code> The alias of the key entry containing the TLS key pair to use to connect to the web service	This parameter is optional. You can set a valid alias of a key entry imported using the "keyentry" target of the Setup Tool user interface
<code>request.timeout</code> The maximum time (expressed in milliseconds) for establishing connections and receiving responses from the web service	This parameter is optional and is set by default to: 60000 . You can set any positive value.
<code>response.timeout</code> The maximum time (expressed in milliseconds) for receiving confirmation responses from the web service	This parameter is optional and is set by default to: 60000 . You can set any positive value.

4.1.26.5 Creating WS Destinations

To create a WS¹⁰⁰ destination, execute the following procedure:

1. Connect to the host of your landscape where a dispatcher is installed
2. Launch your [favorite user interface \[page 22\]](#) and identify as the administrator of the Core Server system
3. Execute the `wsdestination list` command to retrieve the list of WS destinations that are available in the Core Database
4. If the targeted web service corresponds to one of the previously retrieved WS destinations, execute the `wsdestination export` command to ensure that the configuration of this WS destination is correct. If the targeted web service does not correspond to one of the previously retrieved WS destinations, or if the exported configuration does not fit, you must create the relevant WS destination by:
 - Copying the `ws.destination.sk` file available in the `config/s4hc` folder of the dispatcher instance

⁹⁸ Uniform Resource Locator

⁹⁹ Transport Layer Security

¹⁰⁰ Web Services

- Editing this newly created file and modifying the relevant parameters to fit the targeted web service. For further information about the available parameters, refer to the [Configuration Options \[page 235\]](#) section above
5. Once the WS destination has been correctly set up, execute the `wsdestination import` command to import these parameters in the Core Database
 6. Restart the concerned instances of the Core Server system

4.2 Configuring the SAP CC User Interfaces

[Configuring the Web Applications \[page 237\]](#)

[Configuring the Desktop Applications \[page 263\]](#)

[Configuring the Command-Line Applications \[page 268\]](#)

4.2.1 Configuring the Web Applications

[Keywords \[page 237\]](#)

[Preliminary Notes \[page 237\]](#)

[Description \[page 238\]](#)

[Configuring Cockpit \[page 238\]](#)

4.2.1.1 Keywords

GUI¹⁰¹, graphical user interface, user experience (UX), web application, Tomcat, Cockpit

4.2.1.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [Installing and Starting Cockpit](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation
- [Enhanced Logging and Tracing Framework](#) section of the [SAP CC 2023 Application Help](#) documentation

¹⁰¹ Graphical User Interface

4.2.1.3 Description

SAP Convergent Charging provides a web application named Cockpit. With the **SAP Convergent Charging Cockpit** user interface, SAP CC users quickly and efficiently perform your administrative or business configuration tasks. Depending on the user settings, the Cockpit launchpad contains several apps.

A Cockpit web application is connected to one Core Server system.

You can use the following procedures to modify the configuration file of the Cockpit web application and thus fit your specific needs.

4.2.1.4 Configuring Cockpit

The configuration of the Cockpit back-end application relies on a text file named `sap_cc_cockpit_<WAR_FILE_NAME>.properties`, where `<WAR_FILE_NAME>` corresponds to the name of the deployed Cockpit web application deployed on the Tomcat Server system. This configuration file includes settings for both technical and business features. Some changes require a restart of the back-end application.

The Cockpit Web application regularly reads this configuration file and detects certain changes at runtime (passwords, specific settings that are "hot modifiable").

ⓘ Note

- A template file named `sap_cc_cockpit_[WEB_APP_NAME].properties.sk` is available in the delivered ZIP file of the SAP CC Cockpit software unit. You can use this template to create various configuration files (but SAP SE recommends that you do not modify the template itself).
- The Cockpit configuration file uses the ISO 8859-1 character encoding format. As a consequence, characters that cannot be directly represented in this encoding scheme must be written using unicode escapes. For further information, refer to the Java™ Language Specification.
- In a secure environment, the automatic encryption of passwords must be enabled at installation time. See [Enabling the Automatic Encryption of Passwords in the Configuration File](#).
- In a production SAP system landscape, you manage the backups of the configuration files for all the deployed Cockpit back-end applications.

[Configuration Settings for Cockpit \[page 239\]](#)

[Modifying the Configuration File of the Cockpit Web Application \[page 259\]](#)

As an SAP CC system administrator, you want to configure some features or mechanisms. In a production environment, you previously back up the configuration file of the SAP Convergent Charging Cockpit web application (*.PROPERTIES file).

[Configuring the App Process a Chargeable Item \[page 260\]](#)

[Changing the Site for the SAP Companion Content \[page 263\]](#)

For better performance, you can configure the Cockpit web application so that it gets the content for the SAP Companion by using a URL located in another region.

Related Information

[Installing and Starting Cockpit](#)

4.2.1.4.1 Configuration Settings for Cockpit

⚠ Caution

In a secure environment, passwords are encrypted in the configuration file.

A setting modification requires a complete restart of the Cockpit back-end application. Some settings are hot modifiable: their modifications are quite immediately taken into account but some delay may be necessary before to be effective.

The following table contains the list of settings that you can [change \[page 259\]](#), grouped upon the following categories:

- [Cockpit communication settings for communications to Cockpit Database \[page 240\]](#)
- [Cockpit communication settings for communications to the Core Server system \[page 244\]](#)
- [Cockpit communication settings for communications to Core Database \[page 245\]](#)
- [Cache management settings \[page 249\]](#)
- [Data file management settings \[page 249\]](#)
- [User session management and security settings \[page 250\]](#)
- [SAML 2.0 settings \(for identity providers\) \[page 251\]](#)
- [OAuth2 settings \(for third-party authorization servers\) \[page 252\]](#)
- [User management settings \[page 254\]](#)
- [Tracing settings \[page 255\]](#)
- [App Process a Chargeable Item settings \[page 258\]](#)
- [SAP Companion \(fka Web Assistant\) settings \[page 258\]](#)

→ Tip

When configuring the SAP CC Cockpit web application, keep in mind the 4 components of SAP Convergent Charging:

- SAP CC Cockpit and its associated "Cockpit Database"
- SAP CC Core Server and its associated "Core Database"

Once deployed, an SAP CC Cockpit back-end application communicates with all these components:

1. SAP CC Cockpit Database
2. SAP CC Core Server system
3. SAP CC Core Database

Setting	Change Cate- gory	Values	Re- quired
Cockpit Settings for Communications to Cockpit Database			
A running SAP CC Cockpit back-end application communicates with its associated SAP CC Cockpit Database in its RDBMS.			

Setting	Change Category	Values	Required										
<p><code>datasource.jdbc.uri</code></p> <p>As of 2022 FPS 0: The JDBC (Java Database Connectivity) URI of the Cockpit Database that the Cockpit web application connects to as back-end database system (RDBMS). The URI format depends on the database technology.</p> <p>See also: Preparing the Cockpit Database</p>	Requires a restart	<p>You must set up a valid URI respecting the following format that depends on the installed database (Cockpit Database) in your SAP system landscape:</p> <table border="1"> <thead> <tr> <th>Database</th> <th>URI Format</th> </tr> </thead> <tbody> <tr> <td>Oracle with driver "thin"</td> <td> <pre>jdbc:oracle:thin:@<server>:<port>:<database_name></pre> <pre>jdbc:oracle:thin:@//<server>:<port>/<service_name></pre> <p>In most cases:</p> <ul style="list-style-type: none"> The port is 1521. </td> </tr> <tr> <td>MS SQL Server</td> <td> <ul style="list-style-type: none"> IPv4: <pre>jdbc:sqlserver://<server>:<port>;DatabaseName=<database_name>;sendStringParametersAsUnicode=true</pre> IPv6: <pre>jdbc:sqlserver://;serverName=<server>;port=<port>;DatabaseName=<database_name>;sendStringParametersAsUnicode=true</pre> </td> </tr> <tr> <td>IBM DB2</td> <td> <pre>jdbc:db2://<server>:<port>/<database_name>;currentSchema=<schema_name>;</pre> <ul style="list-style-type: none"> The port is 4464. </td> </tr> <tr> <td>SAP Sybase ASE</td> <td> <pre>jdbc:sybase:Tds:<server>:<port>/</pre> </td> </tr> </tbody> </table>	Database	URI Format	Oracle with driver "thin"	<pre>jdbc:oracle:thin:@<server>:<port>:<database_name></pre> <pre>jdbc:oracle:thin:@//<server>:<port>/<service_name></pre> <p>In most cases:</p> <ul style="list-style-type: none"> The port is 1521. 	MS SQL Server	<ul style="list-style-type: none"> IPv4: <pre>jdbc:sqlserver://<server>:<port>;DatabaseName=<database_name>;sendStringParametersAsUnicode=true</pre> IPv6: <pre>jdbc:sqlserver://;serverName=<server>;port=<port>;DatabaseName=<database_name>;sendStringParametersAsUnicode=true</pre> 	IBM DB2	<pre>jdbc:db2://<server>:<port>/<database_name>;currentSchema=<schema_name>;</pre> <ul style="list-style-type: none"> The port is 4464. 	SAP Sybase ASE	<pre>jdbc:sybase:Tds:<server>:<port>/</pre>	■
Database	URI Format												
Oracle with driver "thin"	<pre>jdbc:oracle:thin:@<server>:<port>:<database_name></pre> <pre>jdbc:oracle:thin:@//<server>:<port>/<service_name></pre> <p>In most cases:</p> <ul style="list-style-type: none"> The port is 1521. 												
MS SQL Server	<ul style="list-style-type: none"> IPv4: <pre>jdbc:sqlserver://<server>:<port>;DatabaseName=<database_name>;sendStringParametersAsUnicode=true</pre> IPv6: <pre>jdbc:sqlserver://;serverName=<server>;port=<port>;DatabaseName=<database_name>;sendStringParametersAsUnicode=true</pre> 												
IBM DB2	<pre>jdbc:db2://<server>:<port>/<database_name>;currentSchema=<schema_name>;</pre> <ul style="list-style-type: none"> The port is 4464. 												
SAP Sybase ASE	<pre>jdbc:sybase:Tds:<server>:<port>/</pre>												

→ Remember

"SAP CC Cockpit Database" is a **new database** that is dedicated to the Cockpit web application. **"SAP CC Cockpit requires" this database schema to store its data and settings.**

⚠ Caution

In your SAP system landscape, the `datasource.jdbc.uri` and `sqlhelper.jdbc.uri` settings cannot have the same value.

📌 Note

- In most cases, the port is 1433.
- The IPv6 format can also be used for IPv4 addresses.

Setting	Change Category	Values	Required
		Database	
		URI Format	
		<pre><database_name>? <prop1>=<value1>&<prop2>= <value2></pre>	
		<p>In most cases:</p> <ul style="list-style-type: none"> • There is no property. • The port is 5000. 	
		SAP HANA	
		<pre>jdbc:sap:// <primary_server>:<port>[:<secondary_server>:<port>][/? database- Name=<tenant_name>]&currentSchema=<schema></pre>	
			<p>Note</p> <ul style="list-style-type: none"> • The secondary server can be set when active-passive high availability is enabled in the SAP HANA system. • In most cases, the port is: <ul style="list-style-type: none"> • 3<SAP_HANA_INSTANCE_NUMBER>15 for a single-container SAP HANA system. • Between 3<SAP_HANA_INSTANCE_NUMBER>41 and 3<SAP_HANA_INSTANCE_NUMBER>98 for a multitenant SAP HANA system. • The name of the tenant database can be specified when using a multitenant SAP HANA system.
		→ Tip	
		For more information, see Preparing the Cockpit Database .	

Setting	Change Category	Values	Required
		See also: Cockpit Database	
<p><code>datasource.login</code></p> <p>The login used for authenticating on the Cockpit Database in its RDBMS</p> <p>See also: Preparing the Cockpit Database</p>	Requires a restart	You must set up a value that corresponds to an already-defined database user, account, or login. It depends on the database technology. See Preparing the Cockpit Database .	■
<p><code>datasource.password</code></p> <p>The password used for authenticating on the Cockpit Database in its RDBMS</p>	Requires a restart	You must set up a password that respects the IT security policy of your company for password management.	■
<p><code>datasource.pool.size</code></p> <p>The size of the pool dedicated to the connections to the Cockpit Database in its RDBMS</p>	Requires a restart	The default value is set to: 10 You can set up any positive value.	<input type="checkbox"/>
<p><code>datasource.timeout</code></p> <p>The maximum period (in milliseconds) allocated to acquire a connection to the Cockpit Database from the pool</p>	Requires a restart	The default value is set to: 30000 You can set up any positive value. Setting up this configuration setting to 0 disables the timeout mechanism.	<input type="checkbox"/>
<div style="background-color: #f0f0f0; padding: 5px;"> <p>Note</p> <p>SAP SE recommends that you always set up a value for this timeout to avoid any contention problem.</p> </div>			
<p><code>datasource.batch.size</code></p> <p>As of 2022 FPS 0: The number of statements batched together when executing SQL queries on the Cockpit Database in its RDBMS</p>	Requires a restart	The default value is set to: 50 You can set up any positive value. Setting up this configuration setting to 0 disables the batching mechanism.	<input type="checkbox"/>
<div style="background-color: #f0f0f0; padding: 5px;"> <p>Note</p> <p>SAP SE recommends that you always set up a value to improve performance.</p> </div>			

Setting	Change Category	Values	Required
<p><code>datasource.cache.size</code> (REVOKED)</p> <p>As of SAP CC 2022 FPS 0, this setting is no more used as it relates to the replaced H2 embedded databases.</p>	Requires a restart	<p>→ Remember</p> <p>REVOKED: As of SAP CC 2022 FPS 0, this setting is no more used. Consult the setting <code>datasource.batch.size</code> in the configuration file.</p>	<input type="checkbox"/>
<h3>Core Server Communication/Identification Settings</h3> <p>A running SAP CC Cockpit back-end application communicates with its associated SAP CC Core Server system.</p>			
<p><code>cc.sid</code></p> <p>The <i>SAP System Identifier</i> (aka <i>SID</i>) of the Core Server system that you want to administer with SAP Convergent Charging Cockpit. If you modify this SID while sessions are running, the SAP CC power users can continue their sessions and save their modifications using the previously defined Core Server system.</p>	Immediate (almost)	<p>You must set up a value at the installation time of SAP CC Cockpit. See Installing and Starting Cockpit.</p> <p>⚠ Caution</p> <p>By default, no SID is set. The Web application can thus not start.</p> <p>→ Remember</p> <p>This setting is hot modifiable when Cockpit is executed.</p>	<input checked="" type="checkbox"/>
<p><code>hci.api.delegator.login</code></p> <p>Login used to be authenticated on the HCI API (login for the delegator user)</p>	Requires a restart	<p>The default value is set to: empty (user delegation disabled).</p> <p>You must set up the login of a valid service user with the <code>AUTHORIZATION_DELEGATOR</code> role. This role allows a service user to indirectly grant the usage of the Core Server HCI APIs from Cockpit to an individual Cockpit user.</p>	<input type="checkbox"/>
<p>ⓘ Note</p> <p>This setting is necessary in case of SAML 2.0 authentication protocol.</p>		<p>ⓘ Note</p> <p>Refer to the Standard Users section of the SAP CC 2023 Security Guide documentation for more information.</p>	
<p><code>hci.api.delegator.password</code></p> <p>The password used to be authenticated on the HCI API (password for the delegator user).</p>	Requires a restart	<p>You must set up a password that respects the SAP CC password policy applicable to SAP CC service users.</p> <p>ⓘ Note</p> <p>The password is encrypted by Cockpit using the existing passphrase mechanism.</p>	<input type="checkbox"/>

Setting	Change Category	Values	Required
<code>hci.http.timeout</code> The maximum period (in milliseconds) allocated to the execution of an HCI operation sent to the Core Server system	Requires a restart	The default value is set to: 300000 You can set up any positive value. Setting up this configuration setting to 0 disables the timeout mechanism. <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>→ Recommendation</p> <p>Consider increasing the value when managing large objects, in sync with the Cockpit setting <code>http.multipart.max-file-size</code>.</p> <p>SAP SE recommends that you only change this value in case you or Cockpit users encounter errors when importing files, for example a large mapping table.</p> </div>	■
<code>hci.http.url</code> CSV list of URLs relating to deployed dispatcher instances.	Requires a restart	By default, no URL is set. The Web application can thus not start. You must set up URLs which correspond to instances that belong to the targeted Core Server system declared in the <code>cc.sid</code> setting at the top of the configuration file. <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>⚠ Example</p> <p><code>http://localhost:9100/</code></p> </div>	■

⚠ Caution

In a secure environment, use URLs based on HTTPS.

Core Database Communication Settings

A running SAP CC Cockpit back-end application can communicate with the SAP CC Core Database (in its RDBMS) that is the back-end database of the SAP CC Core Server system.

Setting	Change Category	Values	Required
<p>sqlhelper.jdbc.uri</p> <p>The JDBC (Java Database Connectivity) URI of the RDBMS that contains the Core Database and its schema, as the reference database instance used by the SAP CC Cockpit back-end web application in order to start.</p> <p>See also: Preparing the Core Database</p>	Requires a restart	<p>You must set up one or two valid URIs which correspond to database instances. It depends on the installed database (Core Database) in your SAP system landscape:</p> <p>For SAP HANA, the URI format is:</p> <pre>jdbc:sap:// <primary_server>:<port>[;<secondary_server>:<port>][/? databaseName=<tenant_name>]&currentSchema=<schema></pre> <p>For Sybase ASE, the URI format is:</p> <pre>jdbc:sybase:Tds:<server>:<port>/ <database_name>? <prop1>=<value1>&<prop2>=<value2></pre> <p>For Oracle with "thin" driver, the URI format is:</p> <ul style="list-style-type: none"> - jdbc:oracle:thin:@//<server>:<port>/<ServiceName> - jdbc:oracle:thin:@<server>:<port>:<SID> <p>For MS SQL Server (IPv4), the URI format is:</p> <pre>jdbc:sqlserver:// <server>:<port>;DatabaseName=<database_name>;sendStringParametersAsUnicode=true[;IntegratedSecurity=true]</pre> <p>For MS SQL Server (IPv4 or IPv6), the URI format is:</p> <pre>jdbc:sqlserver://;serverName=<server>;port=<port>;DatabaseName=<database_name>;sendStringParametersAsUnicode=true[;IntegratedSecurity=true]</pre> <p>For IBM DB2, the URI format is:</p> <pre>jdbc:db2://<server>:<port>/ <database_name>;currentSchema=<schema_name>;</pre>	■

⚠ Caution

In your SAP system landscape, the sqlhelper.jdbc.uri and datasource.jdbc.uri settings cannot have the same value.

→ Tip

For more information, see [Preparing the Core Database](#).

See also: [Core Database](#)

Setting	Change Category	Values	Required
<p><code>sqlhelper.login</code></p> <p>The login used for authenticating on the Core Database</p> <p>See also: Preparing the Core Database</p>	Requires a restart	<p>You must set up a value that corresponds to an already-defined database user, account, or login. It depends on the database technology. See Preparing the Core Database.</p> <div style="border: 1px solid #ccc; padding: 10px; background-color: #f9f9f9;"> <p>Note</p> <p>For security reasons, SAP SE recommends that you create a service user dedicated to connections between SAP CC Cockpit and the Core Database.</p> <p>This particular and dedicated database user (or database account) shall be granted a read access to the database views pointing on the CERT_STORE, FILE_METADATA, FILE_METADATA_PATH, METRIC_RECORD, OBJECT_ACCESS_RULE (as of version 2023 FPS 1), OBJECT_CHANGE_LOG, and USER_OPERATION tables.</p> </div>	■
<p><code>sqlhelper.password</code></p> <p>The password of the previously specified login (<code>sqlhelper.login</code>), used for authenticating on the Core Database</p>	Requires a restart	You must set up a password that respects the IT security policy of your company for password management.	■
<p><code>sqlhelper.connection.count</code></p> <p>The number of connections to be opened with the Core Database</p>	Requires a restart	<p>The default value is set to: 20</p> <p>You can set up any positive value.</p>	□
<p><code>sqlhelper.statement.cache.size</code></p> <p>The size of the statement cache</p>	Requires a restart	<p>The default value is set to: 0</p> <p>You can set up any positive value.</p> <div style="border: 1px solid #ccc; padding: 10px; background-color: #f9f9f9;"> <p>Caution</p> <p>SAP SE recommends that you do not modify this setting except under supervision of the SAP Support team.</p> </div>	□
<p><code>sqlhelper.id.interval</code></p> <p>The size of the unique ID batch reservation</p>	Requires a restart	<p>The default value is set to: 10000</p> <p>You can set up any positive value greater than 1000.</p> <div style="border: 1px solid #ccc; padding: 10px; background-color: #f9f9f9;"> <p>Caution</p> <p>SAP SE recommends that you do not modify this setting except under supervision of the SAP Support team.</p> </div>	□

Setting	Change Category	Values	Required
<p><code>sqlhelper.max.redo</code></p> <p>The number of times an instance will re-execute a request in the Core Database</p>	Requires a restart	<p>The default value is set to: 4</p> <p>You can set up any positive value.</p>	<input type="checkbox"/>
<p><code>sqlhelper.reconnect.interval</code></p> <p>The duration (in seconds) between two reconnection attempts</p>	Requires a restart	<p>The default value is set to: 10</p> <p>You can set up any positive value.</p>	<input type="checkbox"/>
<p><code>sqlhelper.reconnect.attempts</code></p> <p>The number of attempts when connecting to the Core Database</p>	Requires a restart	<p>The default value is set to: 4</p> <p>You can set up any positive value.</p>	<input type="checkbox"/>
<p><code>sqlhelper.db.instance.count</code></p> <p>The number of SAP CC Core Database instances that the application can connect to</p>	Requires a restart	<p>The default value is set to: 0</p> <p>You can set up any positive value.</p>	<input type="checkbox"/>
<p><code>sqlhelper.db.timeout</code></p> <p>The frequency (in seconds) of "ping" operations that are sent to the SAP CC Core Database</p>	Requires a restart	<p>The default value is set to: 0</p> <p>You can set up any positive value greater than 30. Setting up this configuration setting to 0 disables the ping operations.</p>	<input type="checkbox"/>
<p><code>sqlhelper.connection.heartbeat</code></p> <p>The frequency (in seconds) of "heartbeat" operations that are sent to the Core Database</p>	Requires a restart	<p>The default value is set to: 0</p> <p>You can set up any positive value greater than 30. Setting up this configuration setting to 0 disables the ping operations.</p>	<input type="checkbox"/>

Setting	Change Category	Values	Required
<code>sqlhelper.jdbc.properties</code> Additional properties for the SQL connections	Requires a restart	You can set up a CSV formatted value as specified in RFC 4180, which means that: <ul style="list-style-type: none"> Fields are separated by a comma delimiter and optionally enclosed by a text double-quote Each field is the concatenation of a property name and a property value, using the following format: <code>property_name=<property_value></code> 	<input type="checkbox"/>
<div style="background-color: #f0f0f0; padding: 10px; border: 1px solid #ccc;"> <p>Note</p> <p>The user login and password cannot be set in this setting because there are defined by the <code>sqlhelper.login</code> and <code>sqlhelper.password</code> settings.</p> </div>			
<code>query.limit.fetchsize</code> Maximum number of results per query	Requires a restart	The default value is set to: 10000 You can set up any positive value greater than 10000.	<input type="checkbox"/>
Cache Management			
<code>cache.type</code> The type of the cached structure containing queries	Requires a restart	The default value is set to: simple You can set up one of the following values: none, simple .	<input type="checkbox"/>
<code>cache.simple.evict.scheduler</code> The duration (in seconds) between two reset operations performed on the cache of queries	Requires a restart	The default value is set to: 60 You can set up any value in the following range: [0,300[<input type="checkbox"/>
Data Files Management			

Setting	Change Category	Values	Required
<code>http.multipart.max-file-size</code> The maximum size (in kilobytes) of the file to upload into the Cockpit application	Requires a restart	The default value is set to: 10240 (about 10 megabytes) You can set up any positive value. Consult the SAP CC users (administrators, pricing specialists) to determine if they need to upload larger files into Cockpit, for example a large mapping table to import. If you increase this maximum size, consider increasing the <code>hci.http.timeout</code> setting because of longer upload times when importing larger files into Cockpit.	<input checked="" type="checkbox"/>
<div style="border-left: 2px solid orange; padding-left: 10px;"> <p>⚠ Caution</p> <p>Modifying this value requires a modification of the memory resources (-Xmx option) allocated to the Java web server running a deployed Cockpit application. See Installing and Starting Cockpit.</p> <p>SAP SE thus recommends that you only change this value in case you encounter errors when importing files, for example a large mapping table.</p> </div>			

User Session Management and Security Settings

<code>http.session.expiration.scheduler</code> The duration (in seconds) between two verifications performed on HTTP sessions in order to detect expired ones. When an HTTP session is expired, this session is deleted.	Requires a restart	The default value is set to: 60 (one minute) You can set up any positive value.	<input type="checkbox"/>
<code>browser.sessionTimeout</code> The maximum period (in minutes) of inactivity until which the session of an SAP CC individual user expires. When this timeout is reached, the unsaved modifications are lost.	Immediate (almost)	The default value is set to: 120 (two hours) You can set up any positive value that corresponds to a period that must be longer than the lock timeout defined by the <code>browser.sessionLockTimeout</code> configuration setting.	<input type="checkbox"/>
<div style="border-left: 2px solid blue; padding-left: 10px;"> <p>→ Remember</p> <p>This setting is hot modifiable when Cockpit is executed.</p> </div>			

Setting	Change Category	Values	Required
<p><code>browser.sessionLockTimeout</code></p> <p>The maximum period (in minutes) during which a session can be left inactive (meaning that there is no interaction between the user and the web application). When this timeout is reached, the application locks the user session automatically and the user must log on again.</p>	Immediate (almost)	<p>The default value is set to: 10</p> <p>You can set up any period that must be shorter than the timeout defined by the <code>browser.sessionTimeout</code> configuration setting. Setting up this configuration setting to 0 disables the locking mechanism.</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>→ Remember</p> <p>This setting is hot modifiable when Cockpit is executed.</p> </div>	<input type="checkbox"/>
SAML 2.0 Settings (for Identity Providers)			
<p><code>saml2.idp_entity_id</code></p> <p>Identifier of the identity provider (IdP).</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>→ Recommendation</p> <p>SAP SE recommends not to enable both OAuth and SAML 2.0 authentication protocols. If so, the automatic sign-in mechanism does not work.</p> </div>	Immediate (almost)	<p>The default value is set to: empty (SAML 2.0 SSO disabled).</p> <p>You can define any valid identifier corresponding to the identity provider.</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>ⓘ Note</p> <p>To enable the SAML 2.0 SSO authentication, user delegation [page 244] mechanism must be activated.</p> </div> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>→ Remember</p> <p>This setting is hot modifiable when Cockpit is executed.</p> </div>	<input type="checkbox"/>
<p><code>saml2.idp_sso_service_url</code></p> <p>URL to redirect the SAML request to (identity provider location).</p>	Immediate (almost)	<p>The default value is set to: empty</p> <p>You can define any valid URL corresponding to the identity provider.</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>→ Remember</p> <ul style="list-style-type: none"> This setting is hot modifiable when Cockpit is executed. This setting is relevant only if <code>saml2.idp_entity_id</code> is set. </div>	<input type="checkbox"/>

Setting	Change Category	Values	Required
<p><code>saml2.idp_certificate</code></p> <p>File name of the file containing the X.509 public key certificate of the identity provider to validate SAML 2.0 assertions.</p>	Immediate (almost)	<p>The default value is set to: empty</p> <p>The certificate must be DER-encoded and may be supplied in binary or Base64 encoding.</p> <div style="background-color: #f0f0f0; padding: 5px; margin-top: 10px;"> <p>Note</p> <p>If the certificate is provided in Base64 encoding, it must start with <code>-----BEGIN CERTIFICATE-----</code> and must end with <code>-----END CERTIFICATE-----</code>.</p> </div> <div style="background-color: #f0f0f0; padding: 5px; margin-top: 10px;"> <p>Remember</p> <ul style="list-style-type: none"> This setting is hot modifiable when Cockpit is executed. This setting is relevant only if <code>saml2.idp_entity_id</code> is set. </div>	<input type="checkbox"/>
<p><code>saml2.sessionMaxTimeout</code></p> <p>Period (in minutes) starting after an SAML authentication at the end of which the user's session expires.</p>	Immediate (almost)	<p>The default value is set to: 720 (12 hours)</p> <p>You can set up any positive value.</p> <div style="background-color: #f0f0f0; padding: 5px; margin-top: 10px;"> <p>Note</p> <p>This timeout is considered only with the SAML 2.0 SSO authentication and when no expiration date is set in the SAML assertion by the identity provider.</p> </div> <div style="background-color: #f0f0f0; padding: 5px; margin-top: 10px;"> <p>Remember</p> <ul style="list-style-type: none"> This setting is hot modifiable when Cockpit is executed. This setting is relevant only if <code>saml2.idp_entity_id</code> is set. </div>	<input type="checkbox"/>

OAuth2 Settings (for Third-Party Authorization Servers)

Setting	Change Category	Values	Required
<code>oauth2.authorization_server.url</code> URL of the authorization server (AS).	Requires a restart	The default value is set to: empty (OAuth2 disabled) You can define any valid URL corresponding to the authorization server.	<input type="checkbox"/>
<div style="background-color: #f0f0f0; padding: 5px;"> <p>→ Recommendation</p> <p>SAP SE recommends not to enable both OAuth and SAML 2.0 authentication protocols. If so, the automatic sign-in mechanism does not work.</p> </div>			
<code>oauth2.authorization_server.client_id</code> Client identifier of the application provided by the authorization server.	Requires a restart	You must define a valid client identifier known by the authorization server.	<input type="checkbox"/>
<code>oauth2.authorization_server.client_secret</code> Client secret of the application defined in the authorization server.	Requires a restart	You must define a valid client secret known by the authorization server.	<input type="checkbox"/>
<code>oauth2.redirect_uri.base_url</code> Reachable based URL used by the authorization server to redirect the authorized user.	Requires a restart	The default value is set to: empty (computed by Cockpit) The URL format must be: <code><baseUrl></code> where <code><baseUrl></code> follows the syntax: <code>https://<IP_OR_DNS_ADDRESS>:<PORT_NB>/<WEB_APP_NAME></code>	<input type="checkbox"/>
<div style="display: flex; justify-content: space-between;"> <div style="background-color: #f0f0f0; padding: 5px; width: 45%;"> <p>📌 Note</p> <p>The <code>redirect_uri</code> must be the same than the <code>redirect_uri</code> registered in the authorization server (see OAuth 2.0 Authorization Framework).</p> </div> <div style="background-color: #f0f0f0; padding: 5px; width: 45%;"> <p>🔗 Example</p> <p><code>https://localhost:8088/cccockpit</code></p> <p>→ Tip</p> <p>This setting must be performed when Cockpit cannot compute a reachable URL.</p> </div> </div>			

Setting	Change Category	Values	Required
<p>oauth2.authorization_server.revocation_url</p> <p>URL used to notify the authorization server that a previously granted token is no longer needed.</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>Note</p> <p>This URL is used when the discovery process fails.</p> </div>	Requires a restart	<p>The default value is set to: empty (no revocation)</p> <p>You can define any valid URL of token revocation endpoint from the authorization provider.</p>	<input type="checkbox"/>
User Management Settings			
<p>msg.api.login</p> <p>Login used to be authenticated by the Message Charging Client API</p>	Immediate (almost)	<p>You must set up a value that corresponds to an already defined user with the Message Charging Client role and the <i>Security Profile</i> set to Service User.</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>→ Remember</p> <p>This setting is hot modifiable when Cockpit is executed.</p> </div>	<input type="checkbox"/>
<p>msg.api.password</p> <p>Password used to be authenticated by the Message Charging Client API</p>	Immediate (almost)	<p>You must set up a password that respects the SAP CC password policy.</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>→ Remember</p> <p>This setting is hot modifiable when Cockpit is executed.</p> </div>	<input type="checkbox"/>
<p>msg.api.timeout</p> <p>Maximum period (in milliseconds) allocated to the execution of a query performed by the Message Charging Client API. It defaults to twenty seconds.</p>	Immediate (almost)	<p>The default value is set to: 20000</p> <p>You can set up any positive value (nonzero).</p> <p>Setting up this configuration setting to 0 disables the timeout mechanism that is required. It may lead to some issues.</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>Note</p> <p>SAP SE recommends that you always set a positive value for this timeout to avoid any contention problem.</p> </div> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>→ Remember</p> <p>This setting is hot modifiable when Cockpit is executed.</p> </div>	<input type="checkbox"/>

Setting	Change Category	Values	Required
<p><code>msg.api.auth.timeout</code></p> <p>As of SAP CC 2022 FPS 0: Maximum period (in milliseconds) allocated to the execution of the authentication query performed by the Message Charging Client API. It defaults to ten seconds.</p>	Immediate (almost)	<p>The default value is set to: 10000</p> <p>The default value corresponds to 10 seconds.</p> <p>You can set up any positive value (nonzero).</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>Note</p> <p>SAP SE recommends that you always set a positive value (non-zero) for this timeout to avoid any problem.</p> <p>The values 0 and -1 disable the timeout mechanism that is required. It may lead to some issues.</p> </div> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>Remember</p> <p>This setting is hot modifiable when Cockpit is executed.</p> </div>	<input type="checkbox"/>
Tracing Settings			
<p><code>ls.app.severity</code></p> <p>Severity threshold for the generation of log messages related to the business processing (application level)</p>	Requires a restart	<p>The default value is set to: INFO</p> <p>You can set up one of the following values: DEBUG, PATH, INFO, WARNING, ERROR, or FATAL</p>	<input type="checkbox"/>
<p><code>ls.app.destination</code></p> <p>CSV list of output destinations for the log messages related to the application level</p>	Requires a restart	<p>The default value is set to: LDC, LDF1</p> <p>Possible values are: LDC, LDF1, LDF2, LDF3, LDF4, or LDF5</p>	<input type="checkbox"/>
<p><code>ls.sys.severity</code></p> <p>Severity threshold for the generation of log messages related to the system processing (system level)</p>	Requires a restart	<p>The default value is set to: INFO</p> <p>You can set up one of the following values: DEBUG, PATH, INFO, WARNING, ERROR, or FATAL</p>	<input type="checkbox"/>
<p><code>ls.sys.destination</code></p> <p>CSV list of output destinations for the log messages related to the system processing (system level)</p>	Requires a restart	<p>The default value is set to: LDC, LDF1</p> <p>Possible values are: LDC, LDF1, LDF2, LDF3, LDF4, or LDF5</p>	<input type="checkbox"/>

Setting	Change Category	Values	Required
<code>ls.trc.severity</code> Severity threshold for the generation of trace messages	Immediate (almost)	The default value is set to: INFO You can set up one of the following values: DEBUG, PATH, INFO, WARNING, ERROR, or FATAL <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>Note</p> <p>To support SAP Passport, this setting must remain set to INFO, to mitigate the lack of logs.</p> </div> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>Remember</p> <p>This setting is hot modifiable when Cockpit is executed.</p> </div>	<input type="checkbox"/>
<code>ls.trc.domain</code> CSV list of trace domains that the generated messages relate to	Immediate (almost)	The default value is set to: empty (no domain) <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>Note</p> <p>To support SAP Passport, this setting must remain empty.</p> </div> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>Remember</p> <p>This setting is hot modifiable when Cockpit is executed.</p> </div>	<input type="checkbox"/>
<code>ls.trc.destination</code> CSV list of output destinations for the generated messages	Immediate (almost)	Possible values are: LDC, LDF1, LDF2, LDF3, LDF4, or LDF5 <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>Remember</p> <p>This setting is hot modifiable when Cockpit is executed.</p> </div>	<input type="checkbox"/>
<code>ld.console.enabled</code> Enables/disables the use of the console	Immediate (almost)	The default value is set to: false Possible values are: true or false <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>Remember</p> <p>This setting is hot modifiable when Cockpit is executed.</p> </div>	<input type="checkbox"/>
<code>ld.console.formatter</code> Output format of traces generated within the console	Immediate (almost)	The default value is set to: TRACE Possible values are: TRACE, LIST, or XML <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>Remember</p> <p>This setting is hot modifiable when Cockpit is executed.</p> </div>	<input type="checkbox"/>

Setting	Change Category	Values	Required
ld.fileX.enabled Enables/disables the use of fileset destination #X (X from 1 to 5)	Immediate (almost)	The default value is set to: true Possible values are: true or false <div style="background-color: #f0f0f0; padding: 5px; margin-top: 10px;"> <p>→ Remember</p> <p>This setting is hot modifiable when Cockpit is executed.</p> </div>	<input type="checkbox"/>
ld.fileX.name Path, name, and extension of trace files for fileset destination #X (X from 1 to 5)	Immediate (almost)	The default value is set to: @CATALINA_HOME@/logs/@WEBAPP_NAME@_LDF2.trc You can set up any string, using the following variables: <ul style="list-style-type: none"> @CATALINA_HOME@, that is replaced at runtime by the home folder of Catalina (Tomcat). @WEB_APP_NAME@, that is replaced at runtime by the context path of the deployed application (in which possible URL separators are replaced by '_'). <div style="background-color: #f0f0f0; padding: 5px; margin-top: 10px;"> <p>→ Remember</p> <p>This setting is hot modifiable when Cockpit is executed.</p> </div>	<input type="checkbox"/>
ld.fileX.size Maximum size before rotation of the trace files for fileset destination #X (X from 1 to 5)	Immediate (almost)	The default value is set to: 2M You can set up any value respecting the <value><unit> format, where: <ul style="list-style-type: none"> <value> is a mandatory positive integer. <unit> is an optional string representing the unit, that can be: K (kilo), M (mega), or G (giga). <div style="background-color: #f0f0f0; padding: 5px; margin-top: 10px;"> <p>→ Remember</p> <p>This setting is hot modifiable when Cockpit is executed.</p> </div>	<input type="checkbox"/>
ld.fileX.setsize Number of trace files before rotation for fileset destination #X (X from 1 to 5)	Immediate (almost)	The default value is set to: 4 You can set up any positive value. <div style="background-color: #f0f0f0; padding: 5px; margin-top: 10px;"> <p>→ Remember</p> <p>This setting is hot modifiable when Cockpit is executed.</p> </div>	<input type="checkbox"/>

Setting	Change Category	Values	Required
ld.fileX.formatter Output format of traces when using fileset destination #X (X from 1 to 5)	Immediate (almost)	The default value is set to: LIST Possible values are: TRACE, LIST, or XML	<input type="checkbox"/>
<div style="background-color: #f0f0f0; padding: 5px;"> <p>→ Remember</p> <p>This setting is hot modifiable when Cockpit is executed.</p> </div>			

App Process a Chargeable Item Settings

charging.catalog.sync.enabled Enables or disables the app to force the pricing catalog synchronization in the rater and bulkloader instances to refresh the catalogs before the charging or simulation operations	Immediate (almost)	The default value is set to: true (synchronization is forced) Possible values are: true or false	<input type="checkbox"/>
<div style="background-color: #f0f0f0; padding: 5px;"> <p>→ Tip</p> <p>If you change this value as a system administrator, your SAP CC users just have to press F5 or reopen the app in their Cockpit user interfaces.</p> </div>			
<div style="background-color: #f0f0f0; padding: 5px;"> <p>→ Remember</p> <p>This setting is hot modifiable when Cockpit is executed.</p> </div>			

charging.output.item.immediate.loading.enabled Enables or disables the immediate loading of output items (billable/consumption items) generated by the charging process execution into SAP Convergent Invoicing for immediate billing. This only applies to the real execution mode of the charging process but not in estimated mode for simulations.	Immediate (almost)	The default value is set to: false (feature is disabled) Possible values are: true or false	<input type="checkbox"/>
<div style="background-color: #f0f0f0; padding: 5px;"> <p>→ Remember</p> <p>This setting is hot modifiable when Cockpit is executed.</p> </div>			
<div style="background-color: #f0f0f0; padding: 5px;"> <p>→ Tip</p> <p>If you change this value as a system administrator, your SAP CC users just have to press F5 or reopen the app in their Cockpit user interfaces.</p> </div>			

SAP Companion (fka Web Assistant) Settings

Setting	Change Category	Values	Required
webassistant.url	Immediate (almost)	<p>The default value is set to: https://webassistant.enable-now.cloud.sap/web_assistant/framework/</p> <p>For better performance, you can set up the value to: <a href="https://<SAP_CLOUD_REGION>/web_assistant/framework/">https://<SAP_CLOUD_REGION>/web_assistant/framework/ or another valid URL.</p> <p>Possible regions for <SAP_CLOUD_REGION> are defined by SAP Enable Now.</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>Note</p> <p>You can find a valid list of framework URLs by checking the documentation of SAP Enable Now.</p> <p>The regions and URLs are listed in the document named Web Assistant Integration, chapter Regional Web Assistant Framework URLs, under task Integrate.</p> </div> <p>You can disable the web assistant feature by removing this setting or leaving it empty.</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>Remember</p> <p>This setting is hot modifiable when Cockpit is executed.</p> </div>	<input type="checkbox"/>

■ Mandatory Optional

4.2.1.4.2 Modifying the Configuration File of the Cockpit Web Application

As an SAP CC system administrator, you want to configure some features or mechanisms. In a production environment, you previously back up the configuration file of the SAP Convergent Charging Cockpit web application (*.PROPERTIES file).

Modify the Configuration File

As a system administrator or an application administrator, to modify the configuration of the Cockpit web application, complete the following procedure:

1. On the Java web server (Tomcat for example), locate the configuration file named `sap_cc_cockpit_<WAR_FILE_NAME>.properties`, where `<WAR_FILE_NAME>` corresponds to the name of the deployed Cockpit web application.

This file belongs to the deployed Cockpit web application that you want to reconfigure.

2. In a production SAP system landscape, back up this configuration file.
3. Edit this text file in a text editor.
4. Modify the value of the [relevant settings \[page 239\]](#).
Some changes can require a restart of the Cockpit back-end application in its Java web server.
5. Save your modifications.
6. In a production SAP system landscape, back up the modified configuration file.

Caution

- If a property is defined more than once in the file, only the last value is considered.
- If the imported file contains several definitions for a same property, only the last one is kept.

4.2.1.4.3 Configuring the App Process a Chargeable Item

To configure the app Process a Chargeable Item, [modify \[page 259\]](#) the configuration file of the deployed Cockpit web application.

[Enabling and Displaying the App Process a Chargeable Item \[page 260\]](#)

Before pricing specialists can use their app Process a Chargeable Item in the Cockpit user interface, a user administrator must create a dedicated and specialized SAP CC user as a service user.

[Enabling the Billable Items Immediate Loading Feature in the App Process a Chargeable Item \[page 261\]](#)

[Disabling the Automatic Synchronization of Pricing Catalogs in Rater and Bulkloader Instances \[page 262\]](#)

Related Information

[Process a Chargeable Item](#)

4.2.1.4.3.1 Enabling and Displaying the App Process a Chargeable Item

Before pricing specialists can use their app Process a Chargeable Item in the Cockpit user interface, a user administrator must create a dedicated and specialized SAP CC user as a service user.

Enable and Display the App

The charging process in the Core Server system requires an SAP CC user with the **Message Charging Client** role.

Therefore, a service user for the Cockpit must be created, granted with the Message Charging Client role:

1. As an SAP CC user administrator, refer to the [Users](#) section of the [SAP CC 2023 Primary Help for Core Tool](#) to:
 - Create a new service user granted with the Message Charging Client role.
 - Check if this user needs credentials regarding the settings of the [MESSAGE_API_AUTHENTICATION_REQUIRED](#) system parameter.
2. As an SAP CC system administrator, create a backup of the `sap_cc_cockpit_<NAME>.properties` configuration file of the Cockpit (where `<NAME>` corresponds to the name of the deployed Cockpit web application).
3. Add the 4 following settings to the configuration file:
 - `msg.api.login`
 - `msg.api.password`
 - `msg.api.timeout`
 - `msg.api.auth.timeout` (as of SAP CC 2022 FPS 0)They correspond to the credentials of the newly created service user and some technical settings for the Cockpit user interface.
See the template configuration file.
4. Save your modifications.
5. Inform your SAP CC users that they can reopen their app [Process a Chargeable Item](#) or refresh their web browsers.

Once done, any individual user of the Cockpit user interface with the **Marketing** role can use the app Process a Chargeable Item.

Related Information

[Process a Chargeable Item](#)

4.2.1.4.3.2 Enabling the Billable Items Immediate Loading Feature in the App Process a Chargeable Item

Before pricing specialists can use the function in their app Process a Chargeable Item, an SAP CC system administrator must enable the feature in the installed Cockpit web application.

When several Cockpit user interfaces are deployed and installed in your integrated SAP CC system landscape, you can choose which user interface is able to load the billable items into SAP Convergent Invoicing.

Prerequisites

- The relevant Core Server system of SAP Convergent Charging is already configured for billable items immediate loading (See [Enabling the Billable Items Immediate Loading \[page 52\]](#)). The deployed Cockpit web application connects to this Core Server system.

Enable the Feature in the App

As an SAP CC system administrator:

1. [Modify \[page 259\]](#) the configuration file of the deployed Cockpit web application.
2. Set up the `charging.output.item.immediate.loading.enabled` setting to **true**.
3. Save your modifications.
4. In a production SAP system landscape, back up the modified configuration file.
5. Inform your SAP CC users that they can reopen their app Process a Chargeable Item or refresh their web browsers.

Related Information

[Enabling the Billable Items Immediate Loading \[page 52\]](#)

[SAP Convergent Charging Cockpit](#)

[Process a Chargeable Item](#)

[Editing and Processing a Chargeable Item](#)

4.2.1.4.3.3 Disabling the Automatic Synchronization of Pricing Catalogs in Rater and Bulkloader Instances

Disable the Feature in the App

As an SAP CC system administrator:

1. [Modify \[page 259\]](#) the configuration file.
2. Set up the `charging.catalog.sync.enabled` setting to **false**.
3. Inform your SAP CC users that they can reopen their apps or refresh their web browsers.

4.2.1.4.4 Changing the Site for the SAP Companion Content

For better performance, you can configure the Cockpit web application so that it gets the content for the SAP Companion by using a URL located in another region.

Consult the product documentation and user assistance of [SAP Enable Now](#).

View the *SAP Companion Integration Guide* at: [SAP Companion Integration Guide](#) or in another SAP site.

Use the page [Regional SAP Companion Framework URLs](#) to determine the appropriate URL for the content of the SAP Companion for SAP CC.

Use the procedure [Modifying the Configuration File of the Cockpit Web Application \[page 259\]](#) to set up the Cockpit setting named `webassistant.url`.

4.2.2 Configuring the Desktop Applications

[Keywords \[page 263\]](#)

[Preliminary Notes \[page 263\]](#)

[Description \[page 264\]](#)

[Configuring Core Tool \[page 264\]](#)

[Configuring BART Tool \[page 266\]](#)

[Configuring CAT Tool \[page 267\]](#)

4.2.2.1 Keywords

GUI¹⁰², graphical user interface, Core Tool, BART Tool, CAT Tool

4.2.2.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [Installing and Launching Core Tool](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation
- [Installing and Launching BART Tool](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation

¹⁰² Graphical User Interface

- [Installing and Launching CAT Tool](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation

4.2.2.3 Description

All desktop applications of SAP Convergent Charging have a default configuration that relies on a configuration file that is automatically created (at first launch time) if this file does not exist. You can use the following procedures to modify the configuration file of the different graphical user interfaces of your SAP CC landscape and thus fit your specific needs:

- [Configuring Core Tool \[page 264\]](#)
- [Configuring BART Tool \[page 266\]](#)
- [Configuring CAT Tool \[page 267\]](#)

Note

- Configuration files are available in the `config` folder of each user interface
- The settings defined in the configuration files do not relate to an SAP user, but are applied to all SAP users

4.2.2.4 Configuring Core Tool

The configuration of the Core Tool user interface can be modified to fit specific needs. The following table contains the list of available parameters that you can change:

Parameter	Type	Description	Default Value	Possible Values
<code>language</code>	string	Language used within the GUI ¹⁰³	EN	An ISO-639 code
<code>country</code>	string	The country specific language used within the GUI	US	An ISO-3166 code

¹⁰³ Graphical User Interface

Parameter	Type	Description	Default Value	Possible Values
<code>catalog.cache.retention_period</code>	integer	Maximum period (in seconds) of retention in a cache of some objects referenced in decision trees. The value 0 deactivates the cache. The recommended value for better user experience is 60.	0	Any positive or null integer value
<code>frame_width</code>	integer	The width of the window of the GUI	900	1 to 65536
<code>frame_height</code>	integer	The height of the window of the GUI	700	1 to 65536
<code>help.contents.url</code> <code>help.components.url</code> <code>help.portal.url</code>	string	Address of the online helps accessible from the <i>Help</i> menu of the Core Tool, that can point to local files or to web address (such as SAP Help Portal)	The URL ¹⁰⁴ of the SAP CC Core Tool user interface documentation on SAP Help Portal	A valid HTTP ¹⁰⁵ or file URL pointing to online helps
<code>xml.verbose</code>	boolean	Verbose mode, used to trace communications between Core Tool and the dispatcher or updater instance of the Core Server system	false	true / false

Configure Core Tool

To modify the configuration of the Core Tool user interface, complete the following procedure:

1. Ensure the concerned Core Tool is completely stopped.
2. Edit the `config/core_tool.config` configuration file. If this file does not exist, create a copy from the `config/core_tool.config.sk` template file.
3. Modify the value of the relevant parameters.
4. Save your modifications.
5. Restart the Core Tool user interface.

⚠ Caution

- If a property is defined more than once in the file, only the last value is considered.

¹⁰⁴ Uniform Resource Locator

¹⁰⁵ HyperText Transfer Protocol

- If the imported file contains several definitions for a same property, only the last one is kept.

4.2.2.5 Configuring BART Tool

The configuration of the BART Tool user interface can be modified to fit specific needs. The following table contains the list of available parameters that you can change:

Parameter	Type	Description	Default Value	Possible Values
language	string	Language used within the GUI ¹⁰⁶	EN	An ISO-639 code
country	string	The country specific language used within the GUI	US	An ISO-3166 code
frame_width	integer	The width of the window of the GUI	900	1 to 65536
frame_height	integer	The height of the window of the GUI	700	1 to 65536
log/level	integer	The level of the generated log messages	2	0 (debug) 1 (info) 2 (warning) 3 (error)
BartHelpContent sURL	boolean	Address of the online helps accessible from the <i>Help</i> menu of the BART Tool, that can point to local files or to web address (such as SAP Help Portal)	The URL ¹⁰⁷ of the SAP CC BART Tool user interface documentation on SAP Help Portal	A valid HTTP ¹⁰⁸ or file URL pointing to online helps
BartHelpPortalU RL				

To modify the configuration of the BART Tool user interface, execute the following procedure:

1. Ensure the concerned BART Tool is completely stopped
2. Edit the `config/bart_tool.config` XML configuration file. If this file does not exist, create a copy from the `config/bart_tool.config.sk` template file
3. Modify the value of the relevant parameters
4. Save your modifications
5. Restart the BART Tool

⚠ Caution

- If a property is defined more than once in the file, only the last value is considered

¹⁰⁶ Graphical User Interface

¹⁰⁷ Uniform Resource Locator

¹⁰⁸ HyperText Transfer Protocol

- If the imported file contains several definitions for a same property, only the last one is kept

4.2.2.6 Configuring CAT Tool

The configuration of the CAT Tool user interface can be modified to fit specific needs. The following table contains the list of available parameters that you can change:

Parameter	Type	Description	Default Value	Possible Values
language	string	Language used within the GUI ¹⁰⁹	EN	An ISO-639 code
country	string	The country specific language used within the GUI	US	An ISO-3166 code
log/level	string	The level of the generated log messages	inform	debug inform warning error
cat.help.contents.url	string	Address of the online helps accessible from the <i>Help</i> menu of the CAT Tool, that can point to local files or to web address (such as SAP Help Portal)	The URL ¹¹⁰ of the SAP CC CAT Tool user interface documentation on SAP Help Portal	A valid HTTP ¹¹¹ or file URL pointing to online helps
help.portal.url				

To modify the configuration of the CAT Tool user interface, execute the following procedure:

1. Ensure the concerned CAT Tool is completely stopped
2. Edit the `config/cat_tool.config` configuration file. If this file does not exist, create a copy from the `config/cat_tool.config.sk` template file
3. Modify the value of the relevant parameters
4. Save your modifications
5. Restart the CAT Tool

⚠ Caution

- If a property is defined more than once in the file, only the last value is considered
- If the imported file contains several definitions for a same property, only the last one is kept

¹⁰⁹ Graphical User Interface

¹¹⁰ Uniform Resource Locator

¹¹¹ HyperText Transfer Protocol

4.2.3 Configuring the Command-Line Applications

[Keywords \[page 268\]](#)

[Preliminary Notes \[page 268\]](#)

[Description \[page 268\]](#)

[Configuring Setup Tool \[page 269\]](#)

[Configuring Config Tool \[page 269\]](#)

4.2.3.1 Keywords

UI, user interface, Setup Tool, Config Tool

4.2.3.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [Installing and Executing Setup Tool](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation
- [Installing and Executing Config Tool](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation
- [Installing and Launching CAT Tool](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation

4.2.3.3 Description

Some command-line applications of SAP Convergent Charging rely on a configuration file that needs to be modified to fit the configuration of your landscape.

You can use the following procedures to modify these configuration files and thus fit your specific needs:

- [Configuring Setup Tool \[page 269\]](#)
- [Configuring Config Tool \[page 269\]](#)

4.2.3.4 Configuring Setup Tool

The Setup Tool user interface directly connects to the back-end database, using connection parameters that are defined in the `boot.config` file available in the `config` folder of dispatcher instances.

For further information about the available parameters, refer to the [Boot Configuration File \[page 29\]](#) dedicated section afterwards.

4.2.3.5 Configuring Config Tool

The Config Tool user interface directly connects to the back-end database, using connection parameters that are defined in the `boot.config` file available in the `config` folder of dispatcher instances.

For further information about the available parameters, refer to the [Boot Configuration File \[page 29\]](#) dedicated section afterwards.

4.3 Configuring the BART Server System

[BART Server Configuration File \[page 269\]](#)

[Acquisition Sessions and Consolidation \[page 276\]](#)

[Communication Channels \[page 280\]](#)

[Java Virtual Machine \[page 282\]](#)

[Logging and Tracing \[page 283\]](#)

[Magic Number Pattern \[page 285\]](#)

[Monitoring and Event Broadcasting \[page 286\]](#)

[Rating Sessions \[page 290\]](#)

[Rerating Sessions \[page 291\]](#)

[Third-Party Integration \[page 292\]](#)

[BART Database \[page 293\]](#)

4.3.1 BART Server Configuration File

[Keywords \[page 270\]](#)

[Preliminary Notes \[page 270\]](#)

[Description \[page 270\]](#)

[Configuration Settings for BART Server \[page 271\]](#)

[Modifying the BART Server Configuration File and Restarting the System \[page 275\]](#)

4.3.1.1 Keywords

`bart.config`

4.3.1.2 Preliminary Notes

For further information, refer to the following SAP CC documentation:

- [Starting and Stopping the Server Systems](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation

4.3.1.3 Description

As described in the [SAP CC 2023 Installation and Maintenance Guide](#) documentation, the configuration of the BART Server system is located in the `bart.config` file:

- This configuration file is available in the `config` folder of the BART Server system already deployed on a dedicated host in your SAP system landscape.
- The file content is grouped upon the following sections:
 - Database connectivity
 - Logs and traces
 - Connection to the Core Server system
 - Connection to the BART Server system
 - Business operations settings

The content and sections change and depend on your installed software version. Check the file to see the details. You can also view the skeleton file (`*.CONFIG.SK`) that is delivered.

You can use this generic procedure to configure the different settings of the BART Server configuration and thus fit your specific needs.

- [Modifying the BART Server Configuration File and Restarting the System \[page 275\]](#)
- [Configuration Settings for BART Server \[page 271\]](#)

4.3.1.4 Configuration Settings for BART Server

The following table contains the list of settings that can be configured within the configuration file of the BART Server system. For further information about the possible values of each setting, refer to the documentation available within the `bart.config` file itself:

Category	Description	BART Server Setting
Database Connectivity		
Connection	JDBC URI of the BART Database	<code>db.SQLHELPER_JDBC_URI</code>
	Name of the BART Database user	<code>db.SQLHELPER_LOGIN</code>
	Password of the BART Database user	<code>db.SQLHELPER_PASSWORD</code>
	CSV list of additional properties for SQL connections	<code>db.SQLHELPER_JDBC_PROPERTIES</code>
	Number of database connections to open	<code>db.SQLHELPER_CONNECTION_COUNT</code>
Retry policy	Maximum number of request retries	<code>db.SQLHELPER_MAX_REDO</code>
	Duration (in seconds) between 2 reconnection attempts	<code>db.SQLHELPER_RECONNECT_INTERVAL</code>
	Maximum number of reconnection attempts	<code>db.SQLHELPER_RECONNECT_ATTEMPTS</code>
Technical settings	Size of the statement cache	<code>db.SQLHELPER_STATEMENT_CACHE_SIZE</code>
	Unique ID for batch reservation	<code>db.SQLHELPER_ID_INTERVAL</code>
Logs and Traces		
Logs (business processing)	Severity threshold for logs	<code>ls.app.severity</code>
	Identifier(s) of the destination(s)	<code>ls.app.destination</code>
Logs (system processing)	Severity threshold for logs	<code>ls.sys.severity</code>
	Identifier(s) of the destination(s)	<code>ls.sys.destination</code>
Traces	Severity threshold for traces	<code>ls.trc.severity</code>
	Identifier(s) of the destination(s)	<code>ls.trc.destination</code>
	Domain(s) for traces	<code>ls.trc.domain</code>
Console Destination	Enable/Disable	<code>ld.console.enabled</code>
	Output format	<code>ld.console.formatter</code>
Fileset Destination #1	Enable/Disable	<code>ld.file1.enabled</code>
	Output format	<code>ld.file1.formatter</code>
	Number of files available for the rotation	<code>ld.file1.setsize</code>
	Maximum file size before rotation	<code>ld.file1.size</code>
	File path, name, and extension	<code>ld.file1.name</code>

Category	Description	BART Server Setting
Fileset Destination #2	Enable/Disable	<code>ld.file2.enabled</code>
	Output format	<code>ld.file2.formatter</code>
	Number of files available for the rotation	<code>ld.file2.setsize</code>
	Maximum file size before rotation	<code>ld.file2.size</code>
	File path, name, and extension	<code>ld.file2.name</code>
Fileset Destination #3	Enable/Disable	<code>ld.file3.enabled</code>
	Output format	<code>ld.file3.formatter</code>
	Number of files available for the rotation	<code>ld.file3.setsize</code>
	Maximum file size before rotation	<code>ld.file3.size</code>
	File path, name, and extension	<code>ld.file3.name</code>
Fileset Destination #4	Enable/Disable	<code>ld.file4.enabled</code>
	Output format	<code>ld.file4.formatter</code>
	Number of files available for the rotation	<code>ld.file4.setsize</code>
	Maximum file size before rotation	<code>ld.file4.size</code>
	File path, name, and extension	<code>ld.file4.name</code>
Fileset Destination #5	Enable/Disable	<code>ld.file5.enabled</code>
	Output format	<code>ld.file5.formatter</code>
	Number of files available for the rotation	<code>ld.file5.setsize</code>
	Maximum file size before rotation	<code>ld.file5.size</code>
	File path, name, and extension	<code>ld.file5.name</code>
Configuration of the BART Server system		
Configuration	IP address or host name of the listening BART Server	<code>bart.collector.server.hostname</code>
	Collector port of the listening BART Server	<code>bart.collector.server.port</code>
	Number of threads for the listening BART Server	<code>bart.collector.server.threads</code>
	HTTP ¹¹² port numberBART Server	<code>bart.http.server.port</code>
	Number of threads for BART's HTTP server	<code>bart.http.server.threads</code>
Securing the servers	HTTP server security and encryption	<code>bart.http.secure</code>
	Client authentication required or not when HTTP server is secured	<code>bart.http.secure.client_auth</code>
	Collector server security and encryption	<code>bart.collector.secure</code>

¹¹² HyperText Transfer Protocol

Category	Description	BART Server Setting
	Client authentication required or not when collector server is secured	<code>bart.collector.secure.client_auth</code>
	List of protocol names that are enabled when performing encrypted communications using the SSL ¹¹³ /TLS ¹¹⁴ protocol for the technical interfaces Message TCP and HCI ¹¹⁵	<code>tls.protocols</code>
	List of cipher suites names that are enabled when performing encrypted communications using the SSL/TLS protocol for the technical interfaces Message TCP and HCI	<code>tls.cipher_suites</code>
Connection to the Core Server system		
Connection	CSV list of dispatchers to contact	<code>cc.dispatcher.boot.http.url.list</code>
	Name of the technical user used to connect to the Core Server system	<code>cc.login</code>
	Password of the specified technical user	<code>cc.password</code>
	Activation or deactivation of the authentication on the message API with the previous credentials	<code>message.api.authentication.enabled</code>
Third-party integration		
Connection to the SAP SLD ¹¹⁶ system	URL ¹¹⁷ of the targeted SAP SLD system	<code>bart.sld.url</code>
	Name of the SAP SLD user	<code>bart.sld.user</code>
	Password of the SAP SLD user	<code>bart.sld.password</code>
Business Settings		
Acquisition	Maximum number of parallel acquisition sessions	<code>acquisition.session.max.number</code>
	Polling period (in milliseconds) for generating events	<code>acquisition.session.monitoring.period</code>
Rerating	Number of threads used for rerating operations, each subscription being rerated by a dedicated thread	<code>rerating.pool.size</code>
	Maximum number of rerating requests that can be queued when rerating subscriptions	<code>rerating.queue.size</code>
	Specifies whether CDRs ¹¹⁸ to select for rerating purpose must have the STATUS_RATED status, or not	<code>rerating.limited_to_rated_status</code>

¹¹³ Secure Socket Layer

¹¹⁴ Transport Layer Security

¹¹⁵ HTTP Communication Interface

¹¹⁶ System Landscape Directory

¹¹⁷ Uniform Resource Locator

¹¹⁸ Call Detail Record (Telecommunications industry), or more generally Consumption Detail Record

Category	Description	BART Server Setting
	Maximum number of subscriptions (by batch rating group) that can be rerated as the same time within a rerating session	<code>rerating.max_number_subscriptions</code>
Rating and charging	Maximum number of parallel rating sessions	<code>rating.session.max.number</code>
	Polling period (in milliseconds) for generating events	<code>rating.session.monitoring.period</code>
	Maximum number of concurrent threads for each rating session	<code>rating.session.threads</code>
	Size of the CDR commit block	<code>rating.cdr.commit.block</code>
	Specifies whether the batch charge API ¹¹⁹ must be used, or not	<code>rating.cdr.batch_charge</code>
	Maximum number of CDRs in a given batch charge operation	<code>rating.cdr.charge.block</code>
	Name of a specific property to add in the chargeable item during rating operations and containing the rating date	<code>rating.cdr.rating_date.property_name</code>
	Name of a specific property to add in the chargeable item during rating operations and containing a unique identifier	<code>rating.cdr.unique_id.property_name</code>
	Source of the unique identifier to add in the chargeable item during rating operations	<code>rating.cdr.unique_id.source</code>
	Specifies whether CDRs must be re-consolidated before being rated	<code>rating consolidate.before.rating</code>
	Specifies whether CDRs selected from the BART Database must be rated, or simply used for benchmarking purpose	<code>rating.bench_mode</code>
	Absolute path of the file used to store CDRs that have been rated but not committed due to a database failure	<code>sql.failures.log.file.name</code>
	Enables/disables the cached structure used for consolidation operations	<code>cache.consolidation.enable</code>
Size of the cached structure used for consolidation operations	<code>cache.consolidation.size</code>	
Job management	Maximum number of running jobs	<code>scheduler.job.pool.size</code>
	Polling period (in milliseconds) for generating events	<code>scheduler.job.monitoring.period</code>
Bulk operations	Number of threads that can simultaneously handle requests concerning bulk operations	<code>bart.bulk.threads</code>
	Number of objects to select within the BART Database for each transaction	<code>bart.bulk.searchFetchSize</code>

¹¹⁹ Application Programming Interface

Category	Description	BART Server Setting
	Number of objects modified by each commit for each database transaction	<code>bart.bulk.modificationFetchSize</code>
Technical Settings		
XML ¹²⁰ validation	Enables/disables the validation of the XML schema	<code>bart.xml_schema_validation</code>
Report handling	Number of report handlers	<code>report.handler.number</code>
	Java class name of the handler	<code>report.handler.<n>.classname</code>
	Absolute path of the configuration file to use when instantiating the report handler	<code>report.handler.<n>.properties</code>
	List of topics (separated by ";") the report handler must subscribe to	<code>report.handler.<n>.topics</code>
Magic number computation	Enables/disables the deduplication operations of CDRs within the BART Database	<code>magic_number.database_deduplicate</code>
	Number of magic numbers to use	<code>magic_number.number</code>
	Name of the CDR to which the magic number <n> should be associated	<code>magic_number.<n>.item_name</code>
	List of fields that must be concatenated to build the magic number	<code>magic_number.<n>.fields</code>
Monitoring	Enables/disables the monitoring capabilities of the BART Database	<code>bart.monitoring</code>
	Maximum number of monitoring listeners	<code>bart.monitoring.clients.max.number</code>

4.3.1.5 Modifying the BART Server Configuration File and Restarting the System

⚠ Caution

An invalid modification of this file can prevent the SAP CC BART Server system from starting, or make it unstable.

Ensure that you understand the consequences of your modification, contact SAP Support for further information.

¹²⁰ eXtended Markup Language

Modify the Configuration File and Restart the System

As a system administrator, to modify the configuration file of the BART Server system, complete the following procedure:

1. Find the `bart.config` file that is located in the `config` folder of the deployed BART Server system (on its dedicated host).
2. In a production SAP system landscape, back up this configuration file.
3. Edit this text file in a text editor.
4. Modify the relevant settings according to your technical or business needs. See [Configuration Settings for BART Server \[page 271\]](#) as a reference.
5. Save your modifications.
6. In a production SAP system landscape, back up the modified configuration file.
7. Restart (stop then start again) the BART Server system and check its successful startup.

⚠ Caution

- If a setting is defined more than once in the file, only the last value is considered by the SAP system.
- If the imported file contains several definitions for a same setting, only the last one is kept.

4.3.1.5.1 Modifying the Ports of the BART Server System

For development or test purpose, you can change the communication ports of the SAP CC BART Server system after installation.

Procedure

1. Edit the local `bart.config` file:
 - `<DRIVE>:\usr\sap\<BART_SYSTEM_ID>\CAB<SAP_INST_NB>\config\bart.config` (Microsoft Windows)
 - `/usr/sap/<BART_SYSTEM_ID>/CAB<SAP_INST_NB>/config/bart.config` (Linux operating systems)
2. Modify the ports that need to be changed
3. Save and close the modified file
4. Restart the BART Server system

4.3.2 Acquisition Sessions and Consolidation

[Keywords \[page 277\]](#)

[Preliminary Notes \[page 277\]](#)

[Description \[page 277\]](#)

[Modifying the Acquisition and Consolidation Settings \[page 277\]](#)

[Acquiring CDRs with the Java API \[page 278\]](#)

[Acquiring CDRs with an IEC \[page 280\]](#)

4.3.2.1 Keywords

CDR¹²¹, acquisition session, consolidation cache

4.3.2.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [Chargeable Items Acquisition](#) section of the [SAP CC 2023 Application Help](#) documentation
- [Chargeable Items Consolidation Process](#) section of the [SAP CC 2023 Application Help](#) documentation

4.3.2.3 Description

As described in the [SAP CC 2023 Application Help](#) documentation, the BART Server system provides acquisition and consolidation features for incoming CDRs¹²², that you can configure using the following procedure

4.3.2.4 Modifying the Acquisition and Consolidation Settings

To configure the acquisition and consolidation operations performed by the BART Server system, refer to the [Modifying the BART Server Configuration File and Restarting the System \[page 275\]](#) section below and modify the following settings of the BART Server:

- `acquisition.session.max.number`, that gives the possibility to specify the maximum number of simultaneous acquisition sessions that can run at a given time
- `acquisition.session.monitoring.period`, that corresponds to the period between 2 generations of "acquisition session status" events. For further information, refer to the [Monitoring and Event Broadcasting \[page 286\]](#) dedicated section below

¹²¹ Call Detail Record (Telecommunications industry), or more generally Consumption Detail Record

¹²² Call Detail Record (Telecommunications industry), or more generally Consumption Detail Record

- `consolidation.cache.enable`, that gives the possibility to enable or disable the consolidation cache used to temporary store additional information related to CDRs¹²³
- `consolidation.cache.size`, that corresponds to the size of the consolidation cache

Note

Chargeable Item Acquisition is also possible with the SAP CC Core Server. Implement your acquisition process by using the `com.highdeal.cnd.message.BatchServiceClient` Java class.

4.3.2.5 Acquiring CDRs with the Java API

Network elements or applications can send CDRs¹²⁴ to the BART Server system and manage the related acquisition sessions. The BART Server then acquires these incoming CDRs, and sends them as chargeable items to the Core Server system. You can develop your own application using the Java APIs¹²⁵ available in the BART¹²⁶ Software Development Kit (SDK) and:

- Implementing the `CDRServiceClient` Java class of the `com.highdeal.bart.message` Java package, in case of communications performed via the Packets over TCP/IP¹²⁷ communication channel
- Implementing the Java classes of the `com.highdeal.bart.hci` Java package, in case of communications performed via the XML¹²⁸ over HTTP¹²⁹ communication channel (HTTP Communication Interface)

For further information, refer to the `com.highdeal.bart.message` and `com.highdeal.bart.hci` Java packages descriptions available in the [Java/XML API Reference \(BART Library\)](#) documentation, that also include the documentation of the concerned XSD fragments.

Example

The following Java snippet defines a client application that communicates using the Packets over TCP/IP communication channel for handling incoming CDRs:

```
CDRServiceClient collector;
try { collector = new CDRServiceClient("BART_HOST",2009); }
catch (Exception e) {
    System.out.println("Cannot initialize BART Collector client -> "+e);
    e.printStackTrace();
}
// Building up the acquisition session
AcquisitionSessionModel session = new AcquisitionSessionModel(...)
try {session = collector.startAcquisitionSession(session);}
catch (InvalidAcquisitionException e)
{System.out.println("InvalidAcquisitionException -> "+e);}
catch (ServerUnavailableException e)
{System.out.println("OperationFailureException -> "+e);}
catch (CommunicationFailureException e)
{System.out.println("OperationFailureException -> "+e);}
```

¹²³ Call Detail Record (Telecommunications industry), or more generally Consumption Detail Record

¹²⁴ Call Detail Record (Telecommunications industry), or more generally Consumption Detail Record

¹²⁵ Application Programming Interface

¹²⁶ Batch Acquisition and Rating Toolset

¹²⁷ Transmission Control Protocol/Internet Protocol

¹²⁸ eXtended Markup Language

¹²⁹ HyperText Transfer Protocol

```

catch (Throwable t) {System.out.println("Throwable -> "+t); }
System.out.println("StartAcquisition() completed");
// Building up some CDRs
Vector cdrs = new Vector();
cdrs.add(new CDRModel(...))
try {result = collector.acquireCDR(cdrs, session);}
catch (InvalidCDRException e) {System.out.println("InvalidCDRException ->
"+e);}
catch (InvalidAcquisitionException e)
{System.out.println("InvalidAcquisitionException -> "+e);}
catch (ServerUnavailableException e)
{System.out.println("OperationFailureException -> "+e);}
catch (CommunicationFailureException e)
{System.out.println("OperationFailureException -> "+e);}
catch (Throwable t) {System.out.println("Throwable -> "+t);}
try {session = collector.stopAcquisitionSession(session);}
catch (InvalidAcquisitionException e)
{System.out.println("InvalidAcquisitionException -> "+e);}
catch (ServerUnavailableException e)
{System.out.println("OperationFailureException -> "+e);}
catch (CommunicationFailureException e)
{System.out.println("OperationFailureException -> "+e);}
catch (Throwable t) {System.out.println("Throwable -> "+t);}
System.out.println("StopAcquisition() completed");

```

❁ Example

The following Java snippet defines a client application that communicates using the XML over HTTP communication channel for handling incoming CDRs:

```

HttpMessageSender sender = ....
StartAcquisitionSessionOp op = new StartAcquisitionSessionOp();
String description = "Test snippet";
String source = "BART Reference";
AcquisitionSessionModel session =
    new AcquisitionSessionModel(source, description,
        AcquisitionSessionModel.ACQUIRE_AND_DEDUPLICATE_MODE);
op.setAcquisitionSession(session);
MessageOriginator originator = new MessageOriginator();
// Setting the name and password of a user granted the right to create a
session in the BART Server
originator.setName("USER");
originator.setAuthentication(new SimpleMessageAuthentication("PASSWORD"));
MessageHeader header = new MessageHeader();
header.setOriginator(originator);
MessageBody body = new MessageBody();
body.addOperation(op);
MessageEnvelope envelope = new MessageEnvelope();
envelope.setBody(body);
envelope.setHeader(header);
try {
    MessageEnvelope result = sender.send(envelope);
    StartAcquisitionSessionResult opRes =
        (StartAcquisitionSessionResult)result.getBody().getResult(0);
    session = opRes.getAcquisitionSession();
}
catch (CommunicationFailureException e)
{System.out.println("CommunicationFailureException: "+e);}
catch (InvalidAcquisitionException e)
{System.out.println("InvalidAcquisitionException -> "+e);}
catch (OperationFailureException e)
{System.out.println("OperationFailureException -> "+e);}
System.out.println("StartAcquisition() completed");

```

4.3.2.6 Acquiring CDRs with an IEC

An IEC (Import/Export Connector) application can send CDRs¹³⁰ to the BART Server system and manage the related acquisition sessions. The BART Server then acquires these CDRs, and sends them as chargeable items to the Core Server system. You can customize this IEC application using some Java tasks that will apply to the concerned data.

For further information, refer to the [Scenarios](#) section of the [CAT Tool](#) online help documentation.

4.3.3 Communication Channels

[Keywords \[page 280\]](#)

[Preliminary Notes \[page 280\]](#)

[Description \[page 281\]](#)

[Modifying the Database Communication Settings \[page 281\]](#)

[Modifying the Core Server Connection Settings \[page 281\]](#)

[Modifying the Communication Settings for Acquisition and Rerating Operations \[page 282\]](#)

[Securing the Communication Channels \[page 282\]](#)

4.3.3.1 Keywords

Monitoring, event, broadcasting, report file handler, UDP¹³¹

4.3.3.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [Chargeable Items Acquisition](#) and [Chargeable Items Rerating](#) features descriptions, available in the [SAP CC 2023 Application Help](#) documentation
- [Enhanced Logging and Tracing Framework](#) section of the [SAP CC 2023 Application Help](#) documentation

¹³⁰ Call Detail Record (Telecommunications industry), or more generally Consumption Detail Record

¹³¹ User Datagram Protocol

4.3.3.3 Description

Communications with the BART Server system rely on different communication channels whose use depend on the concerned elements.

You can use the following procedures to configure the settings related to communication channels and thus fit your specific needs or performance requirements:

- [Modifying the Database Communication Settings \[page 281\]](#)
- [Modifying the Core Server Connection Settings \[page 281\]](#)
- [Modifying the Communication Settings for Acquisition and Rerating Operations \[page 282\]](#)
- [Securing the Communication Channels \[page 282\]](#)

4.3.3.4 Modifying the Database Communication Settings

To communicate with the BART Database, refer to the [Modifying the BART Server Configuration File and Restarting the System \[page 275\]](#) section above and modify the following settings of the BART Server:

- `login`, that corresponds to the name of the BART Database user
- `password`, that corresponds to the password of the specified user
- `database URI`, that corresponds to the URI¹³² of the BART Database
- `sql.failures.log.file.name`, that corresponds to the absolute path of the file used to store information related to non-committed CDR¹³³ modifications in case of BART Database failure. This SQL¹³⁴ failure file is used on startup by the BART Server: to commit these non-committed CDRs

4.3.3.5 Modifying the Core Server Connection Settings

To communicate with the Core Server system, refer to the [Modifying the BART Server Configuration File and Restarting the System \[page 275\]](#) section above and modify the following settings of the BART Server:

- `cc.login`, that corresponds to the name of the technical user used to connect to the Core Server system
- `cc.password`, that corresponds to the password of the specified technical user
- `cc.dispatcher.boot.http.url.list`, that corresponds to a CSV¹³⁵ list of URLs¹³⁶ (including port number) relating to dispatcher instances.

Note

- Use HTTPS¹³⁷ URLs in case of secured communications

¹³² Uniform Resource Identifier

¹³³ Call Detail Record (Telecommunications industry), or more generally Consumption Detail Record

¹³⁴ Structured Query Language

¹³⁵ Comma Separated Value

¹³⁶ Uniform Resource Locator

¹³⁷ HyperText Transfer Protocol Secured

- When the security is activated, the BART Server system cyphers the passwords specified in the `bart.config` configuration file

4.3.3.6 Modifying the Communication Settings for Acquisition and Rerating Operations

To perform acquisition and recharging operations using the BART Server system, it is necessary to configure some settings related to communications performed over the Packets over TCP/IP¹³⁸ communication channel. To modify this configuration, refer to the [BART Server Configuration File \[page 269\]](#) section above and modify the following settings of the BART Server:

- `bart.collector.server.hostname`, that corresponds to the IP address or name of the machine hosting the BART Server system
- `bart.collector.server.port`, that corresponds to the port number of the BART Server collector service
- `bart.collector.server.threads`, that corresponds to the number of threads that can simultaneously handle requests concerning the collector service of the BART Server
- `rerating.pool.size`, that corresponds to the size of the pool dedicated to rerating requests
- `rerating.queue.size`, that corresponds to the number of rerating requests handled by the rerating service

4.3.3.7 Securing the Communication Channels

For security purposes, communication channels used to communicate with the BART Server system can be secured. For further information about the available securing procedures, refer to the dedicated [Securing an SAP CC System Landscape](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation.

4.3.4 Java Virtual Machine

[Keywords \[page 283\]](#)

[Preliminary Notes \[page 283\]](#)

[Description \[page 283\]](#)

¹³⁸ Transmission Control Protocol/Internet Protocol

4.3.4.1 Keywords

JVM¹³⁹ options, virtual machine, memory heap, garbage collection, buffers

4.3.4.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- "JVM¹⁴⁰ option recommendations for SAP Convergent Charging" SAP Note [2006073](#) documentation
- "Generate Java GC Log for SAP Convergent Charging" SAP Note [1950168](#) documentation

4.3.4.3 Description

The architecture of SAP Convergent Charging relies on a set of java-based applications whose execution require a Java Runtime Environment. The BART Server system is a Java process whose execution can be configured to fit specific requirements.

To determine and modify the different JVM¹⁴¹ options for the BART Server system, refer to the [Java Virtual Machine \[page 139\]](#) procedure available for the instances of the Core Server system, and apply the relevant modifications on the startup file of the BART Server system.

4.3.5 Logging and Tracing

[Keywords \[page 283\]](#)

[Preliminary Notes \[page 284\]](#)

[Description \[page 284\]](#)

[Configuration Options \[page 284\]](#)

[Modifying the Logging and Tracing Policy \[page 284\]](#)

4.3.5.1 Keywords

Log, trace, category, severity, domain, threshold, troubleshoot

¹³⁹ Java Virtual Machine

¹⁴⁰ Java Virtual Machine

¹⁴¹ Java Virtual Machine

4.3.5.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [Installing and Launching BART+](#) section of the SAP CC 2023 Installation and Maintenance Guide documentation
- [Enhanced Logging and Tracing Framework](#) section of the SAP CC 2023 Application Help documentation
- [Logging and Tracing Settings](#) group in the SAP CC 2023 System Parameter Reference documentation

4.3.5.3 Description

As described in the [SAP CC 2023 Application Help](#) documentation, SAP Convergent Charging provides logging and tracing features that give the possibility to generate both trace and log messages:

- According to defined levels such as severity, thresholds, domains, categories
- Using different output formats
- In multiple output destinations

Mainly addressed to administrators and support specialists, the generation of these log and trace messages can be configured in order to fit specific needs such as landscape monitoring, performance tracing, issue troubleshooting, and so on. You can use this procedure to configure the logging and tracing capabilities of your BART Server system and thus fit your specific needs.

4.3.5.4 Configuration Options

Logging and tracing features of the BART Server system can be configured to fit specific needs. By default, logging and tracing features are configured to fit a productive landscape, which corresponds to the following configuration:

- The logging feature is enabled, with severity thresholds set to `INFO`
- The tracing feature is enabled, with severity thresholds set to `ERROR`
- Log and trace messages are generated in different files, that are available in [SAP Management Console](#) or [SAP Microsoft Management Console](#) applications
- Generated files are stored both in the console and in the `log` directory of the BART Server system
- File rotation is enabled

4.3.5.5 Modifying the Logging and Tracing Policy

To fit specific needs, you can modify the default configuration of the logging and tracing features.

According to the modifications, you can perform:

- **Immediate** modifications, that are temporary and that can only be performed using the `set` command of the BART+ user interface. For further information, refer to its dedicated online help available in the [SAP CC 2023 Primary Help for BART+](#) documentation
- **Deferred** modifications, that consist in modifying the BART Server configuration file as described in the [Modifying the BART Server Configuration File and Restarting the System \[page 275\]](#) dedicated section

4.3.6 Magic Number Pattern

[Keywords \[page 285\]](#)

[Description \[page 285\]](#)

[Setting Up a Pattern for Magic Numbers \[page 286\]](#)

4.3.6.1 Keywords

Magic number, deduplicate

4.3.6.2 Description

To identify and tag duplicated CDRs¹⁴², the BART Server system manages sequences of magic numbers that are used to uniquely identify a CDR within the BART Database. Each magic number can be made up with the following information:

- The CDR name
- The consumption date, that represents the usage date of the customer service
- The user identifier (USID), that represents the technical identifier of the end customer
- The service identifier (SID), that represents the technical identifier of the customer service
- And all the other data, such as call duration, callee, caller, usage type, service type, and so on... whose availability depends on your business requirements

You can use this procedure to define the pattern for magic numbers used by the BART Server system for each type of CDR, and thus fit your specific needs.

¹⁴² Call Detail Record (Telecommunications industry), or more generally Consumption Detail Record

4.3.6.3 Setting Up a Pattern for Magic Numbers

To set up a pattern for magic numbers used during deduplicating operations, refer to the [Modifying the BART Server Configuration File and Restarting the System \[page 275\]](#) section above and modify the following settings of the BART Server:

- `magic_number.database_deduplicate`, that gives the possibility to enable or disable the CDR¹⁴³ deduplication feature provided by the BART Server system
- `magic_number.number`, that corresponds to the number of magic number patterns to use, which shall be similar to the number of CDR types
- `magic_number.<n>.item_name`, that corresponds to the name of the CDR to which the magic number pattern is associated
- `magic_number.<n>.fields`, that corresponds to the list of fields that must be concatenated to build the magic number, each field corresponding to:
 - A standard property of the associated CDR
 - An additional information available in the associated CDR, that is prefixed by the `item.` string

❁ Example

Considering a CDR named "SAMPLE_CDR" containing:

- The `consumption_date`, `user_id` and `service_id` standard properties
- The "ZZ_USAGE_TYPE" and "ZZ_SERVICE_TYPE" additional information, that are used during batch charging operations to price the usage of the customer service

You can then define the following magic number pattern using the following configuration:

```
magic_number.database_deduplicate=true
magic_number.number=1
magic_number.1.item_name=SAMPLE_CDR
magic_number.1.fields=consumption_date;user_id;service_id;item.ZZ_USAGE_TYPE;i
tem.
ZZ_SERVICE_TYPE
```

4.3.7 Monitoring and Event Broadcasting

[Keywords \[page 287\]](#)

[Preliminary Notes \[page 287\]](#)

[Description \[page 287\]](#)

[Modifying the Monitoring Settings \[page 288\]](#)

[Modifying the Report File Settings \[page 289\]](#)

¹⁴³ Call Detail Record (Telecommunications industry), or more generally Consumption Detail Record

4.3.7.1 Keywords

Monitoring, event, broadcasting, report file handler, UDP¹⁴⁴

4.3.7.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [Chargeable Items Acquisition Process](#) and [Chargeable Items Rerating Processes](#) sections of the SAP CC 2023 Application Help documentation
- [Enhanced Logging and Tracing Framework](#) section of the SAP CC 2023 Application Help documentation

4.3.7.3 Description

The BART Server system can broadcast events through XML¹⁴⁵ messages that are generated according to a defined frequency on the network. The following table contains the list of supported events:

Topic	Event	Description
Acquisition	Acquisition session start	This event is triggered each time a new acquisition session is started through the mediation chain. This event mainly contains the definition of the session being created
	Acquisition session status	This event is triggered at a regular frequency (depending on the BART Server settings) and describes the elapsed time of the session, the number of newly acquired CDRs ¹⁴⁶ and the number of duplicated CDRs
	Acquisition session stop	This event is triggered each time an acquisition session is complete, and contains the total duration of the session, the number of acquired CDRs and the number of duplicated CDRs. When this event is triggered, a report file is generated, containing details about the acquisition session

¹⁴⁴ User Datagram Protocol

¹⁴⁵ eXtended Markup Language

¹⁴⁶ Call Detail Record (Telecommunications industry), or more generally Consumption Detail Record

Topic	Event	Description
Rating	Rating session start	This event is triggered each time a new rating session is started. This event mainly contains the definition of the session being created
	Rating session status	This event is triggered at a regular frequency (depending on the BART Server settings) and describes the elapsed time of the session, the number of rated CDRs and the number of erroneous CDRs
	Rating session stop	This event is triggered each time a rating session is complete, and contains the total duration of the session, the number of rated CDRs and the number of erroneous CDRs. When this event is triggered, a report file is generated, containing details about the rating session
Job Execution	Job start	This event is triggered each time a job execution is started. This event mainly contains the definition of the job being started
	Job status	This event is triggered at a regular frequency (depending on the BART Server settings) and describes the elapsed time of the job execution
	Job stop	This event is triggered each time a job execution is complete. It contains the total duration of the job execution

Mainly addressed to administrators and support specialists, the generation of these events can be configured in order to fit specific needs such as landscape monitoring. You can use this procedure to configure the monitoring and event broadcasting capabilities of your BART Server system and thus fit your specific needs.

4.3.7.4 Modifying the Monitoring Settings

To adapt the BART Server system to specific monitoring needs, refer to the [Modifying the BART Server Configuration File and Restarting the System \[page 275\]](#) section above and modify the following settings of the BART Server:

- `bart.monitoring`, that gives the possibility to enable or disable the monitoring capabilities of BART Server
- `bart.monitoring.clients.max.number`, that corresponds to the maximum number of monitoring listeners
- `acquisition.session.monitoring.period`, that corresponds to the period between 2 generations of “acquisition session status” events described above

- `rating.session.monitoring.period`, that corresponds to the period between 2 generations of “rating session status” events described above
- `scheduler.job.monitoring.period`, that corresponds to the period between 2 generations of “job status” events described above
- `scheduler.job.pool.size`, that gives the possibility to specify the maximum number of jobs that can be active at a given time

4.3.7.5 Modifying the Report File Settings

Everytime a stop event relating to acquisition or rating session is triggered, the BART Server system generates a report file containing detailed information of the completed session.

❁ Example

The following file represents a report related to an acquisition session:

```
CREATION DATE = Tue Nov 15 21:34:10 CET 2005
ACQUISITION DATE = 2005-11-15 21:34:10.717
ACQUISITION DURATION = 24 sec
ACQUISITION SOURCE = location_with_CDRs\source.txt
ACQUISITION DESCRIPTION = Sample acquisition
ACQUISITION MODE= Acquisition and de-duplicate mode
NB CDR ACQUIRED = 961
NB CDR DUPLICATE= 39
NB CDR CONSOLIDATE = 950
STATUS= ended
```

❁ Example

The following file represents a report related to an rating session:

```
CREATION DATE = Tue Nov 29 17:53:32 CET 2005
RATING START DATE = 2005-11-29 17:53:32.303
RATING DURATION = 2 sec
RATING MAX CONSUMPTION DATE = 2005-11-29 17:53:32.287
RATING DESCRIPTION = null
RATING MODE= most mode
NB CDR RATED = 100
NB CDR IN ERROR= 0
STATUS= cleaned
```

The generation of report files relies on dedicated handlers in charge of listening to the adequate stop events. To configure this report file handling mechanism, refer to the [Modifying the BART Server Configuration File and Restarting the System \[page 275\]](#) section above and modify the following settings of the BART Server:

- `report.handler.number`, that gives the possibility to specify a number of file report handlers. Setting this parameter to 0 disables the reporting capabilities of BART Server
- `report.handler.<n>.classname`, that corresponds to the name of the Java class implementing the Event Handler Framework which describes how the events are handled
- `report.handler.<n>.properties`, that corresponds to the absolute path of the configuration file to use when instantiating the report handler

- `report.handler.<n>.topics`, that corresponds to the list of topics (separated by “;”) the handler must subscribe to, considering the following possible topics: acquisition, rating and job

Once report handlers have been configured, you need to modify the configuration files specified in the `report.handler.<n>.properties` settings accordingly, using the execute the following procedure:

1. Edit the relevant configuration file, or create a copy from the default `report.config` file that is located in the config folder of the BART Server instance
2. Modify the following settings according to your needs:
 - `folder`, that corresponds to the absolute path of the folder containing the generated files
 - `filename`, which gives the possibility to specify a prefix for the names of the generated files
 - `fileSuffix`, which gives the possibility to specify a suffix for the names of the generated files

Note

The configuration of the default file handler leads to the generation of report files within the logs folder of the BART Server instance, that are named `report_<DATE>.txt`, where `<DATE>` corresponds to the date of the file generation.

3. Save your modifications

4.3.8 Rating Sessions

[Keywords \[page 290\]](#)

[Preliminary Notes \[page 290\]](#)

[Description \[page 291\]](#)

[Modifying Settings Related to Rating Sessions Management \[page 291\]](#)

4.3.8.1 Keywords

CDR¹⁴⁷, rating session, thread

4.3.8.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [Batch Charging](#) section of the [SAP CC 2023 Application Help](#) documentation
- Description of the offline execution mode of the [Chargeable Items Charging Process](#) available in the [SAP CC 2023 Application Help](#) documentation

¹⁴⁷ Call Detail Record (Telecommunications industry), or more generally Consumption Detail Record

4.3.8.3 Description

As described in the [SAP CC 2023 Application Help](#) documentation, the BART Server system provides a batch rating feature used to rate acquired and consolidated CDRs¹⁴⁸. This feature relies on rating sessions that you can configure using the following procedure.

4.3.8.4 Modifying Settings Related to Rating Sessions Management

To configure the management of rating sessions handled by the BART Server system, refer to the [Modifying the BART Server Configuration File and Restarting the System \[page 275\]](#) section above and modify the following settings of the BART Server:

- `rating.session.max.number`, that gives the possibility to specify the maximum number of simultaneous rating sessions that can run at a given time
- `rating.session.monitoring.period`, that corresponds to the period between 2 generations of “rating session status” events. For further information, refer to the [Monitoring and Event Broadcasting \[page 286\]](#) dedicated section above
- `rating.session.threads`, that corresponds to the maximum number of threads that can be allocated to a given rating session

4.3.9 Rerating Sessions

[Keywords \[page 291\]](#)

[Preliminary Notes \[page 292\]](#)

[Description \[page 292\]](#)

[Modifying Settings Related to Rerating Sessions Management \[page 292\]](#)

4.3.9.1 Keywords

CDR¹⁴⁹, rerating session, thread

¹⁴⁸ Call Detail Record (Telecommunications industry), or more generally Consumption Detail Record

¹⁴⁹ Call Detail Record (Telecommunications industry), or more generally Consumption Detail Record

4.3.9.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [Rerating Operations Driven by the BART Server System](#) description of the [Chargeable Items Rerating](#) feature available in the [SAP CC 2023 Application Help](#) documentation
- [Rerating Driven by the BART Server System](#) description available in the [Chargeable Items Rerating Process](#) section of the [SAP CC 2023 Application Help](#) documentation

4.3.9.3 Description

As described in the [SAP CC 2023 Application Help](#) documentation, the BART Server system can be configured to work in conjunction with the Core Server system during rerating operations. You can use this business process to fix billing and pricing errors. You correct the consumption detail records or the pricing logic and you re-charge these service consumptions. Re-invoicing and re-billing is triggered. This feature relies on rerating sessions that you can configure using, the procedure described in the next section.

4.3.9.4 Modifying Settings Related to Rerating Sessions Management

To configure the management of rerating sessions handled by the BART Server system, refer to the [Modifying the BART Server Configuration File and Restarting the System \[page 275\]](#) section above and modify the following settings of the BART Server:

- `rerating.pool.size`, that gives the possibility to specify the number of threads used to rerate subscriptions
- `rerating.queue.size`, that corresponds to the maximum number of rerating requests that can be queued when rerating subscriptions

⚠ Caution

The `rerating.pool.size` parameter must not exceed the maximum number of concurrent rating sessions defined through the `rating.session.max.number` parameter. Furthermore, the number of rating and rerating sessions running at the same time must also not exceed the maximum number of concurrent rating sessions.

4.3.10 Third-Party Integration

[Keywords \[page 293\]](#)

[Preliminary Notes \[page 293\]](#)

[Description \[page 293\]](#)

[Modifying the SAP SLD Connection Settings \[page 293\]](#)

4.3.10.1 Keywords

SLD¹⁵⁰, payload

4.3.10.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- “Update of SAP System Component Repository in SLD¹⁵¹” SAP Note [669669](#)  documentation

4.3.10.3 Description

The BART Server system can be integrated with third-party applications. You can use the following procedure to configure the settings related to the integration with the SAP System Landscape Directory (SLD) system.

4.3.10.4 Modifying the SAP SLD Connection Settings

To send payload information to the SAP SLD system during the startup sequence of the BART Server system, it is necessary to configure some settings related to the integration with third-party systems. To modify this configuration, refer to the “Modifying the BART Server configuration file” section above and modify the following settings of the BART Server:

- `bart.sld.url`, that corresponds to the IP address or name of the SLD Data Supplier Service in the targeted SAP SLD system, using the following format: `http://<SLD_HOST>:<SLD_PORT>/sld/ds`
- `bart.sld.user`, that corresponds to the name of the SAP SLD user
- `bart.sld.password`, that corresponds to the password of the specified user

4.3.11 BART Database

[Keywords \[page 294\]](#)

¹⁵⁰ System Landscape Directory

¹⁵¹ System Landscape Directory

[Preliminary Notes \[page 294\]](#)

[Description \[page 294\]](#)

[Modifying the Partitioning Settings \[page 294\]](#)

4.3.11.1 Keywords

Database, retention period, partitioning

4.3.11.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [Database partitioning](#) section of the [SAP CC 2023 Application Help](#) documentation
- “BART Database” dedicated online help available in the [SAP CC 2023 Core Database Reference](#) documentation

4.3.11.3 Description

In your SAP Convergent Charging (SAP CC) system landscape, BART Database is the back-end database of the BART Server system to store technical data. In order to improve performance of the running BART Server system regarding the storage of large number of CDRs¹⁵², the BART Database is partitioned using a “Storage partitioning” method.

You can use the following procedures to modify the behavior of the BART Database regarding data partitioning, and thus fit your specific needs.

See [Modifying the Partitioning Settings \[page 294\]](#).

4.3.11.4 Modifying the Partitioning Settings

The storage partitioning of the BART Database can be adapted to improve performance during some operations such as data purging or archiving. According to your RDBMS technology, you can use the following procedures to configure:

- The number of days that CDRs¹⁵³ are kept in the BART Database
- The number of days or partitions that are created in advance

¹⁵² Call Detail Record (Telecommunications industry), or more generally Consumption Detail Record

¹⁵³ Call Detail Record (Telecommunications industry), or more generally Consumption Detail Record

- How partitions are created (automatically or manually)
- The directories used to store tablespaces, filegroups, or segments

[SAP ASE Databases Partitioning \[page 295\]](#)

[Oracle Databases Partitioning \[page 297\]](#)

[MS SQL Server Databases Partitioning \[page 300\]](#)

4.3.11.4.1 SAP ASE Databases Partitioning

The Core Database tables are not partitioned due to the limitations of the Business partitioning mechanism described in the [Overview](#) section of this documentation. The tables of the BART Database use the storage partitioning which is implemented into SQL¹⁵⁴ stored procedures dedicated to the management of these storage partitions. These SQL procedures give the possibility to:

- Create new partitions
- Purge and archive existing partitions
- Import previously archived partitions
- Clean previously imported partitions

After each operation, the record of the [PARTITION_STATUS](#) table related to the concerned partition is updated to inform that this operation successfully ended. The following table lists the possible partitions status according to the performed operation:

Operation	SQL Procedure	Status
Partition creation	MANAGE_NEW_PARTITION	1
Partition archiving	MANAGE_ARCHIVE	2

This procedure takes into account 4 parameters:

- **destinationDirectory**, which corresponds to file system directory in which partitions will be stored as file
- **checkCDR**, which corresponds to a Boolean (0=False, 1=True) used to ensure that no unrated CDR¹⁵⁵ (whose status is 0,1 or 7) exist in the [CDR](#) table before performing the purge operation
- **force**, which corresponds to a Boolean (0=False, 1=True) used to stop the operation or continue with a warning
- **purgeWithNoArchive**, which corresponds to a Boolean (0=False, 1=True) used to disable the archiving

¹⁵⁴ Structured Query Language

¹⁵⁵ Call Detail Record (Telecommunications industry), or more generally Consumption Detail Record

Operation	SQL Procedure	Status
Partition import	IMPORT_ARCHIVE This procedure takes into account 3 parameters: <ul style="list-style-type: none"> • destinationDirectory, which corresponds to the file system directory containing the partitions to import • fromDate, the date of the first partition to import • numberOfDays (default 1), the number of partition to import 	3

Note

These dates are String values which respect a "YYYYMMDD" format

Note

For further information about these SQL procedures, refer to the [SAP CC 2023 Administration and Operation Guide](#) documentation.

4.3.11.4.1.1 Partitioning Settings

The partitioning mechanism of a BART Database running under a Sybase ASE RDBMS¹⁵⁶ relies on the following SQL¹⁵⁷ procedures:

Procedure	Description
CONFIGURE	This procedure gives DBA ¹⁵⁸ the possibility to configure the global partitioning policy by filling in the PARTITION_PURGE table with the parameters specified as arguments
ADD_SEGMENT	This procedure gives DBA the possibility to create a new segment
REMOVE_SEGMENT	This procedure gives DBA the possibility to remove a segment which is no more used for storing new partitions

¹⁵⁶ Relational Database Management System

¹⁵⁷ Structured Query Language

¹⁵⁸ DataBase Administrator

Procedure	Description
MANAGE_NEW_PARTITION	This procedure gives DBA the possibility to manually trigger the creation of new partitions, that are only created if needed.

Note

To create partitions automatically, you can create a job within Sybase ASE that calls the MANAGE_NEW_PARTITION procedure

To modify the default configuration of the partitioning mechanism, you must execute these procedures specifying arguments that correspond to your needs. The following table contains the list of available arguments you can use:

Procedure	Argument	Description
CONFIGURE	<code>partitionDays</code> (integer)	The number of days CDRs are kept in the BART database. Set by default to 40 days, this retention period cannot exceed 70 days.
	<code>partitionAdvanceDays</code> (integer)	The number of partitions to create in advance
ADD_SEGMENT	<code>segment</code> (varchar)	Name of the segment to add, with a maximum of 256 characters
REMOVE_SEGMENT	<code>segment</code> (varchar)	Name of the segment to remove
MANAGE_NEW_PARTITION	None	None

4.3.11.4.2 Oracle Databases Partitioning

The Core Database tables are partitioned with the business partitioning mechanism described in the [Overview](#) section of this documentation. The tables of the BART Database use the storage partitioning which is implemented into SQL¹⁵⁹ stored procedures dedicated to the management of these storage partitions. These SQL procedures give the possibility to:

- Create new partitions
- Purge and archive existing partitions
- Import previously archived partitions
- Clean previously imported partitions

After each operation, the record of the [PARTITION_STATUS](#) table related to the concerned partition is updated to inform that this operation successfully ended. The following table lists the possible partitions status according to the performed operation:

¹⁵⁹ Structured Query Language

Operation	SQL Procedure	Status
Partition creation	MANAGE_NEW_PARTITION	1
Partition archiving	MANAGE_ARCHIVE This procedure takes into account 3 parameters: <ul style="list-style-type: none"> • archiveDatabase, which corresponds to the name of the database to use to transfer data • checkCDR, which corresponds to a Boolean (0=False, 1=True) used to ensure that no unrated CDR¹⁶⁰ (whose status is 0,1 or 7) exist in the <i>CDR</i> table before performing the purge operation • force, which corresponds to a Boolean (0=False, 1=True) used to stop the operation or continue with a warning 	2
Partition purge (and cleaning)	MANAGE_PURGE This procedure removes from the BART Database all partitions of the <i>CDR</i> table whose partition status is 2 or 6.	3
Partition import	IMPORT_ARCHIVE This procedure takes into account: <ul style="list-style-type: none"> • 2 dates which delimit an interval used to isolate the <i>CDR</i> table records according to the consumption date • The name of the database to use to transfer data 	6

Note

These dates are String values which respect a "YYYYMMDD" format

Note

For further information about these SQL procedures, refer to the [SAP CC 2023 Administration and Operation Guide](#) documentation.

4.3.11.4.2.1 Partitioning Settings

The partitioning mechanism of a BART Database running under an Oracle RDBMS¹⁶¹ relies on the following SQL¹⁶² procedures:

¹⁶⁰ Call Detail Record (Telecommunications industry), or more generally Consumption Detail Record

¹⁶¹ Relational Database Management System

¹⁶² Structured Query Language

Procedure	Description
<code>BART_ARCHIVE_PURGE.CONFIGURE</code>	This procedure gives DBA ¹⁶³ the possibility to configure the global partitioning policy, by filling in the <code>PARTITION_PURGE</code> table with the parameters specified as arguments
<code>BART_ARCHIVE_PURGE.ADD_DIRECTORY</code>	This procedure gives DBA the possibility to create a new directory, resize an existing directory or reactivate a removed directory
<div style="border: 1px solid #ccc; background-color: #f0f0f0; padding: 10px;"> <p>Note</p> <ul style="list-style-type: none"> Each directory name is unique and is respect the "BART_yyyymmdd" pattern, where yyyymmdd is a date You must create one directory at least at installation Resize the directory in case the initial size is exceeded </div>	
<code>BART_ARCHIVE_PURGE.CONFIGURE_TABLESPACE</code>	This procedure gives DBA the possibility to configure tablespace names
<code>BART_ARCHIVE_PURGE.REMOVE_DIRECTORY</code>	This procedure gives DBA the possibility to remove a directory which is no more used in order to store new tablespaces
<code>BART_ARCHIVE_PURGE.MANAGE_NEW_PARTITION</code>	This procedure gives DBA the possibility to manually trigger the creation of new partitions, that are only created if needed
<code>BART_ARCHIVE_PURGE.START_SCHEDULER</code>	This procedure activates the Oracle database scheduler for calling each day (at 2:00 AM), the <code>MANAGE_NEW_PARTITION</code> procedure
<code>BART_ARCHIVE_PURGE.STOP_SCHEDULER</code>	This procedure stops the Oracle database scheduler used to execute the <code>MANAGE_NEW_PARTITION</code> regularly
<code>BART_ARCHIVE_PURGE.RUN_SCHEDULER</code>	This procedure is equivalent to the <code>START_SCHEDULER</code> procedure except that the first execution of the <code>MANAGE_NEW_PARTITION</code> procedure is immediate

To modify the default configuration of the partitioning mechanism, you must execute these procedures specifying arguments that correspond to your needs. The following table contains the list of available arguments you can use:

Procedure	Argument	Description
<code>BART_ARCHIVE_PURGE.CONFIGURE</code>	<code>partitionDays</code> (integer)	The number of days CDRs ¹⁶⁴ are kept in the BART Database. Set by default to 40 days, this retention period cannot exceed 70 days
	<code>partitionAdvanceDays</code> (integer)	The number of partitions to create in advance

¹⁶³ DataBase Administrator

¹⁶⁴ Call Detail Record (Telecommunications industry), or more generally Consumption Detail Record

Procedure	Argument	Description
BART_ARCHIVE_PURGE.ADD_DIRECTORY	directory (varchar)	Path of the directory to create, with a maximum of 2,000 characters
	fileSize (varchar)	Initial size of the directory to create. Set by default to 1GB, this size cannot exceed 128GB
	extendSize (varchar)	The extension size of the directory, automatically handled by Oracle when necessary, and set by default to 250MB
BART_ARCHIVE_PURGE.CONFIGURE_TABLESPACE	tablespaceprefix (varchar)	The prefix of the tablespace name, set by default to "BART_"
	tablespacesuffix (varchar)	The suffix of the tablespace name
	datafilesuffix (varchar)	The suffix of the file containing the tablespace, set by default to ".dat"
BART_ARCHIVE_PURGE.REMOVE_DIRECTORY	directory (varchar)	The name of the directory to remove
BART_ARCHIVE_PURGE.MANAGE_NEW_PARTITION	None	None
BART_ARCHIVE_PURGE.START_SCHEDULER	None	None
BART_ARCHIVE_PURGE.STOP_SCHEDULER	None	None
BART_ARCHIVE_PURGE.RUN_SCHEDULER	None	None

4.3.11.4.3 MS SQL Server Databases Partitioning

The Core Database tables are not partitioned due to the limitations of the Business partitioning mechanism described in the [Overview](#) section of this documentation. The tables of the BART Database use the storage partitioning which is implemented into SQL¹⁶⁵ stored procedures dedicated to the management of these storage partitions. These SQL procedures give the possibility to:

- Create new partitions
- Purge and archive existing partitions
- Import previously archived partitions
- Clean previously imported partitions

After each operation, the record of the [PARTITION_STATUS](#) table related to the concerned partition is updated to inform that this operation successfully ended. The following table lists the possible partitions status according to the performed operation:

¹⁶⁵ Structured Query Language

Operation	SQL Procedure	Status
Partition creation	MANAGE_NEW_PARTITION	1
Partition archiving	MANAGE_ARCHIVE This procedure takes into account 3 parameters: <ul style="list-style-type: none"> • archiveDatabase, which corresponds to the name of the database to use to transfer data • checkCDR, which corresponds to a Boolean (0=False, 1=True) used to ensure that no unrated CDR¹⁶⁶ (whose status is 0,1 or 7) exist in the <i>CDR</i> table before performing the purge operation • force, which corresponds to a Boolean (0=False, 1=True) used to stop the operation or continue with a warning 	2
Partition purge (and cleaning)	MANAGE_PURGE This procedure removes from the BART Database all partitions of the <i>CDR</i> table whose partition status is 2 or 6.	3
Partition import	IMPORT_ARCHIVE This procedure takes into account: <ul style="list-style-type: none"> • 2 dates which delimit an interval used to isolate the <i>CDR</i> table records according to the consumption date • The name of the database to use to transfer data <div style="border: 1px solid #ccc; background-color: #f0f0f0; padding: 5px; margin-top: 10px;"> <p>Note</p> <p>These dates are String values which respect a "YYYYMMDD" format</p> </div>	6

Note

For further information about these SQL procedures, refer to the [SAP CC 2023 Administration and Operation Guide](#) documentation.

4.3.11.4.3.1 Partitioning Settings

The partitioning mechanism of a BART Database running under a Microsoft SQL¹⁶⁷ Server RDBMS¹⁶⁸ relies on the following SQL procedures:

Procedure	Description
CONFIGURE	This procedure gives DBA ¹⁶⁹ the possibility to configure the global partitioning policy by filling in the PARTITION_PURGE table with the parameters specified as arguments

¹⁶⁶ Call Detail Record (Telecommunications industry), or more generally Consumption Detail Record

¹⁶⁷ Structured Query Language

¹⁶⁸ Relational Database Management System

Procedure	Description
ADD_DIRECTORY	<p>This procedure gives DBA the possibility to create a new directory, resize an existing directory or reactivate a removed directory for storing filegroups</p> <div style="border: 1px solid #ccc; background-color: #f9f9f9; padding: 10px;"> <p>Note</p> <ul style="list-style-type: none"> Each directory name is unique and is respect the "BART_yyyymmdd" pattern, where yyyymmdd is a date You must create one directory at least at installation </div>
REMOVE_DIRECTORY	<p>This procedure gives DBA the possibility to remove a directory which is no more used in order to store new filegroups</p>
MANAGE_NEW_PARTITION	<p>This procedure gives DBA the possibility to manually trigger the creation of new partitions, that are only created if needed</p> <div style="border: 1px solid #ccc; background-color: #f9f9f9; padding: 10px;"> <p>Note</p> <p>To create partitions automatically, you can create a job within SQL Server that calls the MANAGE_NEW_PARTITION procedure</p> </div>

To modify the default configuration of the partitioning mechanism, you must execute these procedures specifying arguments that correspond to your needs. The following table contains the list of available arguments you can use:

Procedure	Argument	Description
CONFIGURE	partitionDays (integer)	The number of days CDRs ¹⁷⁰ are kept in the BART Database. Set by default to 40 days, this retention period cannot exceed 70 days.
	partitionAdvanceDays (integer)	The number of partitions to create in advance
ADD_DIRECTORY	directory (varchar)	Path of the directory to create, with a maximum of 2.000 characters
	fileSize (varchar)	Initial size of the directory to create, set by default to 1GB
	extendSize (varchar)	The extension size of the directory, automatically handled by SQL Server when necessary, and set by default to 250MB
REMOVE_DIRECTORY	directory (varchar)	The name of the directory to remove

¹⁶⁹ DataBase Administrator

¹⁷⁰ Call Detail Record (Telecommunications industry), or more generally Consumption Detail Record

Procedure	Argument	Description
MANAGE_NEW_PARTITION	None	None

4.4 Configuring the Diameter Server System

⚠ Caution

From SAP Convergent Charging SP 4, there is no further planned enhancements to the Diameter Server component. For further information, refer to SAP Note [2792189](#).

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[AVP Dictionary \[page 308\]](#)

[Communication Channels \[page 309\]](#)

[Java Virtual Machine \[page 310\]](#)

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4.4.1 Diameter Server Configuration File

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[Description \[page 304\]](#)

[Configuration Settings for Diameter Server \[page 305\]](#)

[Modifying the Diameter Server Configuration File \[page 308\]](#)

4.4.1.1 Keywords

serverConfig.xml

4.4.1.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [Starting and Stopping the Server Systems](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation

4.4.1.3 Description

As described in the [SAP CC 2023 Installation and Maintenance Guide](#) documentation, the configuration of the Diameter Server system is located in the `serverConfig.xml` file:

- This configuration file is available in the `config` folder of the Diameter Server system already deployed on a dedicated host in your SAP system landscape.
- The file content is grouped upon the following sections:
 - License/keys settings
 - Diameter stack
 - Exchange capability information
 - Supported applications
 - Supported vendors
 - Peer discovery policy
 - Incoming messages handling
 - Routing table to handle proxiable requests
 - Security settings
 - Charging stack
 - Logging/tracing settings
 - Third-party integration (with SAP SLD)
 - TLS encryption (protocols, cypher suites)

The content and sections change and depend on your installed software version. Check the file to see the details.

- The XML format is basic and allows defining the necessary configuration settings for the SAP system. As the root XML element, the `properties` XML element contains the complete configuration. For a single-value setting, the XML element named `entry` is used with the XML attributes (`key` and `value`). For multivalue settings, the XML element `entry` with no XML attributes must be used. Sequences of `properties` XML elements encapsulate the different values specified by `entry` XML elements with the XML attributes (`key` and `value`).

❖ Example

```
For example: <entry key="TLSEnabledProtocols"><properties><entry key="TLSEnabledProtocol" value="TLSv1.1" /></properties><properties><entry key="TLSEnabledProtocol" value="TLSv1.2" /></properties></entry>
```


You can use this generic procedure to configure some settings of the Diameter Server configuration and thus fit your specific needs.

- [Modifying the Diameter Server Configuration File \[page 308\]](#)
- [Configuration Settings for Diameter Server \[page 305\]](#)

4.4.1.4 Configuration Settings for Diameter Server

The following table contains the list of settings that can be configured within the configuration file of the Diameter Server system, including recommendations regarding their modification:

Setting and Category	Description	SAP CC Settings	Configurable
License Management			
LicenseKey	License key of the OpenBlox Java Diameter Stack used by the Diameter Server system	<input type="checkbox"/>	<input type="radio"/>
Diameter Stack			
URI	IP address or name of the machine hosting the Diameter Server system	<input type="checkbox"/>	<input type="radio"/>
StackType	Peer mode of the Diameter Server system	<input type="checkbox"/>	<input type="checkbox"/>
MajorVersion	Major version of the Diameter Base Protocol	<input type="checkbox"/>	<input type="checkbox"/>
MinorVersion	Minor version of the Diameter Base Protocol	<input type="checkbox"/>	<input type="checkbox"/>
Exchange Capability Information			
Realm	Domain name, used to determine whether messages can be satisfied locally or routed to another domain	<input type="checkbox"/>	<input type="checkbox"/>
VendorId	Identifier of the Diameter vendor	<input type="checkbox"/>	<input type="checkbox"/>
ProductName	Product name of the Diameter Server system	<input type="checkbox"/>	<input type="checkbox"/>
FirmwareRevision	Firmware revision, used to inform Diameter peers	<input type="checkbox"/>	<input type="checkbox"/>
Supported Applications			
ApplicationId	Identifier used to determine which Diameter application supports the messages	<input type="checkbox"/>	<input type="checkbox"/>
ApplicationIdType	Type of application	<input type="checkbox"/>	<input type="checkbox"/>
Supported Vendors			
SupportedVendorID	Identifier used in CER ¹⁷¹ and CEA ¹⁷² messages to inform peers that the sender supports the vendor-specific AVPs ¹⁷³ defined by this identified vendor	<input type="checkbox"/>	<input type="checkbox"/>
Peer Discovery Policy			

¹⁷¹ Capabilities-Exchanging-Request

¹⁷² Capabilities-Exchanging-Answer

¹⁷³ Attribute-Value Pair

Setting and Category	Description	SAP CC Settings	Configurable
TWTimer	Watchdog Timer (in seconds) used to control the frequency of DWR ¹⁷⁴ messages. A small value fasters the detection of a peer failure, but increases the number of generated messages	<input type="checkbox"/>	◇
AcceptUnknownPeers	Accept or refuse CERs from unknown peers	<input type="checkbox"/>	◇
CheckProtocolErrors	Enable or disable the check of protocol errors	<input type="checkbox"/>	◇
Incoming Messages Handling			
OpenedSessionsMaximum	Maximum number of opened sessions	<input type="checkbox"/>	◇
StateEventPoolCoreSize		<input type="checkbox"/>	◇
StateEventPoolMaximumSize		<input type="checkbox"/>	◇
StateEventHandlerQueueCapacity		<input type="checkbox"/>	◇
StateEventPoolKeepAliveTime		<input type="checkbox"/>	◇
Routing Table to Handle Proxiable Requests			
RealmName	Primary key of the realm-based routing table	<input type="checkbox"/>	<input type="checkbox"/>
RealmApplicationId	Identifier of application, used as secondary key in routing table lookups	<input type="checkbox"/>	<input type="checkbox"/>
RealmLocalAction	Handling method for messages. The default value is set to: LOCAL Possible values are: LOCAL, RELAY, PROXY, or REDIRECT	<input type="checkbox"/>	<input type="checkbox"/>
Logging and Tracing			
RootLoggerLevel	Severity threshold for logs, that is not modifiable and thus does not require a restart of the Diameter Server system. The default value is set to: INFO Possible values are: OFF, SEVERE, WARNING, INFO, CONFIG, FINE, FINER, FINEST, or ALL	<input type="checkbox"/>	■
Security Settings			
SecurityId	Identifier used during TLS negotiation between diameter peers	<input type="checkbox"/>	■
TLSKeyStoreFile	Name of the file as keystore and containing private keys and certificates related to the Diameter Server system	<input type="checkbox"/>	■

¹⁷⁴ Device-Watchdog-Request

Setting and Category	Description	SAP CC Settings	Configurable
TLSTrustStoreFile	Name of the file used as truststore and containing private keys and certificates trusted by the Diameter Server system	<input type="checkbox"/>	<input checked="" type="checkbox"/>
TLSTrustStorePassword	Passphrase of the keystore	<input type="checkbox"/>	<input checked="" type="checkbox"/>
TLSTrustStorePassword	Passphrase of the truststore	<input type="checkbox"/>	<input checked="" type="checkbox"/>
TLSEnabledProtocol	List of TLS protocols	<input type="checkbox"/>	<input checked="" type="checkbox"/>
TLSEnabledCipherSuite	List of cypher suites	<input type="checkbox"/>	<input checked="" type="checkbox"/>
Charging Stack			
OCSHostName	IP address or name of the machine hosting the Core Server system	<input checked="" type="checkbox"/>	<input type="checkbox"/>
OCSPort	External port of the dispatcher instance of the Core Server system that is used by the Diameter Server system to communicate over the Packets over TCP/IP ¹⁷⁵ communication channel	<input checked="" type="checkbox"/>	<input type="checkbox"/>
OCSUser	Name of the technical user used to connect to the Core Server system	<input checked="" type="checkbox"/>	<input type="checkbox"/>
OCSPassword	Password of the specified technical user	<input checked="" type="checkbox"/>	<input type="checkbox"/>
OCSSecured	Enable or disable the securing of communications with the Core Server system	<input checked="" type="checkbox"/>	<input type="checkbox"/>
OperationTimeout	Timeout (in milliseconds) for charging requests	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
<div style="border: 1px solid #ccc; background-color: #f9f9f9; padding: 10px; margin: 10px 0;"> <p>Note</p> <p>Set by default to 1000ms, SAP SE recommends that you modify this value according to your business requirement.</p> </div>			
Third-Party Integration			
SLDURL	URL of the targeted SAP SLD system	<input checked="" type="checkbox"/>	<input type="checkbox"/>
SLDUser	Name of the SAP SLD user	<input checked="" type="checkbox"/>	<input type="checkbox"/>
SLDPassword	Password of the SAP SLD user	<input checked="" type="checkbox"/>	<input type="checkbox"/>

Yes
 No
 Yes, also during the installation
 Not recommended

¹⁷⁵ Transmission Control Protocol/Internet Protocol

4.4.1.5 Modifying the Diameter Server Configuration File

As a system administrator, to modify the configuration file of the Diameter Server system, execute the following procedure:

1. Stop the running Diameter Server system.
2. Find the `serverConfig.xml` file. It is located in the `config` folder of the deployed Diameter Server system (on its dedicated host).
3. In a production SAP system landscape, back up this configuration file.
4. Edit this XML file in a text editor for example.
5. Modify the relevant settings according to your technical or business needs. See [Configuration Settings for Diameter Server \[page 305\]](#) as a reference.
6. Save your modifications.
7. In a production SAP system landscape, back up the modified configuration file.
8. Start the Diameter Server system again and check its successful startup.

4.4.2 AVP Dictionary

[Keywords \[page 308\]](#)

[Preliminary Notes \[page 308\]](#)

[Description \[page 309\]](#)

[Modifying the AVP Dictionary \[page 309\]](#)

4.4.2.1 Keywords

AVP¹⁷⁶ dictionary, XML¹⁷⁷, XSD

4.4.2.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

¹⁷⁶ Attribute-Value Pair

¹⁷⁷ eXtended Markup Language

- [AVP Dictionary](#) section of the [SAP CC 2023 Application Help](#)

4.4.2.3 Description

The Diameter Server system used an AVP¹⁷⁸ dictionary that is used to store all the AVP descriptions related to specific vendor network elements, that are not natively recognized by the Diameter Stack provided by the Traffix Systems company, and must thus be defined and described to be used during CCRs¹⁷⁹ and CCAs¹⁸⁰ mapping operations. You can use the following procedure to modify this configuration file and thus fit your specific business needs.

⚠ Caution

The AVP dictionary is designed and customized by the project team during the implementation project phase. SAP SE recommends that system administrators do not change these settings.

4.4.2.4 Modifying the AVP Dictionary

To modify the AVP¹⁸¹ dictionary of the Diameter Server system, execute the following procedure:

1. Stop the Diameter Server system
2. Backup the `avpDictionary.xml` file, that is located in the config folder of the Diameter Server instance
3. Edit the `avpDictionary.xml` file
4. Modify the relevant settings according to your needs
5. Save your modifications
6. Restart the Diameter Server system

4.4.3 Communication Channels

[Keywords \[page 310\]](#)

[Preliminary Notes \[page 310\]](#)

[Description \[page 310\]](#)

[Securing the Communication Channels \[page 310\]](#)

¹⁷⁸ Attribute-Value Pair

¹⁷⁹ Credit Control Request

¹⁸⁰ Credit Control Answer

¹⁸¹ Attribute-Value Pair

4.4.3.1 Keywords

Communication channels, securing

4.4.3.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- “Communication Channel Security” section of the [SAP CC 2023 Security Guide](#) documentation
- [Securing an SAP CC System Landscape](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation

4.4.3.3 Description

Communications with the BART Server system rely on different communication channels whose use depend on the concerned elements. You can use the following procedure to secure these communication channels and thus fit your specific needs or performance requirements.

4.4.3.4 Securing the Communication Channels

For security purposes, all communication channels (except the Messages over UDP¹⁸² one) used to communicate within your SAP CC landscape can be secured. For further information about the available securing procedures, refer to the dedicated [Securing an SAP CC System Landscape](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation.

4.4.4 Java Virtual Machine

[Keywords \[page 311\]](#)

[Preliminary Notes \[page 311\]](#)

[Description \[page 311\]](#)

¹⁸² User Datagram Protocol

4.4.4.1 Keywords

JVM¹⁸³ options, virtual machine, memory heap, garbage collection, buffers

4.4.4.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- "JVM option recommendations for SAP Convergent Charging" SAP Note [2006073](#) documentation
- "Generate Java GC Log for SAP Convergent Charging" SAP Note [1950168](#) documentation

4.4.4.3 Description

The architecture of SAP Convergent Charging relies on a set of java-based applications whose execution require a Java Runtime Environment. The Diameter Server system is a Java process whose execution can be configured to fit specific requirements. To determine and modify the different JVM¹⁸⁴ options for the Diameter Server system, refer to the "Java Virtual Machine" procedure available for the instances of the Core Server system, and apply the relevant modifications on the startup file of the Diameter Server system.

4.4.5 Logging and Tracing

[Keywords \[page 311\]](#)

[Preliminary Notes \[page 312\]](#)

[Description \[page 312\]](#)

[Configuration Options \[page 312\]](#)

[Modifying the Logging Settings of the Diameter Server \[page 314\]](#)

4.4.5.1 Keywords

Logging.properties, log, trace, category, severity, domain, threshold, troubleshoot

¹⁸³ Java Virtual Machine

¹⁸⁴ Java Virtual Machine

4.4.5.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [Starting and Stopping the Server Systems](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation

4.4.5.3 Description

As described in the [SAP CC 2023 Application Help](#) documentation, SAP Convergent Charging provides logging and tracing features that give the possibility to generate both trace and log messages:

- According to defined levels such as severity, thresholds, domains, categories
- Using different output formats
- In multiple output destinations

Mainly addressed to administrators and support specialists, the generation of these log and trace messages can be configured in order to fit specific needs such as landscape monitoring, performance tracing, issue troubleshooting, and so on. You can use this procedure to configure the logging and tracing capabilities of the Diameter Server system, that rely on the Java native logging framework whose configuration is located in the `logging.properties` file:

- That is available in the `config` folder of the Diameter Server instance
- Whose content is grouped upon the following sections:
 - Handlers definition
 - Handlers configuration
 - Default log level

4.4.5.4 Configuration Options

The following table contains the list of settings related to logging capabilities of the Diameter Server system that you can configure to fit your specific needs:

Settings	Description
Handlers Definition	
<code>handlers</code>	CSV (space delimited) list of handlers' class-names for the root logger, set by default to: <code>java.util.logging.ConsoleHandler</code> <code>java.util.logging.FileHandler</code>
Default Log Level	

Settings	Description
<code>.level</code>	<p>Default log level for every logger whose level is not explicitly defined, set by default to: CONFIG</p> <p>Possible values are: OFF, SEVERE, WARNING, INFO, CONFIG, FINE, FINER, FINEST or ALL</p>
Console Handler Configuration	
<code>java.util.logging.ConsoleHandler.level</code>	<p>Log level for the console output, set by default to: ALL</p> <p>Possible values are: OFF, SEVERE, WARNING, INFO, CONFIG, FINE, FINER, FINEST or ALL</p>
<code>java.util.logging.ConsoleHandler.formatter</code>	<p>Classname of the string formatter used for texts printed into the console</p>
File Handler Configuration	
<code>java.util.logging.FileHandler.level</code>	<p>Log level for the console output, set by default to: ALL</p> <p>Possible values are: OFF, SEVERE, WARNING, INFO, CONFIG, FINE, FINER, FINEST or ALL</p>
<code>java.util.logging.FileHandler.formatter</code>	<p>Classname of the string formatter used for texts printed into the console</p>
<code>java.util.logging.FileHandler.pattern</code>	<p>Pattern used to generate the output file name, that consists of a string including the following components which are replaced at runtime:</p> <ul style="list-style-type: none"> • <code>"/</code>, that represents the local pathname separator • <code>%t</code>, that represents the system temporary directory • <code>%h</code>, that represents the value of the <code>"user.home"</code> system property • <code>%g</code>, that represents the generation number used to distinguish rotated logs. If no <code>%g</code> field has been specified and if the file count is greater than one, the generation number will be added to the end of the generated filename, after a dot • <code>%u</code>, that represents a unique number used to resolve conflicts • <code>%%</code>, that can be used to translate a single percent sign <code>%</code>
<code>java.util.logging.FileHandler.limit</code>	<p>Approximate maximum amount to write (in bytes) to a given file. Setting this system parameter to 0 means that the written amount is not limited</p>
<code>java.util.logging.FileHandler.count</code>	<p>Number of output files available for the rotation cycle</p>
<code>java.util.logging.FileHandler.append</code>	<p>Specifies whether the FileHandler should append content onto an existing output file, or not</p>

4.4.5.5 Modifying the Logging Settings of the Diameter Server

To modify the logging settings of the Diameter Server system, execute the following procedure:

1. Stop the Diameter Server system
2. Backup the `logging.properties` file
3. Edit the `logging.properties` file, that is located in the config folder of the Diameter Server instance
4. Modify the relevant settings according to your needs
5. Save your modifications
6. Restart the Diameter Server system

4.4.6 Multiple Services Credit-Control

[Keywords \[page 314\]](#)

[Preliminary Notes \[page 314\]](#)

[Description \[page 314\]](#)

[Implementing MSCC \[page 315\]](#)

4.4.6.1 Keywords

MSCC¹⁸⁵, service dictionary, XML¹⁸⁶, XSD

4.4.6.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [Service Dictionary](#) section of the [SAP CC 2023 Application Help](#) documentation
- [Service Dictionary \[page 316\]](#) section of this documentation

4.4.6.3 Description

As described in the [SAP CC 2023 Application Help](#) documentation, the service dictionary gives the possibility to register multiple services with different mappings, and thus implement the multiple-services credit control

¹⁸⁵ Multiple-Services Credit Control

¹⁸⁶ eXtended Markup Language

feature within the Diameter Server system. You can use the following procedure to modify the relevant settings of the service dictionary and thus fit your specific business needs regarding MSCC¹⁸⁷.

4.4.6.4 Implementing MSCC

The following table contains the list of AVPs¹⁸⁸ that rely to the MSCC¹⁸⁹ support:

XML ¹⁹⁰ Element	Description
<code>msscServiceKeyDesc</code>	Determines which mapping must be applied to the CCR ¹⁹¹
<code>msscServiceDesc</code>	Defines the mapping that must be used to transform CCRs into charging requests. Mandatory to activate the support of MSCC, this element contains one <code>msscMappingDesc</code> sub-element
<code>msscMappingDesc</code>	Indicates where the following sub-elements can be found in the CCR: <ul style="list-style-type: none"> Mandatory sub-elements: <ul style="list-style-type: none"> <code>eventNameDesc</code>, that corresponds to the name of the chargeable item class <code>reservationIdDesc</code>, that corresponds to the identifier of the reservation <code>unitPropertyDesc</code>, that corresponds to the unit property which is used to identify the property to inverse in case of inverse rating Optional sub-elements: <ul style="list-style-type: none"> <code>infoPropertyDesc</code>, that corresponds to a user property to map, when required. You can define a default value for this property in case this property is not available in the MSCC AVP¹⁹²

To activate the support of MSCC, you must thus execute the [Modifying the Service Dictionary \[page 316\]](#) procedure and add at least one `msscServiceDesc` element to the service dictionary.

Note

- If a CCR contains several MSCC AVPs but no `msscServiceDesc` element is defined in the service dictionary, a `DIAMETER_UNABLE_TO_COMPLY` error will be sent
- The `serviceDictionaryMSCC.xml` is provided in the examples folder of the Diameter Server instance as an example including MSCC elements. In this example, the "Rating-Group" AVP is used as key for the mapping and as reservation ID.

¹⁸⁷ Multiple-Services Credit Control

¹⁸⁸ Attribute-Value Pair

¹⁸⁹ Multiple-Services Credit Control

¹⁹⁰ eXtended Markup Language

¹⁹¹ Credit Control Request

¹⁹² Attribute-Value Pair

4.4.7 Service Dictionary

[Keywords \[page 316\]](#)

[Preliminary Notes \[page 316\]](#)

[Description \[page 316\]](#)

[Modifying the Service Dictionary \[page 316\]](#)

4.4.7.1 Keywords

Service dictionary, AVP¹⁹³, XML¹⁹⁴, XSD

4.4.7.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [Service Dictionary](#) section of the [SAP CC 2023 Application Help](#) documentation

4.4.7.3 Description

The Diameter Server system used a service dictionary that is used to store all the descriptions of each managed service, including the AVP¹⁹⁵ mapping between the Diameter messages and the charging operation messages exchanged between the Diameter Server and Core Server systems. You can use the following procedure to modify this configuration file and thus fit your specific business needs.

⚠ Caution

The service dictionary is designed and customized by the project team during the implementation project phase. SAP SE recommends that system administrators do not change these settings.

4.4.7.4 Modifying the Service Dictionary

To modify the service dictionary of the Diameter Server system, execute the following procedure:

¹⁹³ Attribute-Value Pair

¹⁹⁴ eXtended Markup Language

¹⁹⁵ Attribute-Value Pair

1. Stop the Diameter Server system
2. Backup the `serviceDictionary.xml` file, that is located in the config folder of the Diameter Server instance
3. Edit the `serviceDictionary.xml` file
4. Modify the relevant settings according to your needs
5. Save your modifications
6. Use the `serviceDictionary.xsd` XSD schema to ensure that your modifications are valid
7. Restart the Diameter Server system

4.4.8 Third-Party Integration

[Keywords \[page 317\]](#)

[Preliminary Notes \[page 317\]](#)

[Description \[page 317\]](#)

[Modifying the SAP SLD Connection Settings \[page 318\]](#)

4.4.8.1 Keywords

SLD¹⁹⁶

4.4.8.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- “Update of SAP System Component Repository in SLD” SAP Note [669669](#)  documentation

4.4.8.3 Description

The Diameter Server system can be integrated with third-party applications. You can use the following procedure to configure the settings related to the integration with the SAP System Landscape Directory (SLD) system.

¹⁹⁶ System Landscape Directory

4.4.8.4 Modifying the SAP SLD Connection Settings

To send payload information to the SAP SLD system during the startup sequence of the Diameter Server system, it is necessary to configure some settings related to the integration with third-party systems. To modify this configuration, refer to the [Modifying the Diameter Server Configuration File \[page 308\]](#) section above and modify the following settings of the Diameter Server:

- `SLDURL`, that corresponds to the IP address or name of the SLD Data Supplier Service in the targeted SAP SLD system, using the following format: `http://<SLD_HOST>:<SLD_PORT>/sld/ds`
- `SLDUser`, that corresponds to the name of the SAP SLD user
- `SLDPassword`, that corresponds to the password of the specified user

4.5 Configuring the Import/Export Connector System

[Scenario Management \[page 318\]](#)

[Specific Actions \[page 319\]](#)

4.5.1 Scenario Management

[Keywords \[page 318\]](#)

[Preliminary Notes \[page 318\]](#)

[Description \[page 319\]](#)

4.5.1.1 Keywords

CAT¹⁹⁷, scenario

4.5.1.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- [Installing and Launching CAT Tool](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation

¹⁹⁷ Connector Administration Tool

- [Scenarios](#) section of the [SAP CC 2023 Primary Help for CAT Tool \(+IEC\)](#) documentation

4.5.1.3 Description

The CAT Tool user interface gives the possibility to model scenarios that represent sequences of basic actions executed by the Import/Export Connector system. For further information, refer to the [Scenarios](#) section of the [SAP CC 2023 Primary Help for CAT Tool \(+IEC\)](#) documentation, that contains details about:

- Scenario modeling
- Scenario building
- Scenario execution

4.5.2 Specific Actions

[Keywords \[page 319\]](#)

[Preliminary Notes \[page 319\]](#)

[Description \[page 319\]](#)

4.5.2.1 Keywords

Java function, customization, SDK

4.5.2.2 Preliminary Notes

For further information, refer to the following SAP CC documentations:

- `com.highdeal.iec` Java package description, available in the [SAP CC Java/XML API Reference \(IEC Library\)](#) documentation

4.5.2.3 Description

The Import/Export Connector system can be customized by developing your own Java classes using the IEC SDK that gives the possibility to:

- Add new actions

- Customize the reporting capabilities of the Import/Export Connector system
- Customize the connection to the BART Server system

For further information, refer to the [SAP CC Java/XML API Reference \(IEC Library\)](#) documentation.

5 Fine-Tuning SAP Convergent Charging

Fine-tuning must be performed to further adjust the system settings to support specific business or technical requirements and optimize the overall performance.

- [Fine-Tuning the Smart Distribution Mode \[page 205\]](#)
- [Fine-Tuning the Table Rollover Policy \[page 138\]](#)

6 Monitoring of SAP CC

Within the management of SAP Technology, real-time monitoring is an essential task during production operations or when finalizing the project implementation. Deploying a monitoring architecture enables the system administrators and operation teams to get an overview of the SAP system landscape at a glance and provides an infrastructure to gather and manage system information.

Monitoring works as an early warning system that monitors and displays the status of multiple systems and independent business components.

The main features of the monitoring architecture are:

- User-definable alert monitors for critical system events
- Method assignments to analyze alerts and react to them automatically
- Performance system to display recent performance data graphically

SAP provides both technical monitoring and business monitoring for SAP CC.

[Component Specific Monitoring \[page 322\]](#)

[Monitoring \[page 323\]](#)

[Technical Monitoring and Alerting Using SAP Solution Manager \[page 325\]](#)

[Technical Monitoring Using CA Introscope for SAP \[page 328\]](#)

[Technical Monitoring Using SAP Convergent Charging Cockpit \[page 332\]](#)

[Monitoring of the Data Files Generation and Bulkloading \[page 337\]](#)

[Manual Monitoring \[page 337\]](#)

[Database Monitoring \[page 339\]](#)

[Error and Process Monitoring \[page 340\]](#)

[Monitoring of SAP Java Components \[page 341\]](#)

[Business Monitoring \[page 342\]](#)

[Detailed Monitoring and Tools for Problem and Performance Analysis \[page 344\]](#)

6.1 Component Specific Monitoring

The following table lists the components of SAP Convergent Charging 2023 and the third-party components to monitor in your SAP system landscape:

Component and System	Product	Monitor
Core Server <ul style="list-style-type: none"> SAP CC system Hosts JVM File system 	SAP Convergent Charging 2023	<ul style="list-style-type: none"> Technical monitoring: <ul style="list-style-type: none"> Technical Monitoring and Alerting Using SAP Solution Manager [page 325] Technical Monitoring Using CA Introscope for SAP [page 328] Technical Monitoring Using SAP Convergent Charging Cockpit [page 332] Monitoring of the Data Files Generation and Bulkloading [page 337] Error monitoring
BART Server <ul style="list-style-type: none"> SAP CC system Host JVM 		<ul style="list-style-type: none"> Business Monitoring with BART Tool of SAP CC [page 342]: <ul style="list-style-type: none"> Offline acquisition Offline charging Error monitoring
Core Database <ul style="list-style-type: none"> Database system (RDBMS) Hosts 	Database Technology	Database Monitoring [page 339]
Cockpit Database <ul style="list-style-type: none"> Database system (RDBMS) Host 		
BART Database <ul style="list-style-type: none"> Database system (RDBMS) Host 		
IEC Database <ul style="list-style-type: none"> Database system (RDBMS) Host 		
Java Web Server (for SAP CC Cockpit) <ul style="list-style-type: none"> System Host JVM 	JWS Technology	<ul style="list-style-type: none"> Technical Monitoring [page 324] Error monitoring

Consider the components, systems, and applications that are part of your SAP system landscape.

6.2 Monitoring

[Technical Monitoring \[page 324\]](#)

[Performance Monitoring \[page 324\]](#)

[Alert Monitoring \[page 325\]](#)

6.2.1 Technical Monitoring

Technical monitoring consists in monitoring the performance and health of systems in complex and heterogeneous SAP system landscapes. It targets the infrastructure levels of the SAP CC 2023 systems and applications:

- Communications with databases, frontends, backends, and other systems
 - For business scopes: SAP S/4HANA Cloud Public Edition, SAP S/4HANA, SAP ERP, or SAP CRM
 - For technical scopes: APM, SAP SLD, SAP CTS+
- Data/item file generation (high volume of files) and bulkloading
- Internal important activities (data cache management, intra-communications)

This monitoring is based on metrics available in [CA Introscope for SAP CC](#). SAP CC provides you with the [SAP CC 2023 Performance Metric Reference](#) documentation.

Consider the following activities:

- [Technical Monitoring and Alerting Using SAP Solution Manager \[page 325\]](#)
- [Technical Monitoring Using CA Introscope for SAP \[page 328\]](#)
- [Technical Monitoring Using SAP Convergent Charging Cockpit \[page 332\]](#)
- [Monitoring of the Data Files Generation and Bulkloading \[page 337\]](#)
- [Manual Monitoring \[page 337\]](#)

→ Recommendation

SAP recommends that you define and implement automated monitoring for technical monitoring and alerting. Refer to the [Technical Monitoring and Alerting Using SAP Solution Manager \[page 325\]](#) section.

6.2.2 Performance Monitoring

You use performance monitoring to display statistical data on the performance of the SAP CC 2023 systems in your SAP system landscape.

If you are analyzing the performance of an SAP CC system, you should normally start with the *Triage* dashboard in the monitoring consoles of CA Introscope for SAP. You can use also IS Investigator and the [SAP CC 2023 Performance Metric Reference](#) documentation. See [Troubleshooting and Root Cause Analysis Using CA Introscope for SAP \[page 448\]](#).

Performance monitoring facilitates the tuning of SAP Convergent Charging in real time, high volume, and high availability environments.

→ Recommendation

SAP recommends that you define and implement automated monitoring for technical monitoring and alerting. Refer to the [Technical Monitoring and Alerting Using SAP Solution Manager \[page 325\]](#) section.

6.2.3 Alert Monitoring

Proactive, automated monitoring is the basis for ensuring reliable operations for your SAP system landscapes. SAP provides you with the infrastructure and recommendations needed to setup your alert monitoring to recognize critical situations for SAP CC 2023 systems (and their database systems) as quickly as possible. Refer to the [Technical Monitoring and Alerting Using SAP Solution Manager \[page 325\]](#).

→ Recommendation

SAP recommends that you define and implement automated monitoring for technical monitoring and alerting. Refer to the [Technical Monitoring and Alerting Using SAP Solution Manager \[page 325\]](#) section.

6.3 Technical Monitoring and Alerting Using SAP Solution Manager

→ Remember

You must use SAP Solution Manager 7.2 or later.

Prior to SP 13, SAP Solution Manager 7.2 does not deliver predefined content for SAP CC 2023. System Monitoring for SAP CC 2023 can be implemented with a custom template.

During the implementation phase or the production operation phase, you can use SAP Solution Manager in combination with [CA APM Introscope](#) for SAP to monitor the performance and health of the SAP CC systems in real time.

Use the [Technical Monitoring](#) functions in SAP Solution Manager to manage the monitoring of the performance and health of SAP CC 2023 systems in complex, heterogeneous landscapes. It targets the infrastructure levels of the SAP CC systems.

A dedicated [work center](#) is the central access to functions and tools for monitoring your SAP solutions and accelerating problem solving.

Work Center	Description
Technical Monitoring Work Center	The Technical Monitoring work center provides tools and capabilities for monitoring the SAP CC system landscape.

Work Center	Description
Technical Monitoring Inbox Alert	<ul style="list-style-type: none"> Provides central access to automated alerts from the system monitoring area Allows you to start analyzing and solving detected problems in the SAP CC landscape
System Monitoring	<ul style="list-style-type: none"> Provides the current status of systems, databases, and hosts Allows you to access the latest snapshot of monitoring data for systems, databases and hosts

For further information, refer to the [Application Operations Guide](#) documentation on the [SAP Solution Manager](#).

→ Recommendation

Implement and use [Technical Monitoring](#) in SAP Solution Manager 7.2 and later for monitoring your SAP CC 2023 system landscape in real time. Follow the [Customizing](#) activities outlined in SAP Solution Manager.

6.3.1 Implementation in your SAP CC Landscape

Prerequisites

- The [CA Introscope](#) packaged solution is installed
- [SAP Solution Manager](#) is configured with CA Introscope using the SAP Solution Manager Administration work center
- The SAP CC system is:
 - Installed and configured to work with CA Introscope (otherwise manually configure the Introscope Java Agent as described in the SAP Note [1453216](#))
 - Configured to provide information to SAP [System Landscape Directory \(SLD\)](#) (SAP SLD)
 - Registered in SAP SLD

Installation Considerations

- Install both [Diagnostics Agent](#) and [SAP Host Agent](#) on each machine hosting an instance of the running SAP CC system (Core Server) and its back-end database system. Refer to the detailed SAP Note [1365123](#)
- Implement Technical Monitoring in SAP Solution Manager 7.2 or later for the monitoring of SAP Convergent Charging. Apply the setup procedures outlined in SAP Note [1875021](#). In case of any problems not covered by the FAQ, report an incident on component [SV-SMG-MON-ALR](#) or [SV-SMG-MON-DIA](#) component on SAP Support Portal

Note

You use the SAP Solution Manager Configuration work center (transaction [SOLMAN_SETUP](#)) to:

- Complete the information about the SAP CC system declared in SAP Solution Manager
- Set up the managed system cluster
- Set up the technical monitoring

6.3.2 Working with the Technical Monitoring Work Center in SAP Solution Manager

To use tools and capabilities for monitoring SAP CC landscape, you start the Technical Monitoring work center in SAP Solution Manager by using SAP Logon and SAP Easy Access.

Note

In SAP Solution Manager, a *technical system* consists of the SAP system but also the instances, hosts, and IT infrastructure devices that contribute to it.

Activities

You can monitor:

- Availability
- Performance
- Exceptions and errors
- Alerts

Monitor an SAP CC System and its Hosts

1. In the *Technical Monitoring* work center, choose *System Monitoring*
2. In the *Selection* screen area, choose *All Systems*
3. To view the status of technical systems that relate to SAP Convergent Charging, select them
4. Click *System Monitoring*
5. To display monitored data, select a location (*Start Embedded* or *Start New Window*). A window displays the monitored data that relates to the SAP CC cluster. The cluster is identified by the SID¹⁹⁸ of the SAP CC system
6. Click the *System Name* to view the hierarchy of the cluster and analyze the system hierarchy:

¹⁹⁸ SAP System Identifier

- Instances of the SAP CC systems. Several instances are hosted by the same machine
- Instances of the database system

The naming convention of the instance node level is: `<SID>~UNSPECIFIC~<INSTANCE_ID>` on `<HOST_NAME>`, where:

- `<SID>` is the SAP system
- `<INSTANCE_ID>` is the identifier of the instance in the SAP CC Core Server system (example: dispatcher#1, rater#2, updater#1, bulkloader#2)
- `<HOST_NAME>` is the name of the machine hosting an instance of the SAP CC system

7. Click [Availability to](#)
8. Click [Performance to](#)
9. Click [Exception to](#)
10. Click [Alerts](#) to view the alert inbox and the alerts raised for the system cluster

Note

Click [Configuration Status](#) to view the configuration settings in SAP Solution Manager that relates to the SAP CC monitoring. A window opens the SAP Solution Manager Configuration work center at the stage of the configuration of the Technical Monitoring feature.

Monitor the Back-End Database System and its Hosts

Refer to the procedure above.

Related Documentation

For further information, refer to the [Application Operations Guide](#) documentation on the [SAP Solution Manager](#).

6.4 Technical Monitoring Using CA Introscope for SAP

During the implementation phase or the production operation phase, you can use [CA APM Introscope](#) to monitor manually the performance and health of the SAP CC Core Server systems in the SAP system landscape. You can use the information delivered by the monitoring consoles to analyze the SAP CC systems and take appropriate actions when necessary.

You work with the predefined dashboards and alerts to operate the technical monitoring of SAP Convergent Charging.

→ Recommendation

Install and use CA Introscope for monitoring and root cause analysis of SAP CC 2023. Follow the setup procedure outlined in SAP Note [1453216](#).

In case of any problems with CA Introscope not covered by the FAQ, open a customer message on component [XX-PART-WILY](#) on SAP Support Portal.

Implement and use Technical Monitoring in SAP Solution Manager 7.2 and later for monitoring your SAP CC 2023 system landscape in real time. See [Technical Monitoring and Alerting Using SAP Solution Manager \[page 325\]](#).

6.4.1 Implementation in Your SAP CC Landscape

Installation Considerations

- Implement the CA Introscope for SAP solution packaged by SAP in your production system landscape. Refer to the SAP Note [797147](#) to implement CA APM Introscope and install its components (Enterprise Manager, Workstation, WebView) in your SAP system landscape. This package is a component of SAP Solution Manager.
- Implement the additional package delivered by SAP on top of the CA IS Enterprise Manager system. It includes the necessary Introscope Management Modules developed by SAP. Refer to the SAP Note [1579474](#) to install the required specialized package provided by SAP to enhance the services and functions of CA Introscope.
- Make sure that you have installed the *Management Module* that includes the monitoring dashboards specialized for SAP CC: SAP_SRM_CRM (Products for "SRM and CRM").

Note

For later manual installation, refer to the [SAP CC 2023 Administration Guide \[page 8\]](#) and to SAP Note [1453216](#) for more about information about setting up and configuring CA Introscope for SAP CC 2023.

6.4.2 Manual Monitoring with CA Introscope

You monitor nominal performance of the SAP CC Core Server systems. You can view live data or historical data.

Refer to the product documentation of CA Introscope for more information about:

- User interfaces and windows
- Getting started of the user interfaces (start, stop, ...)
- Using of the monitoring consoles in the user interfaces (navigation, tasks, operations)
- Using the *Workstation Investigator* tool

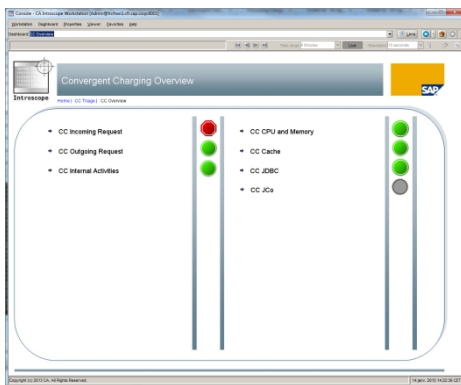
Prerequisites

The *Management Module* SAP_SRM_CRM (Products for "SRM and CRM") is installed to the top of the CA IS Enterprise Manager system. This management module includes the monitoring instrumentation and dashboards specialized for SAP Convergent Charging.

Monitoring Performance with Dashboards and Alert Indicators in the Monitoring Consoles

- Identify the health or performance problems in the *CC Overview* dashboard. Verify the overall alert indicators
- Use the *CC Triage* dashboard to determine the current activities of the monitored system and to refine your understanding of normal situation or potential problems

Dashboards for SAP Convergent Charging Available in CA IS Monitoring Consoles



- Use the specialized dashboards to determine the current throughputs, latencies, and errors in the monitored SAP CC Core Server systems:

Console Dashboard

CC Incoming Request

CC Outgoing Request

CC Internal Activities

CC CPU¹⁹⁹ and Memory

CC Cache

CC JDBC²⁰⁰

CC JCo²⁰¹

Refer to the primary help available in the monitoring console to understand the performance metrics and signaled problems.

¹⁹⁹ Central Processing Unit

²⁰⁰ Java Database Connectivity

²⁰¹ Java Connector

6.4.3 CA IS Workstation User Interface

Get Started (Microsoft Windows)

1. Go to the `C:\usr\sap\ccms\apmintroscope` directory
2. Start the user interface by launching the `Introscope_Workstation.exe` program for Microsoft Windows
3. Enter the URL²⁰² and dedicated communication port of the CA IS Enterprise Manager system
4. Log on with your credentials
5. In the *Workstation* menu, select the *New Console* submenu
6. A new *Console* window opens
7. Select one of the dashboards dedicated to SAP Convergent Charging. The naming convention is "CC ...". For example, you select the *CC Overview (SAP SRM CRM)* item in the dropdown

The user interface displays the selected dashboard:

- Navigate to the relevant dashboards to perform your daily tasks for technical monitoring
- Check out the alert indicators. Perform investigation, root analysis, troubleshooting in the monitoring console or in Workstation Investigator

Note


When your system landscape includes several SAP CC systems, use the Lens feature to display the instances of the SAP CC system to monitor. You select the corresponding CA Introscope agent.

Using CA IS Workstation Investigator

In the monitoring consoles, when a metric viewer displays abnormal information, you can open an Investigator window directly focused on the corresponding metric. Refer to the [Troubleshooting and Root Cause Analysis Using CA Introscope for SAP \[page 448\]](#) section.

→ Tip

Consult the secondary help available when you click:

- The title of a dashboard
- The  icons next to the graphs

²⁰² Uniform Resource Locator

6.4.4 CA IS WebView User Interface

Get Started (Microsoft Windows)


1. Log on to the CA Introscope WebView user interface with your credentials
2. In the *Consoles* tab, select one of the dashboards dedicated to SAP Convergent Charging. The naming convention is "CC ...". For example, you select the *CC Overview (SAP SRM CRM)* item in the dropbox
3. Click the *View* button

The user interface displays the selected dashboard:

- Navigate to the relevant dashboards to perform your daily tasks for technical monitoring
- Check out the alert indicators. Perform investigation, root analysis, troubleshooting

→ Tip

Consult the secondary help available when you click:

- The title of a dashboard
- The  icons next to the graphs

6.5 Technical Monitoring Using SAP Convergent Charging Cockpit

Cockpit is an intuitive web application and a central tool that enables the SAP CC system administrators and pricing specialists to manage the SAP Convergent Charging 2023 systems and data quickly and efficiently.

[Implementation in Your SAP CC Landscape \[page 333\]](#)

[Monitoring Output Item Files \(aka Data Files\) from SAP Convergent Charging \[page 334\]](#)

[Working with the App Analyze Item Files in CC Cockpit \[page 337\]](#)

6.5.1 Implementation in Your SAP CC Landscape

Prerequisites

- The SAP CC Core Server system that you want to administer with the Cockpit application must be available in your SAP system landscape.
Refer to the [Installing a Core Server in a Monohost Landscape](#) or to the [Installing a Core Server in a Multihost Landscape](#) procedures of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation if necessary, and the Product Availability Matrix (PAM) here: support.sap.com/pam
- You have identified the SAP system ID (SID) of the targeted Core Server system and the list of HTTP²⁰³ URLs of the dispatcher instances running in the system you want to connect to.
- A Tomcat server using a Java 17 JVM²⁰⁴ must be available. For further information, use the Tomcat documentation and recommendations.
 - In terms of security requirements, the installation must comply with the recommendations of the [SAP CC 2023 Security Guide](#) documentation. As shown on the architecture schema available in the [SAP CC Software Components](#) section, the Apache Tomcat server must also be able to communicate with:
 - The dispatcher and updater instances running in the Core Server system
 - The Core Database
 - In terms of sizing requirements, SAP SE recommends that you increase the size of the Tomcat heap memory (Xmx option of the JVM) to 4096M in order to manage large objects within Cockpit.
 - The time zone used by the Tomcat server must be the same as the system time zone of the connected Core Server system. Refer to the [Setting Up the System Time Zone](#) procedure to ensure that the time zone is correctly configured.
- You install and maintain the same version for both the Core Server system and the Cockpit application.

Oracle RDBMS

If your landscape contains one or multiple Oracle databases, you need to execute the following procedure in order to update your Apache Tomcat server with the relevant Oracle JDBC²⁰⁵ driver:

1. Execute the [Downloading the Oracle JDBC Driver](#) procedure to download the relevant JAR archive.
2. Copy the downloaded JAR file into the `lib` subfolder that is available in the root directory of the Apache Tomcat server.

Installation Considerations

Proceed to the installation of the Cockpit according to the [Installing and Starting Cockpit](#) section of the [SAP CC 2023 Installation and Maintenance Guide](#) documentation.

²⁰³ HyperText Transfer Protocol

²⁰⁴ Java Virtual Machine

²⁰⁵ Java Database Connectivity

6.5.2 Monitoring Output Item Files (aka Data Files) from SAP Convergent Charging

You monitor the high-volume *item files* that are generated by the SAP CC Core Server system. These data files are crucial for the service provider company that monetizes the chargeable services. They contain the *output items* that relate to the business operations (charging, activation, and refilling).

Note

Different types of item files are generated depending on the configuration of the SAP system. For example, the [notification policy \[page 192\]](#), the [CIF configuration \[page 77\]](#) and the [RIF configuration \[page 119\]](#).

The generated files to monitor are produced by the rater instances and modified by the bulkloader instances that compose the SAP system (Core Server). Additionally, rater and bulkloader instances generate control files that you can monitor to detect processing errors.

Prerequisite

The CIF is enabled and configured by the implementation and integration team. See [Enabling the Charging Output Integration Framework \(CIF\) Processor \[page 122\]](#).

[Output Item Files \[page 334\]](#)

[Monitoring the File Metadata \[page 336\]](#)

[Monitoring the Unprocessed Items \[page 336\]](#)

Related Information

[Data Files Generation](#)

[Bulk Loading Mechanism](#)

[Acquisition using the Core Server](#)

6.5.2.1 Output Item Files

In the environment of SAP Convergent Charging, the rater instances of the running Core Server system generate high-volume data files named item files. The bulkloader instances are responsible for the conversion and load to SAP Convergent Invoicing of the content of these item files in the form of billable items and consumption items (if it is your business case).

A rater is associated with one or several bulkloaders.

File Core Server System (and Its File System)

		Rater Instances		Bulkloader Instances	
File Type	Files	Directories	Files	Directories	
Charged item files • Post-paid • Pre-paid	<ul style="list-style-type: none"> Item files (incl. post-paid charged items) Control files 	See the values of POST-PAID_CIT_WRITER_ROOT_PATH to determine the names of the directories.	<ul style="list-style-type: none"> Erroneous item files (*.err.zip, *.err.gz, or *.err.csv) Control files <p>The item file from the rater is renamed to avoid concurrent accesses.</p> <p>Each bulkloader instance reads the in sequence, converts the output item to a billable item (BIT) and sends it to SAP Convergent Invoicing in its system or cloud.</p>	See the values of POST-PAID_CIT_READER_ROOT_PATH to determine the names of the directories.	
	<ul style="list-style-type: none"> Item files (incl. pre-paid charged items) Control files 	See the values of PRE-PAID_CIT_WRITER_ROOT_PATH to determine the names of the directories.	<ul style="list-style-type: none"> Erroneous item files (*.err.zip, *.err.gz, or *.err.csv) Control files 	See the values of PRE-PAID_CIT_READER_ROOT_PATH to determine the names of the directories.	
Refill record files					
Chargeable item files • Al-ready-charge d • Ac-quired-only	<ul style="list-style-type: none"> Item files (results of the charging process) Control files 	See the values of CHARGED_CI_WRITER_ROOT_PATH to determine the names of the directories.	<ul style="list-style-type: none"> Erroneous item files (*.err.zip, *.err.gz, or *.err.csv) Control files <p>Each bulkloader instance reads the files in sequence, converts the output item to a consumption item and sends it to SAP Convergent Invoicing in its system or cloud.</p>	See the values of CHARGED_CI_READER_ROOT_PATH to determine the names of the directories.	
	<ul style="list-style-type: none"> Item files (results of the acquisition process) Control files 	See the values of AC-QUIRED_CI_WRITER_ROOT_PATH to determine the names of the directories.	<ul style="list-style-type: none"> Erroneous item files (*.err.zip, *.err.gz, or *.err.csv) Control files 	See the values of AC-QUIRED_CI_READER_ROOT_PATH to determine the names of the directories.	

To know the directories in the file system used by SAP CC, view the runtime values of the following system parameters:

- [XXX_ROOT_PATH \(BulkWriter\)](#)
- [XXX_ROOT_PATH \(BulkReader\)](#)

Related Information

[Data Files Generation](#)
[Bulk Loading Mechanism](#)

6.5.2.2 Monitoring the File Metadata

Prerequisite

The recording (and purge) of file metadata is enabled and configured by the implementation and integration team. See [Enabling the Recording of File Metadata \[page 127\]](#) and [Configuring the File Metadata Purge Mechanism and Its Scheduler \[page 134\]](#).

[Description \[page 336\]](#)

6.5.2.2.1 Description

Analyze Item Files is an application available in the SAP CC Cockpit application that enables the SAP CC Application and System Administrators (system, application, business) to filter and visualize the metadata related to the data files generated during the different processes. For monitoring purpose, you can use the following procedures to create relevant dashboards that you can save as variants and reuse later.

6.5.2.3 Monitoring the Unprocessed Items

Unprocessed items correspond to items which have not been processed yet, for various possible reasons such as:

- These items are new items, recently stored within data files
- These items correspond to invalid items that could not be sent to SAP Convergent Invoicing in its system (SAP S/4HANA or SAP ERP) or cloud (SAP S/4HANA Cloud Public Edition)
- Communication errors occurred during the communication with SAP Convergent Invoicing
- And so on

SAP CC Cockpit gives you the possibility to create a dashboard for monitoring the unprocessed items created because of a communication error, distributed by class name over the recording period. SAP SE recommends that you consider this dashboard as a sample, that you can adapt to fit your specific needs or preferences.

Refer to the [Tips and Tricks](#) section of the app Analyze Item Files in the [SAP CC 2023 Primary Help for Cockpit](#) documentation to take note of the different steps to configure such a dashboard.

6.5.3 Working with the App Analyze Item Files in CC Cockpit

With the app Analyze Item Files, you can visualize and analyze the high-volume item files that are generated by the SAP CC Core Server system. To facilitate your technical operations, you quickly and efficiently inspect the selected item files.

Activities

Refer to the [Analyze Item Files](#) documentation for a complete description of the different activities and tasks that you can perform with the app Analyze Item Files.

6.6 Monitoring of the Data Files Generation and Bulkloading

- Output item files:
 - Charged item files (containing postpaid charged items or prepaid charged items)
 - Refill record files
 - Chargeable item files (containing "charged" chargeable items or "acquired-only" chargeable items)
- Rerate files
- Transaction files (deprecated since release 2.0)
- Data files (former legacy format) (deprecated since release 2.0)

Note

In an integrated *SAP Solution* scenario, SAP CC does not generate any transaction/data files.

6.7 Manual Monitoring

Manual monitoring is a highly effort-intensive approach that usually requires expert involvement.

You can use the following tools and user interfaces to perform manual monitoring of the SAP CC 2023 systems in your SAP system landscape:

User Interface	Day to Day Tasks	Quick Procedure
Cockpit	Visualize and analyze the metadata related to the data files generated by SAP CC during the different business processes (charging, activation, or refilling).	Use the app Analyze Item Files to display the recorded metadata.
Admin+	<p>View the indicators of the SAP CC system about:</p> <ul style="list-style-type: none"> • Host memory and Java heaps • Data cache usage • Scheduled activities <div style="background-color: #f0f0f0; padding: 5px; margin-top: 10px;"> <p>Note</p> <p>Refer to the SAP CC 2023 System Parameter Reference for the complete list of indicators.</p> </div>	<p>Use the <code>get</code> command and the relevant indicator.</p> <div style="background-color: #f0f0f0; padding: 5px; margin-top: 10px;"> <p>Example</p> <p>You view the <code>FREE_MEMORY</code></p> </div>
	<p>View some statistics of the:</p> <ul style="list-style-type: none"> • Business services • Technical services 	Use the <code>get</code> and the <code>SERVICES_STATISTICS</code> indicator to retrieve statistics about the different services running in an instance of the SAP CC Core Server system.
	<p>View some service time statistics for the client systems or applications that are connected to SAP Convergent Charging via the <i>Message TCP</i> technical interface:</p> <ul style="list-style-type: none"> • General information about the connection (access point, identifications, time, communications) • Information about the requested service operations 	Use the <code>fetch_client_statistics</code> command to display service time statistics for the connected SAP CC charging client.
BART+	<p>View the running sessions in the SAP CC BART Server system related to the offline charging operations:</p> <ul style="list-style-type: none"> • Batch acquisition • Batch rating and charging 	Use the <code>monitor</code> to display the current sessions.
BART Tool	<p>Manually monitor the offline charging operations:</p> <ul style="list-style-type: none"> • Batch acquisition • Batch rating and charging 	Use the <i>Supervision</i> window to display the current sessions.
CA Introscope Workstation [page 328]	Manually monitor the health and performance of the system. Refer to the Technical System Landscape [page 19] section of this document	Use the Console of CA IS Workstation to display the predefined dashboards available for monitoring the health and performance of the SAP CC systems in the SAP system landscape. Refer to the Technical Monitoring Using CA Introscope for SAP [page 328] section of this documentation.
SAP Solution Manager [page 325]	Manually monitor the health and performance of the system	N/A

→ Recommendation

Define and implement automated monitoring for technical monitoring and alerting. Refer to the [Technical Monitoring and Alerting Using SAP Solution Manager \[page 325\]](#) section of this documentation.

6.8 Database Monitoring

Database monitoring is essential for the functioning of SAP Convergent Charging (SAP CC). A list of database monitoring documentation references is provided in this section.

SAP CC 2023 Component	Back-End Database
Core Server	Core Database
Cockpit	Cockpit Database
BART Server (*)	BART Database (*)
Optional component for offline/batch charging scenarios	
Import/Export Connector (IEC) (**)	<ul style="list-style-type: none">IEC Database (**)
!/\ Only available in a development SAP system landscape	<ul style="list-style-type: none">SAP-Customer Database

→ Recommendation

- Install and use *DBA Cockpit* for monitoring the databases of SAP Convergent Charging.
- Follow the setup procedures outlined in SAP Notes:
 - [1664432](#) (SAP HANA)
 - [1532253](#) (SAP Sybase ASE)
 - [1265134](#) (Oracle)
 - [1388700](#) (MS SQLServer)
 - [1267189](#) (IBM DB2)
- The prerequisites for database administration and monitoring are described in SAP Note [1027146](#).

Related Information

For more information about database administration, consult the official product documentation of the database furnisher and the SAP product documentation and user assistance on SAP Help Portal.

Your database platform is...	Read the section...
SAP HANA	<i>Database Administration for SAP HANA</i>
SAP Sybase ASE	<i>Database Administration for SAP ASE</i>

Your database platform is...	Read the section...
IBM DB2	<i>Database Administration for IBM DB2 for Linux, and Windows</i>
Oracle	<i>Database Administration for Oracle</i>
Microsoft SQL Server	<i>Database Administration for Microsoft SQL Server</i>

6.9 Error and Process Monitoring

[Error and Process Monitoring with SAP Solution Manager \[page 340\]](#)

6.9.1 Error and Process Monitoring with SAP Solution Manager

The system monitoring functions monitor the systems within your solution landscape in real time. On the managed hosts, log file and process monitoring can be set up.

→ Recommendation

Install and use *Technical Monitoring* of SAP Solution Manager for working with your SAP CC 2023 systems and applications.

Installation Considerations

Follow the setup procedure outlined in SAP Note [1875021](#).

Error Monitoring

The log files of SAP CC 2023 are monitored for "Error" patterns. The monitor will present its status and alerts according to the presence and severity of log entries in the SAP Convergent Charging log files.

Operating System Monitoring

The server machines hosting the SAP Convergent Charging application are monitored for resource consumption. Operating system metrics like overall CPU²⁰⁶ and memory consumption are reported. In

addition, the Operating System processes `java.exe` are monitored for resource consumption. You can customize the thresholds for alert triggering to suit our individual needs.

Recommendation by SAP

→ Recommendation

Implement and use Technical Monitoring in SAP Solution Manager 7.2 and later for monitoring your SAP CC 2023 system landscape in real time.

See [Technical Monitoring and Alerting Using SAP Solution Manager \[page 325\]](#) section of this documentation.

6.10 Monitoring of SAP Java Components

SAP Convergent Charging (SAP CC) is based on the Java technology. SAP Solution Manager, a central monitoring system (CEN) enables collecting data from SAP CC. CA APM Introscope(R) is an application performance management (APM) solution created to manage Java application performance. It utilizes Introscope Java Agents (aka Byte Code Adapter) and Introscope Enterprise Manager (IS EM) in the context of the SAP Solution Manager to collect performance and health data.

Java Monitoring and Management

Java monitoring and management provides developers, supporters, operations teams, and SAP customers with information about:

- Configuration, such as release, version, host, and port
- Monitoring critical conditions for IT operations
- Detailed performance and status data to detect and diagnose problems
- Detailed statistics on activity and resource consumption for accounting and auditing, service level agreement (SLA) reporting, and problem analysis

Note

Refer to the product documentation of these solutions for more information about monitoring Java-based components.

²⁰⁶ Central Processing Unit

See Also

[Log Files of the Java Garbage Collection \(GC\) \[page 349\]](#)

[Viewing Java Thread Dumps \[page 413\]](#)

6.11 Business Monitoring

[Business Monitoring with BART Tool of SAP CC \[page 342\]](#)

[Monitoring the Immediate Loading of Billable Items \[page 342\]](#)

6.11.1 Business Monitoring with BART Tool of SAP CC

Use the SAP CC [BART Tool](#) user interface to monitor the business operations performed by the SAP CC BART Server system:

- Offline acquisition of service consumption information from mediation systems: you monitor the acquisition sessions collecting the Consumption Detail Records (CDRs) that relate to customer service usage
- Offline charging of these service consumptions: you monitor the batch rating and charging sessions running or scheduled in the BART Server system

Consult the [SAP CC 2023 Application Help](#) for more information about the offline charging services.

6.11.2 Monitoring the Immediate Loading of Billable Items

To monitor the optimal running of the billable items immediate loading, use the log messages and the performance and health metrics that relate to this feature.

Logs

To monitor the processing of the billable items immediate loading, monitor the log messages that are recorded by the rater instances of in the running SAP CC system.

Enablement:	Commit:	Rollback:	Reversal:
com.sap.SCC.core_server.000734	com.sap.SCC.core_server.000736	com.sap.SCC.core_server.000737	com.sap.SCC.core_server.000738
com.sap.SCC.core_server.000735			com.sap.SCC.core_server.000739

Metrics

To monitor the processing of the billable items immediate loading, monitor the performance and health metrics that are available for the RFC executions in remote SAP systems. As of SAP CC 2020 FPS 2, the rater instances report metrics that relate to the immediate loading of billable items into SAP Convergent Invoicing:

- Average Response Time (ms)
 - Concurrent Invocations
 - Errors Per Interval
 - Responses Per Interval
 - Stall Count
1. Monitor if a rater instance reports a call to the FKK_BIX_REVERSE_CC function module.
 2. Monitor the errors for the following function calls:
 - FKK_BIX_REVERSE_CC
 - BAPI_TRANSACTION_ROLLBACK
 - BAPI_TRANSACTION_COMMIT
 - /1FE/xxxx_BIT_CREATE_API, where xxxx stands for the four-character name of the billable item class for the billable items to be loaded.
 - /1FC/xxxx_CIT_CREATE_PROXY, where xxxx stands for the four-character name of the consumption item class for the consumption items to be loaded.

Reference: *SAP Convergent Charging | Backends | {Destination} on {Hostname} (JCo) | Function {Function Name}*

In the running SAP CC system, check if a rater instance reports a call to the FKK_BIX_REVERSE_CC function module.

Note

In rare cases, a rater instance must call the FKK_BIX_BIT_REVERSE_CC function module in order to reverse billable items that were successfully committed in SAP Convergent Invoicing but relating transaction commit finally failed in the SAP CC Core Database system.

In the target SAP Convergent Invoicing component, a manual reversal may be necessary by a pricing administrator.

See the log message [com.sap.SCC.core_server.000739](#).

6.12 Detailed Monitoring and Tools for Problem and Performance Analysis

[Log and Trace Files in Your SAP System Landscape \[page 344\]](#)

[Log and Trace Files in SAP CC 2023 \[page 344\]](#)

[Files of the SAP CC Core Server System \[page 346\]](#)

[Log Files of the Java Garbage Collection \(GC\) \[page 349\]](#)

[Technical Operations \[page 351\]](#)

[Files of the Other SAP CC Systems \[page 353\]](#)

[Files of the Graphical User Interfaces \[page 354\]](#)

[Log Files of the Java Web Server for SAP CC Cockpit \[page 355\]](#)

[Error Files of SAP CC 2023 \[page 355\]](#)

[Useful Errors and Error Code List \[page 360\]](#)

[Further Information \[page 360\]](#)

6.12.1 Log and Trace Files in Your SAP System Landscape

Log and trace files are essential for analyzing problems and determining possible causes.

Consider the logging and tracing features of:

- SAP Convergent Charging (SAP CC systems, user interfaces, applications, web application)
- Java Virtual Machine (JVM) that executes the process of an instance of a running SAP CC system
- Back-end database systems (RDBMs)

Note

The running SAP CC Core Server system can generate thread dump files that provides your SAP Support Team with some supportability and tracing-like tools.

6.12.2 Log and Trace Files in SAP CC 2023

SAP CC has a common framework used by all its software components:

Functions	Core Server	BART Server	Diameter Server	Cockpit	Graphical User Interfaces
Severity thresholds management	Yes	Yes	Yes	Yes	Not enabled by default
<p>Different levels of information can be recorded in the files according to thresholds based on the severity of the records.</p> <p>By default:</p> <ul style="list-style-type: none"> • INFO for logs • ERROR for traces 					
Rotating files	Yes	Yes	Yes	Yes	Not enabled by default
Different log files are successively used each time the current log file reaches its maximum size.	Maximum size: 200 MB	Maximum size: 2 MB	Maximum size: 20 MB	Maximum size: 2 MB	
Backup of files	Yes	Yes	Yes	Yes	Not enabled by default
<p>A backup log file is created each time the current log file reaches its maximum size.</p> <p>Old backup log files are recycled.</p>					

Note

- For each SAP CC server system, there is a specific log file for containing console error messages.
- In the following, the `<HOME>` directory refers to the path: `/usr/sap/<SID>/<INSTANCE_NAME>/` where `<SID>` is specified at installation (and is the unique ID of the SAP system) and `<INSTANCE_NAME>` is automatically assigned to an instance by the SAP installer and is composed of three characters and two digits that represent the instance number.
- The `<WORKING_DIRECTORY>` is a particular shared repository defined at the installation time. See the [SAP CC 2023 Installation and Maintenance Guide](#) documentation for more details.
- The SAP CC Cockpit web application generates only trace messages.
- By default, the logging and tracing function is disabled in the graphical user interfaces that are desktop applications. Refer to the [Troubleshooting of SAP CC \[page 445\]](#) section for more information about the temporary recording of logs and traces in the SAP CC GUIs²⁰⁷ (Core Tool, BART Tool, CAT Tool).
- Consider the log files that relate to the performance and health of the Java garbage collection (GC) processed by each Java Virtual Machine that executes an instance of a running SAP CC system.

Related Information

[Enhanced Logging and Tracing Framework Output Formats](#)

²⁰⁷ Graphical User Interface

6.12.3 Files of the SAP CC Core Server System

The following default settings are available for a productive system landscape and can be customized during the implementation project phase or later during the operation phase:

SAP CC 2023 Components

(Subcomponents)	Content	Filenames (by Default)	Path (by Default)
Core Server	Logs	Files (current): <code><INSTANCE_ID>_LDF1.0.log</code>	<code><HOME>/work/log/</code>
All instances		Backup files: <ul style="list-style-type: none">• <code><INSTANCE_ID>_LDF1.1.log</code>• ...• <code><INSTANCE_ID>_LDF1.<n>.log</code> Format: <code><INSTANCE_ID> = <INSTANCE_TYPE>#<NB></code>	

❁ Example

- `dispatcher#1_LDF1.0.log`
- `dispatcher#1_LDF1.1.log`
- `rater#2_LDF1.0.log`
- `rater#2_LDF1.1.log`

Each instance of the SAP CC Core Server system has its own set of log files. Several instances can be installed on the same host machine.

By default, the first destination fileset is used to record the log messages.

→ Remember

Some other destination filesets can be configured to contain log messages.

**SAP CC 2023
Components**

(Subcomponents)	Content	Filenames (by Default)	Path (by Default)
Core Server All instances	Traces	<p>Files:</p> <ul style="list-style-type: none"> • <code><INSTANCE_ID>_LDF2.0.trc</code> • <code><INSTANCE_ID>_LDF2.1.trc</code> • ... • <code><INSTANCE_ID>_LDF2.<n>.trc</code> <p>Format: <code><INSTANCE_ID>=<INSTANCE_TYPE>#<NB></code></p> <div style="background-color: #f0f0f0; padding: 5px;"> <p>❖ Example</p> <ul style="list-style-type: none"> • <code>rater#2_LDF2.0.trc</code> • <code>rater#2_LDF2.1.trc</code> • <code>rater#2_LDF2.2.trc</code> • <code>rater#2_LDF2.3.trc</code> </div> <p>Each instance of the SAP CC Core Server system has its own set of trace files. Several instances can be installed on the same host machine.</p> <p>By default, the second destination fileset is used to record the trace messages.</p> <div style="background-color: #f0f0f0; padding: 5px;"> <p>→ Remember</p> <p>Some other destination filesets can be configured to contain trace messages.</p> </div>	<code><HOME>/work/log/</code>
Core Server All instances	Thread Files	<p>Files:</p> <p><code><INSTANCE_ID>_<DATE>_<TRIGGER_TYPE>.zip</code></p> <p>There are different filename classes: one of each type of trigger.</p> <div style="background-color: #f0f0f0; padding: 5px;"> <p>❖ Example</p> <p><code>rater#2_yyyy-MM-dd'T'HH'H'mm'm'ss's_ondemand.zip</code> (when the <code>dump</code> command is used in Admin+)</p> </div>	see the <code>THREAD_DUMP_OUTPUT_PATH</code> system parameter
Core Server All instances	Dump	<p>Full dump of threads of the complete SAP CC system or of the specified instances.</p> <p>The dump describes each Java processing thread with its stack traces.</p>	Console of Admin+

SAP CC 2023 Components

(Subcomponents)	Content	Filenames (by Default)	Path (by Default)
Core Server	Traces	Files: JCO*.trc	<HOME>/work/
dispatcher instances	JCo ²⁰⁸ RFC ²⁰⁹		
bulkloader instances	communications with SAP CRM and SAP ERP/FI-CA sys- tems		
Core Server	Avalara AvaTax for Communications (AFC) Logs (Tax Journal)		
taxer instances			
Core Server	Status message including error	<INSTANCE_ID>_<THREAD_ID>.sta	<HOME>/work/
taxer instances	codes	These files are generated by the external tax system (Avalara AvaTax for Communications (AFC)) when the taxer instances start. Each taxer can produce several files.	

Consider also the log files of the Java Virtual Machine (JVM). Refer to the [Log Files of the Java Garbage Collection \(GC\) \[page 349\]](#) section of this documentation.

Related Tasks

- Use [Admin+](#) to get the current system configuration settings for log and trace management SAP CC Core Server system.
- Use [Admin+](#) and the `logs` command to display some logs of the Core Server systems.
- Use [BART+](#) and the `logs` command to display some logs of the BART Server systems.
- Use [Root Cause Analysis](#) in SAP Solution Manager to display the logs and traces of the SAP CC systems and the other components (Java Virtual Machine, back-end database). Refer to the [Root Cause Analysis and Exception Management in SAP Solution Manager \[page 447\]](#) section of this documentation.

Related Documentation

- [SAP CC 2023 Administration Guide \[page 8\]](#) for the system configuration for the logging and the tracing functions
- [SAP CC 2023 System Parameter Reference](#) for the system parameters of the functions
- [SAP CC 2023 Application Help](#) for detailed descriptions of the functions
- [SAP CC 2023 Log Message Reference and Error Troubleshooting](#) for detailed descriptions of the important log messages and troubleshooting

²⁰⁸ Java Connector

²⁰⁹ Remote Function Call

6.12.4 Log Files of the Java Garbage Collection (GC)

To track any performance issue with the Java garbage collection (GC) processing, it is important to log all garbage collector events.

SAP Convergent Charging (SAP CC) is based on the Java technology. A Java Virtual Machine (JVM) executes the process of an instance in an SAP CC system. Each virtual machine performs a garbage collection (GC) function to manage and optimize the allocated host memory and the physical storage of data in this memory. SAP CC runs with a SapMachine that provides two types of log entries:


- Basic logs (Java GC history log)
- Advanced logs (Java verbose GC log)

Note

By default, the logging and tracing of the garbage collection processed by the running Java Virtual Machines are not enabled.

See also: [Enabling the Generation of Java GC Logs \[page 142\]](#)

→ Remember

- Consider the central SAP Note [1950168](#)  for more information about the recommended configuration settings and some configuration determination rules.
- For advanced troubleshooting, consider the trace entries. The SapMachine does a lot of tracing, which can aid runtime analysis of Java programs like the systems and applications (IEC²¹⁰) of SAP Convergent Charging. Examples are garbage collection statistics, method tracing or exception tracing.

If you applied the recommendations, the following files are available:

²¹⁰ Import/Export Connector

SAP CC 2023 Components	Content	File Names (by Default)	Path (by Default)
Core Server All instances	Java GC History (Logs)	<p>Files (current): <code>garbage-<INSTANCE_ID>gc.prf</code></p> <p>Backup files:</p> <ul style="list-style-type: none"> <code>garbage-<INSTANCE_ID>gc.prf.b00</code> ... <code>garbage-<INSTANCE_ID>gc.prf.b19</code> <p>Format: <code>garbage-<INSTANCE_ID>gc.prf</code> with <code><INSTANCE_ID> = <INSTANCE_TYPE>#<INSTANCE_NB></code></p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>❁ Example</p> <ul style="list-style-type: none"> <code>garbage-rater#1gc.prf</code> <code>garbage-rater#1gc.prf.b00</code> <code>garbage-rater#2gc.prf</code> <code>garbage-rater#2gc.prf.b00</code> <p>Each instance of the SAP CC Core Server system has its own set of log files. Several instances can be installed on the same host.</p> </div>	<code><PATH_TO_WORK_FOLDER></code>
Core Server All instances	Java Verbose GC Logs	<p>Files:</p> <ul style="list-style-type: none"> <code>garbage-<INSTANCE_ID>.txt</code> <p>Format: <code>garbage-<INSTANCE_ID>.txt</code> with <code><INSTANCE_ID>.txt = <INSTANCE_TYPE>#<NB></code></p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>❁ Example</p> <ul style="list-style-type: none"> <code>garbage-rater#1.txt</code> <p>Each instance of the SAP CC Core Server system has its own set of trace files. Several instances can be installed on the same host.</p> </div>	<code><PATH_TO_WORK_FOLDER></code>

Example

For example, an administrator of an SAP Convergent Charging Core Server system can define the following configuration settings for the logging of the garbage collection activity in the Java virtual machines that run this SAP CC system in a production environment. Note that a total of 3 GB of storage space is reserved:

- Java GC History (parameter `-XX:+GCHistory`):
 - GC History File Name and Path: `<PATH_TO_WORK_FOLDER>/garbage-<INSTANCE_ID>gc.prf`
 - GC History Compression Level: 0
 - GC History Max File Size: 100 MB
 - GC History Max File Count: 20
- Java Verbose GC Logs (parameter `-Xlog:gc`):

- File Name and Path: <PATH_TO_WORK_FOLDER>/garbage-<INSTANCE_ID>.txt
- Log GC Max File Size: 50 MB
- Log GC Max File Count: 20
- Print GC Details: yes
- Print GC Cause: yes
- Print GC Date Stamps: yes
- Print Tenuring Distribution: yes
- Print Promotion Failure: yes
- Print FLS Statistics: 1

Do not configure your SAP CC systems with these JVM options and values. Use the SAP recommendations in the SAP Note [1950168](#) and from your SAP Support Team.

6.12.5 Technical Operations

[Checking Log Files \[page 351\]](#)

[Checking Trace Files \[page 352\]](#)

[Checking Error Files \[page 353\]](#)

6.12.5.1 Checking Log Files

The SAP Convergent Charging (SAP CC) systems and applications log errors and important messages in log files. By monitoring the log files and recorded logs, you can identify unusual activity in a timely way.

Procedure

Regularly check the following log files for errors and warnings:

- Log files of the SAP CC Core Server system
- Log files of the other SAP CC systems available in your SAP system landscapes
For SAP CC Cockpit, there are no log files but there are trace files.
- Other log files

As an administrator or a member of the operation team:

1. View the logs.
2. Check that there are no **fatal errors** recorded in the logs.
If yes, investigate your case and determine the action plan. Analyze the fatal errors.
3. Check that there are no **errors** recorded in the logs.
If yes, investigate your case and determine the action plan. Analyze the errors.

4. Check that there are no [warnings](#) in these logs.
If yes, determine if you need to investigate your case immediately or later on. Analyze the warnings.

→ Tip

In a production SAP system landscape, check the [SAP CC 2023 Log Message Reference and Error Troubleshooting](#) documentation and contact your SAP Support Team.

For example, [com.sap.SCC.core_server.000003](#).

Related Information

[Files of the SAP CC Core Server System \[page 346\]](#)

6.12.5.2 Checking Trace Files

The SAP Convergent Charging (SAP CC) systems and applications log trace messages in trace files. By checking the trace files and recorded traces, you can identify unusual activity in a timely way, ease the troubleshooting investigations for root cause analyses.

[Checking the Trace File of SAP CC Cockpit \[page 352\]](#)

6.12.5.2.1 Checking the Trace File of SAP CC Cockpit

The SAP CC Cockpit web applications log trace messages in trace files. By checking the trace files and recorded traces, you can identify unusual activity in a timely way, ease the troubleshooting investigations for root cause analyses.

Regularly check the trace files for errors and warnings.

As an administrator or a member of the operation team:

1. View the traces.

See Also

Configurations of the recorded traces: [Configuring Cockpit \[page 238\]](#)

6.12.5.3 Checking Error Files

Related Information

[Error Files of SAP CC 2023 \[page 355\]](#)

6.12.6 Files of the Other SAP CC Systems

SAP CC 2023 Components	Content	Filenames (by Default)	Path(by Default)
BART Server	Logs	Files: <ul style="list-style-type: none"> • bart_server_LDF1.0.log • bart_server_LDF1.1.log • ... • bart_server_LDF1.<n>.log 	<HOME>/work/log/
	File report about offline acquisition sessions or batch rating and charging sessions (offline charging)	<ul style="list-style-type: none"> • Mass acquisition of Consumption Detail Records (CDRs): bart_REPORT_ACQUISITION_YY-MM-DD_X.txt • Batch charging results: bart_REPORT_RATING_YY-MM-DD_X.txt 	<HOME>/work/
	Traces	bart_server_LDF2.0.trc	<HOME>/work/log/
	Dump	<p>Full dump of threads of the complete SAP CC system or of the specified instances.</p> <p>The dump describes each Java processing thread with its stack traces.</p>	Console of BART+
Diameter Server	Logs	Files: <ul style="list-style-type: none"> • diameter_server.log • diameter_server.log.0 • diameter_server.log.1 • ... • diameter_server.log.<n> 	<HOME>/work/logs

6.12.7 Files of the Graphical User Interfaces

SAP CC 2023 Components	Content	Filenames (by Default)	Path (by Default)
Core Tool	Logs	No file by default	N/A
BART Tool	Traces	No file by default	N/A
CAT Tool	Operation request messages ²¹¹ Operation requests and XML messages setn to the SAP system	No file by default	N/A
Cockpit	Logs	There is no log message file. Refer to the log files of the Java Web Server system where the Cockpit web applications are deployed.	-
	Traces	Files: <ul style="list-style-type: none"> • <code>cccockpit_LDF2.trc</code> • <code>cccockpit_LDF2.0.trc</code> • <code>cccockpit_LDF2.1.trc</code> • <code>cccockpit_LDF2.2.trc</code> Pattern: <ul style="list-style-type: none"> • <code><WEB_APP_NAME>_LDF2.trc</code> • <code><WEB_APP_NAME>_LDF2.<i>.trc</code> Where: <ul style="list-style-type: none"> • <code><WEB_APP_NAME></code> is the technical name of the deployed Cockpit application. It is the URI of the web application. In the Apache Tomcat Server system, it is the application path or the Tomcat Context. • <code><i></code> is an integer from 0 to 2 	<code><CATALINA_HOME>/logs/</code> Where <code><CATALINA_HOME></code> is the home directory of Catalina (Apache Tomcat Server) on the Tomcat host. By default, the SAP CC Cockpit web applications generate files in the default log folder of the Apache Tomcat Server system.

Refer to the [Troubleshooting of SAP CC \[page 445\]](#) section for more information about the traces and other supportability tools and procedures.

²¹¹ The XML message content is only visible in the Core Tool user interface.

6.12.8 Log Files of the Java Web Server for SAP CC Cockpit

Apache Tomcat Server

If you installed SAP CC Cockpit in an *Apache Tomcat Server* system, refer to the log files of this Java Web Server system. `catalina.log`.

❖ Example

In the `catalina.log` file, you may find such entry:

```
Jan 14, 2017 2:31:22 PM org.apache.catalina.loader.WebappClassLoader
checkThreadLocalMapForLeaks

SEVERE: The web application [/cccockpit] created a ThreadLocal with key of
type [java.lang.ThreadLocal] (value [java.lang.ThreadLocal@7193666c]) and a
value of type
[com.highdeal.logging.context.LoggingContextThreadLocal.LoggingContext]
(value
[com.highdeal.logging.context.LoggingContextThreadLocal$LoggingContext@20deea7
f]) but failed to remove it when the web application was stopped.
This is very likely to create a memory leak.
```

Related Information

[Installing and Starting Cockpit](#)

6.12.9 Error Files of SAP CC 2023

Regularly verify that the error directories do not include any erroneous files.

Error Files of the Main Component

SAP CC 2023 Components	Content	Filenames	Path
Core Server Bulkloader instances	Billable items in file that has been rejected by SAP ERP/FI-CA(*).	<p>*.arc.zip, *.arc.gz, *.arc.csv</p> <p>These items are stored in new files in the INVALID directory. To load the file content, apply the following procedure:</p> <ol style="list-style-type: none"> 1. Open the item file to see the reason of the reject of the item 2. Fix the defect according to the noticed reason by modifying the item (ex: modify a field date) or by improve the provisioning on SAP ERP/FI-CA side (ex: create missing account) 3. Move the file from INVALID directory to the regular directory 4. Check that the items are properly loaded inside SAP ERP/FI-CA 	<ul style="list-style-type: none"> • <WORKING_DIRECTORY> / SAPCC_CIT / ACQUIRED / INVALID / • <WD> / SAPCC_CIT / CHARGED / INVALID / <p>Note that the path may differ: it is defined in the CIF configuration. See an example here [page 98].</p>

Components	Content	Filenames	Path
	Billable items in file not sent due to communication failure with SAP ERP/FI-CA(*)	<p>*.arc.zip, *.arc.gz, *.arc.csv</p> <p>These items are stored in new files in the COM_EXCEPTION directory. To load the file content, apply the following procedure:</p> <ol style="list-style-type: none"> 1. Open the item file in order to see the reason of the reject of the item 2. Fix the defect according to the noticed reason by modify the SAP Convergent Charging configuration, or by modifying the SAP ERP/FI-CA configuration, or by modifying the OS configuration 3. Check on SAP ERP/FI-CA if the items have been loaded 4. Remove from the file the items which have already been loaded 5. Move the file from COM_EXCEPTION direction to the regular directory 6. Check that the remaining items are properly loaded inside SAP ERP/FI-CA 	<ul style="list-style-type: none"> • <WORKING_DIRECTORY> / SAPCC_CIT / POSTPAID / COM_EXCEPTION / • <WD> / SAPCC_CIT / PREPAID / COM_EXCEPTION / <p>Note that the path may differ: it is defined in the CIF configuration. See an example here [page 98].</p>
	Consumption items in file that has been rejected by SAP ERP/FI-CA(*)	<p>*.arc.zip, *.arc.gz, *.arc.csv</p> <p>These items are stored in new files in the INVALID directory. To load the file content, apply the following procedure:</p> <ol style="list-style-type: none"> 1. Open the item file to see the reason of the reject of the item 2. Fix the defect according to the noticed reason by modifying the item (ex: modify a field date) or by improve the provisioning on SAP ERP/FI-CA side (ex: create missing account) 3. Move the file from INVALID directory to the regular directory 4. Check that the items are properly loaded inside SAP ERP/FI-CA 	<ul style="list-style-type: none"> • <WORKING_DIRECTORY> / SAPCC_CI / ACQUIRED / INVALID / • <WD> / SAPCC_CI / CHARGED / INVALID / <p>Note that the path may differ: it is defined in the CIF configuration. See an example here [page 98].</p>

Content	Filenames	Path
Consumption items in file not sent due to communication failure with SAP ERP/FI-CA(*)	<p>*.arc.zip, *.arc.gz, *.arc.csv</p> <p>These items are stored in new files in the COM_EXCEPTION directory. To load the file content, apply the following procedure:</p> <ol style="list-style-type: none"> 1. Open the item file in order to see the reason of the reject of the item 2. Fix the defect according to the noticed reason by modify the SAP Convergent Charging configuration, or by modifying the SAP ERP/FI-CA configuration, or by modifying the OS configuration 3. Check on SAP ERP/FI-CA if the items have been loaded 4. Remove from the file the items which have already been loaded 5. Move the file from COM_EXCEPTION direction to the regular directory 6. Check that the remaining items are properly loaded inside SAP ERP/FI-CA 	<ul style="list-style-type: none"> • <WORKING_DIRECTORY> / SAPCC_CI / ACQUIRED / COM_EXCEPTION / • <WD> / SAPCC_CI / CHARGED / COM_EXCEPTION / <p>Note that the path may differ: it is defined in the CIF configuration. See an example here [page 98].</p>
There is a technical issue during the item write or during the item read.	<p>*.err.zip, *.err.gz, *.err.csv</p> <p>The file is renamed with the ERR extension. See Charged Item Files Partially or Not Loaded into SAP ERP/FI-CA [page 486].</p> <p>To load the file content, apply this procedure: Inspecting the Erroneous Item Files/Control Files and Resuming the System Operations [page 487].</p>	<ul style="list-style-type: none"> • <WORKING_DIRECTORY> / SAPCC_CIT / ACQUIRED / • <WD> / SAPCC_CI / CHARGED / • <WD> / SAPCC_CIT / POSTPAID / • ... <p>Items are stuck in an erroneous file inside the regular directory with the ERR extension.</p>

Components	Content	Filenames	Path
	Notification alerts not sent to SAP CRM SAP ERP/FI-CA(*)	<p>*.arc.zip, *.arc.gz, *.arc.csv</p> <p>Each bulkloader instance of the Core Server system has its own set of error log files.</p> <p>Several instances can be installed on the same host machine.</p> <p>A control file includes the error message.</p> <p>Try to fix the problem and consult the Troubleshooting section.</p>	<ul style="list-style-type: none"> • <code><WORKING_DIRECTORY>/SAPCC_NOTIF/ERROR/</code>

Note

(*)

The bulkloader instances are only installed in a system landscape in an integrated SAP Solution scenario with the SAP CRM and SAP ERP/FI-CA components of SAP Business Suite.

- By default, the error files related to the mass loading function of billable items and consumption items into the SAP ERP/FI-CA systems are located in subfolders of the Working Directory defined at the installation time in each machine hosting an instance of the SAP CC system.

You can determine those subfolders by getting the values of the following system parameters with [Admin+](#) or [Manage SAP CC System Parameters](#):

- [CHARGED_CI_ERR_INVALID_WRITER_ROOT_PATH](#)
- [CHARGED_CI_ERR_COM_EXCEPTION_WRITER_ROOT_PATH](#)
- [NOTIF_WRITER_ROOT_PATH](#)
- In case of advanced system configurations, these names of parameters can change:
 - Use [Setup Tool](#) from a dispatcher instance and export the CIF²¹² configuration of the bulkloader instances:

```
setup cif export bulkLoader <myfilename>
```

- In the exported file, locate the error handling nodes that include root path information.

File Formats

For more information about the formats of the error files, refer to the [SAP CC 2023 Application Help](#) documentation.

In the [Processes and Functions](#) chapter, consult the [Data Files Bulk Loading Process](#) section.

²¹² Charging output Integration Framework

Error Files of Other Components

SAP CC 2023 Components	Content	Filenames (by Default)	Path (by Default)
BART Server	Error message	<code>error.log</code>	<code><HOME>/work/</code>
	SQL failure files	<p>When an SQL failure occurs during a batch rating and charging session, the BART Server system securely stops all ongoing processes, saves the list of CDRs being charged to files and shuts down to prevent any other failure.</p> <p>The lists of pending CDRs in process are saved to sql failures files.</p> <p>The sql failure files are reloaded when the BART Server system restarts and the content is then committed to the running database.</p> <p>The function prevents the system from triggering faulty batch charging sessions, which may lead to inconsistencies in price computation.</p>	<code><HOME>/work/logs/sql_failures</code>

6.12.10 Useful Errors and Error Code List

BART Server

During a batch rating and charging session, the BART Server system can retrieve rating and charging errors from the connected Core Server system. The BART Server system always stores an error code directly in each processed Consumption Detail Record (CDR).

You can analyze the error through the BART Tool user interface or by consulting the error code list available in the `<BART_HOME>/docs/errors/` folder.

6.12.11 Further Information

- [SAP CC 2023 Security Guide](#) for the formats of the logs
- [SAP CC 2023 Administration Guide \[page 8\]](#) for the configuration of the log file management

7 Management of SAP CC

SAP provides you with an infrastructure that allows your system administration team to administer SAP Technology effectively by completing all tasks related to technical administration and operation. This section describes the related topics on the SAP application level.

[Starting and Stopping \[page 361\]](#)

[Software Configuration \[page 364\]](#)

[Administration Tools \[page 366\]](#)

[Configuring and Reconfiguring \[page 368\]](#)

When needed, you can modify the technical configurations of SAP Convergent Charging systems and applications.

[Viewing System Indicators and Runtime Values \[page 368\]](#)

In the environment of SAP Convergent Charging, you need to use the Admin+ user interface to view and inspect the system indicators of your running SAP systems.

[Backup and Restore \[page 368\]](#)

[Periodic Tasks \[page 381\]](#)

[Load Balancing \[page 398\]](#)

[Scaling SAP Convergent Charging \[page 401\]](#)

[User Account Management \[page 402\]](#)

[License Management \[page 403\]](#)

[Maintaining Certificates \[page 403\]](#)

As a system administrator, I want to change security certificates when their validity is about to expire.

[Management of Outdated Technical Data \[page 404\]](#)

[Administration: System Audit and Control \[page 406\]](#)

7.1 Starting and Stopping

The procedure for starting and stopping the deployed SAP CC systems in your SAP system landscapes depends on the underlying operating system (OS) of the hosts composing each SAP CC system.

For more information, refer to the [SAP CC 2023 Installation and Maintenance Guide](#) documentation. See [Starting and Stopping the Server Systems](#).

Launch Tools for SAP Convergent Charging (SAP CC)

Application	Application Type		OS Availability	
	GUI	Command-Line	Microsoft Windows	Linux Operating System
SAP Management Console (SAP MC)	■		■	■
SAP Microsoft Management Console (SAP MMC)	■		■	
SAPControl		■	■	■

Start and Stop Sequence

Sequence for a Real-Time Scenario (Online Charging Variant)

SAP CC 2023 Component	Sequence	Tool and Description
Core Server (System) All instances	1 (n)	<ul style="list-style-type: none"> SAPControl (Microsoft Windows, Linux Operating System) SAP Management Console (Linux Operating Systems) SAP Microsoft Management Console (Microsoft Windows) <div style="border: 1px solid #ccc; background-color: #f9f9f9; padding: 10px; margin-top: 10px;"> <p>→ Recommendation</p> <ul style="list-style-type: none"> Start or restart one instance at a time: one after the other. Wait for an instance to be fully (re)started before (re)starting another one. Always first (re)start the dispatcher instances. SAP SE recommends this specific order for (re)starting: <ol style="list-style-type: none"> Dispatcher instances Updater instances Guider instances Rater instances Bulkloader instances <p>You can get the list of the instances by using the Display System Status app of the Cockpit, or Admin+ and the <code>list</code> command.</p> </div>
Diameter Server (System)	2	<ul style="list-style-type: none"> SAPControl (Microsoft Windows, Linux Operating System) SAP Management Console (Linux Operating System) SAP Microsoft Management Console (Microsoft Windows)

Batch Mode Scenario (Offline Charging Variant)

SAP CC 2023 Component	Sequence	Tool and Description
Core Server (System) All instances	1 (n)	<ul style="list-style-type: none">• SAPControl (Microsoft Windows, Linux Operating System)• SAP Management Console (Linux Operating System)• SAP Microsoft Management Console (Microsoft Windows) <div style="border: 1px solid #ccc; background-color: #f9f9f9; padding: 10px;"><p>→ Recommendation</p><ul style="list-style-type: none">• Start or restart one instance at a time: one after the other. Wait for an instance to be fully (re)started before (re)starting another one.• Always first (re)start the dispatcher instances.• SAP SE recommends this specific order for starting or re-starting:<ol style="list-style-type: none">1. The dispatcher instances2. The updater instances3. The guider instances4. The rater instances5. The bulkloader instances6. The taxer instancesThe bulkloader and the taxer instances are maybe not installed on your landscape depending on your Business Scenario.</div>
BART Server (System)	2	Optionally launch: <ul style="list-style-type: none">• SAPControl (Microsoft Windows, Linux Operating System)• SAP Management Console (Linux Operating System)• SAP Microsoft Management Console (Microsoft Windows)
Import/Export Connector (Application)	3	Optionally launch: <ul style="list-style-type: none">• From console: <code>iec_remote.sh</code> (Linux Operating System)• From command prompt: <code>iec_remote.bat</code> (Microsoft Windows)

Related Documentation

- SAP Management Console (SAP MC): [SAP Management Console](#)
- SAP Microsoft Management Console (SAP MMC): [SAP Microsoft Management Console](#)
- SAPControl: <https://help.sap.com/viewer/ff18034f08af4d7bb33894c2047c3b71/latest/en-US/471d6feeff6e0d46e1000000a155369.html>

Related Information

[Starting and Stopping the Server Systems](#)

7.2 Software Configuration

This chapter explains which components of SAP Convergent Charging 2023 are configurable and which SAP CC tools are available for adjusting.

All the configuration procedures are grouped in a unique configuration document. The relevant tools (graphical user interfaces and command line programs) are provided with each software component.

SAP CC 2023 Component	SAP CC Tool	Configurations
Core Server	Cockpit	System configuration (SAP system parameters) <ul style="list-style-type: none"> • Business features • Technical features
	Core Tool	Business configuration (Master data, business and custom data, end-customer data)
	Admin+	<ul style="list-style-type: none"> • System configuration (SAP system parameters) <ul style="list-style-type: none"> • Business features • Technical features • Business configuration (business and custom data) • Technical configuration
	Setup Tool	<ul style="list-style-type: none"> • System configuration (technical features: CIF, RIF...) • Data configuration
	Config Tool	System configuration (SAP system parameters) <ul style="list-style-type: none"> • Business features • Technical features
BART Server (Offline Charging)	BART Tool	<ul style="list-style-type: none"> • Business configuration (transactional data) • Job management • Monitoring
	BART+	<ul style="list-style-type: none"> • Business configuration • Technical configuration
	BART Setup Tool	
Import/Export Connector (IEC)	CAT Tool	Technical configuration

SAP CC 2023 Component	SAP CC Tool	Configurations
Diameter Server (Online Charging)	N/A	A text editor should be used
<div style="border: 1px solid #ccc; padding: 10px;"> <p>⚠ Caution</p> <p>From SAP Convergent Charging SP 4, there is no further planned enhancements to the Diameter Server component. For further information, refer to SAP Note 2792189.</p> </div>		
	The Diameter Server system has no specific configuration tool	

For more information about implementation and configuration, refer to the [SAP CC 2023 Administration Guide \[page 8\]](#) documentation.

Configuration Files

All the components of SAP CC 2023 use some configuration files located in the `<HOME>/config/` installation folder. Templates are also provided (*.sk file extension) to facilitate the management of these configuration files.

Core Server

The SAP CC Core Server system uses mostly configurations stored in SAP CC Core Database in the following database tables:

- INSTANCE_CONFIGURATION
- CONFIGURATION
- CERT_STORE
- INSTANCE_CERT_STORE

You can use the [Cockpit](#) user interface, the [Cockpit](#) user interface and the [Setup Tool](#) user interface to view or change the system settings related to system processes or business processes.

BART Server

The SAP CC BART Server system uses a single configuration file (`bart.config`) in read/write access. Its file format uses the ISO 8859-1 character encoding. Refer to the [SAP CC 2023 Administration Guide \[page 8\]](#) documentation for more information.

Some settings are stored in SAP CC BART Database in the `CERT_STORE` and `INSTANCE_CERT_STORE` database tables. You can use the [BART Setup Tool](#) user interface to view or change the security certificates.

ⓘ Note

Characters that cannot be directly represented in this encoding scheme must be written using Unicode escapes. Consult details at: http://java.sun.com/docs/books/jls/third_edition/html/lexical.html#3.3

Diameter Server

The SAP CC Diameter Server system uses a single configuration file (`diameter.config`) in read/write access. Its file format uses the ISO 8859-1 character encoding. Refer to the [SAP CC 2023 Administration Guide \[page 8\]](#) documentation for more information.

⚠ Caution

From SAP Convergent Charging 5.0 SP 4, there is no further planned enhancements to the Diameter Server component. For further information, refer to SAP Note [2792189](#).

7.3 Administration Tools

This chapter explains which components have administration tools and where to find related documentation.

SAP CC 2023 Component	Administration Tool	Description	Server System Restart Needed?
Core Server	Cockpit	<ul style="list-style-type: none"> System configuration: system parameter management System information: <ul style="list-style-type: none"> Item files monitoring System and instance status System and data auditing: license, system usage Master data (for service provider) configuration and maintenance 	Always for system configuration
	Core Tool	<ul style="list-style-type: none"> User management Master data (for service provider) configuration and maintenance Customization of business data (public holidays, currencies) and maintenance 	No restart
	Admin+	<ul style="list-style-type: none"> Configuration: <ul style="list-style-type: none"> System parameter management <ul style="list-style-type: none"> Business settings Technical settings Business data Technical operations 	Always

📌 Note

Online changes are only possible for log settings. See the [SAP CC 2023 System Parameter Reference](#) documentation.

SAP CC 2023 Component	Administration Tool	Description	Server System Restart Needed?
	Setup Tool	<ul style="list-style-type: none"> Configuration: <ul style="list-style-type: none"> System Data Certificate management License management 	Always
	Config Tool	<ul style="list-style-type: none"> System configuration: system parameter management 	
	SL Common GUI	<ul style="list-style-type: none"> System deployment (multiple hosts, multiple instances) Configurations (system / data) 	
BART Server	BART Tool	<ul style="list-style-type: none"> System configuration Operations 	No restart
	BART+	<ul style="list-style-type: none"> Business configuration (master data) Technical configuration 	Always
	BART Setup Tool		
Diameter Server	N/A	A text editor should be used	Always

⚠ Caution

From SAP CC 5.0 SP 4, there is no further planned enhancements to the Diameter Server component. For further information, refer to SAP Note [2792189](#).

The Diameter Server system has no specific administration tool

→ Recommendation

To consider the parameter changes, the server systems may need to restart. In a production environment, schedule always these operations during a specific low traffic period. According to your environment (high availability or not), a downtime may be necessary and this process can temporarily decrease the performances of SAP Convergent Charging. Consult the [High Availability Operations \[page 414\]](#) section of this documentation.

7.4 Configuring and Reconfiguring

When needed, you can modify the technical configurations of SAP Convergent Charging systems and applications.

There are various tools and methods.

Depending on the function or mechanism to modify, you can manage:

- Immediate changes that are immediately taken into account.
Depending on the modified setting, some delay may be necessary before the change is effective.
Only few settings are candidate for immediate modifications
- Deferred changes that require a restart.

7.5 Viewing System Indicators and Runtime Values

In the environment of SAP Convergent Charging, you need to use the Admin+ user interface to view and inspect the system indicators of your running SAP systems.

→ Tip

You cannot use the SAP Convergent Charging Cockpit user interface to view system indicators.

Using Admin+

Use the Admin+ user interface and its `get` command:

- [Launch Admin+ \[page 368\]](#).
- In the console, use the [get command](#).
See also: [SAP CC 2023 Primary Help for Admin+](#)

→ Tip

Consult the [SAP CC 2023 System Parameter Reference](#) documentation for more information about the system indicators.

See also: [SAP CC 2023 Performance Metric Reference](#)

7.6 Backup and Restore

You must back up your SAP system landscape regularly to ensure that you can restore and recover it in case of failure.

Backup and Restore Strategy

The backup and restore strategy for SAP Convergent Charging (SAP CC) 2023 consists of two parts:

- Backup and restore coverage for each component (see table below) and for the associated databases
- Cross-system data dependencies and handling

The backup and restore strategy for your system landscape should not only consider SAP systems but should also be embedded in overall business requirements and incorporate your company's entire process flow.

Note

In addition, the backup and restore strategy must cover disaster recovery processes, such as the loss of a data center through fire. It is the most important in this context that you ensure that backup devices are not lost together with normal data storage (separation of storage locations).

Based on the type of application data a component holds, we have used a categorization scheme that can be used to analyze the backup requirements of any system component and to easily determine an appropriate backup method for this component.

The following table contains the component list of SAP CC 2023 and the appropriate categories:

SAP CC 2023 Component	SAP Category for Backup/Restore	Methods for Backup and Restore	Backup Operations for Application Data
Core Server	X Category X: Original application data, data exchange with other systems, data managed by a DBMS, not based on SAP WebAS	<ol style="list-style-type: none"> 1. Application data: Back up the data and ensure data consistency with other systems. 2. Software: Backup is necessary. 3. Software configuration: Backup is necessary. 4. Logs: Backup is necessary. 	<ul style="list-style-type: none"> • File backup: <ul style="list-style-type: none"> • Business critical original data (item files resulting from charging operations) • Business critical original data (error files with charged items resulting from charging operations) • Logs and traces • Database backup (Core Database): <ul style="list-style-type: none"> • Business critical original data (master data) • Software configurations
BART Server (when available in the SAP system landscape)	X Category X: Original application data, data exchange with other systems, data managed by a DBMS, not based on SAP WebAS	<ol style="list-style-type: none"> 1. Application data: Back up the data and ensure data consistency with other systems. 2. Software: Backup is necessary. 3. Software configuration: Backup is necessary. 4. Logs: Backup is necessary. 	Database backup (BART Database)

SAP CC 2023 Component	SAP Category for Backup/Restore	Methods for Backup and Restore	Backup Operations for Application Data
Diameter Server (if available in the SAP system landscape)	II Category II: Only software and configuration information, no application data	<ol style="list-style-type: none"> 1. Application data: No data backup is required. 2. Software: Initial software backup after installation and backup after changes have been applied. 3. Software configuration: Backup is necessary. 4. Logs: Backup is required. 	N/A
<div style="display: flex; justify-content: space-between;"> <div style="width: 20%; background-color: #e0e0e0; padding: 5px;"> <p>Note</p> <p>Data exchange with other systems</p> </div> <div style="width: 60%; background-color: #e0e0e0; padding: 5px;"> <p>Note</p> <p>After a system crash, you can use any of the procedures to restore your component:</p> <ul style="list-style-type: none"> • Perform a new installation and restore the configuration • Restore the backup of the software and the software configuration </div> </div>			
Import/Export Connector (if available in the SAP system landscape)	Category: IX / X Original application data, data exchange with other systems, data managed or not managed by a DBMS	<ol style="list-style-type: none"> 1. Application data: Back up the application specific file system and ensure data consistency with other systems. 2. Software: Backup is necessary. 3. Software configuration: Backup is necessary. 4. Logs: No backup is required. 	<ul style="list-style-type: none"> • File backup • Database backup
Core Tool	II Category II: Only software and configuration information, no application data	<ol style="list-style-type: none"> 1. Application data: No data backup is required. 2. Software: No backup is required. 3. Software configuration: No backup is required. 4. Logs: No data backup is required. 	N/A
Cockpit (as of version 2022 FPS 0)	X Category X: Original application data, data exchange with other systems, data managed by a DBMS, not based on SAP WebAS	<ol style="list-style-type: none"> 1. Application data: Back up the data and ensure data consistency with other systems. 2. Software: Backup is necessary. 3. Software configuration: Backup is necessary. 4. Logs: Backup is necessary. 	<ul style="list-style-type: none"> • File backup <ul style="list-style-type: none"> • Software configurations (PROPERTIES files of all the deployed applications) • Database backup (Cockpit Database)
Cockpit (other release versions 2021, 2020, and 5.0)	II Category II: Only software and configuration information, no application data	<ol style="list-style-type: none"> 1. Application data: No data backup is required. 2. Software: No backup is required. 3. Software configuration: No backup is required. 4. Logs: No data backup is required. 	N/A

SAP CC 2023 Component	SAP Category for Backup/Restore	Methods for Backup and Restore	Backup Operations for Application Data
BART Tool (if available in the SAP system landscape)	II Category II: Only software and configuration information, no application data	<ol style="list-style-type: none"> 1. Application data: No data backup is required. 2. Software: No backup is required. 3. Software configuration: No backup is required. 4. Logs: No data backup is required. 	N/A
CAT Tool (if available in the SAP system landscape)	VI Category VI: Original application data, data exchange with other systems, data not managed by a DBMS	<ol style="list-style-type: none"> 1. Application data: Back up the application specific file system (scenario files). 2. Software: No backup is required. 3. Software configuration: No backup is required. 4. Logs: No data backup is required. 	File backup

General Recommendations

You must regularly test your backup and restore strategy. A single test is insufficient, since the SAP CC 2023 system landscape is likely to change and render a given strategy redundant. System administrators need an up-to-date backup and recovery strategy to restore failed systems.

SAP recommends that you perform a backup:

- After the initial installation and configuration of the SAP CC 2023 system landscape
- After specific changes, such as changes to the configuration, software update of individual components, or replacement of components made to the system landscape. This of course depends on the frequency of such changes

When you decide which components or which parts of the components to back up, consider the following factors:

- Time required for a complete reinstallation
- Time required for additional configuration
- Effects of the expected downtime of one or more infrastructure components with regard to the overall availability of the landscape

A backup process must ensure:

- Logical consistency
Restore the SAP CC 2023 system landscape (cross-system data consistency) to a consistent status. The restoration applies at document level at the time of the backup. This includes the successful rollback of all open business transactions with respect to the exchange of data.
- Physical consistency
Restore individual SAP CC 2023 components to a consistent state, followed by a successful startup of the restored components, and a successful reconnection to other components. Physical consistency provides a working runtime environment in which newly created business data can be exchanged. This is required

to develop a transactional conduct on user level to react to broken workflows and outdated documents appearing after the restoration.

7.6.1 Detailed Backup and Restore

When you plan a backup and restore strategy for application data, software and configuration files, you must consider the following elements:

- Operating system
- Database data files
- Database software
- SAP software and file systems
- Log files (SAP and others)
- Software and other system components (file systems and configuration files)

A component that has application data (a database, for example) usually comprises application software and configuration files (runtime infrastructure) that need a backup as well. A component, which contains no application data, may comprise configuration files and software that require a backup.

The following table lists various elements of components and details the necessary data that needs backup or needs to be restored in each category.

SAP CC 2023 Component	Online Charging	Offline Charging
Core Server	Yes	Yes
Core Database	Yes	Yes
Core Tool	Yes	Yes
Diameter Server	Yes if part of the SAP CC system landscape	-
BART Server	-	Yes when part of the SAP CC system landscape
BART Database	-	Yes
BART Tool	-	Yes
Import/Export Connector	-	Yes
CAT Tool	-	Yes

Online and Offline Charging: Core Server, Core Database, and Core Tool

SAP CC 2023 Component	Data to Be Backed Up	Data Location	Backup Recommended	Backup Frequency
Core Server System	Software	Files created by the SAP installer in the appropriate folder (<code>/usr/sap/<SID>/SYS/profile/</code>)		<ul style="list-style-type: none"> Once a month to once a week After installation or maintenance changes
	<div style="border: 1px solid #ccc; background-color: #f9f9f9; padding: 5px;"> <p>Note</p> <p>Each instance of the Core Server system has its own installation folder.</p> </div>			
	Software configuration	<ul style="list-style-type: none"> Files stored in <code>/usr/sap/<SID>/<INSTANCE_ID>/config/</code> folder (for each instance composing the SAP CC system) If the CA APM Introscope Agent is installed with the SAP CC system, consider the <code>IntroscopeAgent.profile</code> file. Configuration data records are stored in the back-end database (Core Database) in its RDBMS <p>See backup/restore for Core Database.</p>		<ul style="list-style-type: none"> Once a month to once a week After installation or maintenance changes
	Application data	<ul style="list-style-type: none"> Data is mostly stored in the Core Database (detailed in this table) Multiple important data files (aka item files) contain business data for accounting and billing purposes 	See Core Database	
	Logs	Files stored in <code>/usr/sap/<SID>/<INSTANCE_ID>/work/</code> folder (for each instance)		Once a month to once a week
Core Database	Software	Depends on your RDBMS		After installation and after maintenance changes
	Software configuration	Depends on your RDBMS		<ul style="list-style-type: none"> Once a month to once a week After installation or maintenance changes
	Application data	In the database		Once a month to once a week
	Logs	Depends on your RDBMS		
	Core Tool	Software	Files stored in the default installation folder <code><HOME>/</code>	

SAP CC 2023 Component	Data to Be Backed Up	Data Location	Backup Recommended	Backup Frequency
	Software configuration	Files stored in <HOME>/config/ folder (default installation)		

Online Charging with Diameter Server

Note

As of SP 4 for release 5.0, there are no further planned enhancements to the Diameter Server component. Refer to SAP Note [2792189](#).

SAP CC 2023 Component	Data to Be Backed Up	Data Location	Backup Recommended	Backup Frequency
Diameter Server System	Software	Files created by the SAP installer in the appropriate folder (/usr/sap/<SID>/SYS/profile)		After installation and after maintenance changes
	Software configuration	Files in /usr/sap/<SID>/<INSTANCE_ID>/config/ folder	<ul style="list-style-type: none"> Once a month to once a week After installation or maintenance changes 	
	Logs	Files in /usr/sap/<SID>/<INSTANCE_ID>/work/ folder		Once a month to once a week

Offline Charging with BART Server, BART Database, BART Tool, Import/Export Connector, and CAT Tool

SAP CC 2023 Component	Data to Be Backed Up	Data location	Backup Recommended	Backup Frequency
BART Server System	Software	Files created by the SAP installer in the appropriate folder (/usr/sap/<SID>/SYS/profile/)	<ul style="list-style-type: none"> Once a month to once a week After installation or maintenance changes 	

SAP CC 2023 Component	Data to Be Backed Up	Data location	Backup Recommended
			Backup Frequency
	Software configuration	Files in <code>/usr/sap/<SID>/<INSTANCE_ID>/config/</code> folder	<ul style="list-style-type: none"> Once a month to once a week After installation or maintenance changes
	Application data	Data is stored in the BART Database detailed in this table	See: BART Database
	Logs	Files in <code>/usr/sap/<SID>/<INSTANCE_ID>/work/</code> folder	Once a month to once a week
BART Database	Software	Depends on your RDBMS	After installation and after maintenance changes
	Software configuration	Depends on your RDBMS	<ul style="list-style-type: none"> Once a month to once a week After installation or maintenance changes
	Application data	In the database	Once a month to once a week
	Logs	Depends on your RDBMS	
Import/Export Connector	Software	Files in default installation folder (<code><HOME></code>)	After installation and after maintenance changes
	Software configuration	Files in <code><HOME>/config/</code> folder (default installation)	<ul style="list-style-type: none"> Once a month to once a week After installation or maintenance changes
	Application data	Data is stored in the IEC Database detailed in this table	See IEC Database
	Logs	Files in <code><HOME>/logs/</code> folder (default installation)	Once a month to once a week
IEC Database	Software	Depends on your RDBMS	After installation and after maintenance changes
	Software configuration	Depends on your RDBMS	<ul style="list-style-type: none"> Once a month to once a week After installation or maintenance changes
	Application data	In the database	Once a month to once a week
	Logs	Depends on your RDBMS	
BART Tool	Software	Files in the default installation folder <code><HOME>/</code>	

SAP CC 2023 Component	Data to Be Backed Up	Data location	Backup Recommended
			Backup Frequency
	Software configuration	Files in <HOME>/config/ folder (default installation)	
CAT Tool	Software	Files in the default installa- tion folder <HOME> /	
	Software configuration	Files and database	
	Application Data	Files	

CC_EZTAX Central Repository

When your system landscape includes functions to manage the US taxes for telecommunications, you have to back up and restore a central repository CC_EZTAX that includes few software files and data related to the Avalara AvaTax for Communications (AFC) software:

SAP CC 2023 Component	Data to Be Backed Up	Data location	Backup Recommended
			Backup Frequency
BART Server	Software	Files created by the SAP installer in the appropriate folders of CC_EZTAX reposi- tory: <ul style="list-style-type: none"> • /jar/ contains the file eztax.jar • /lib/ contains Avalara AvaTax for Communications (AFC) library files (*.dll, *.so) 	<ul style="list-style-type: none"> • Once a month to once a week • After installation or maintenance changes
	Software configuration	N/A	
	Application data	<ul style="list-style-type: none"> • transervdesc.txt file • Avalara AvaTax for Communications (AFC) database files (CC_EZTAX/db/) 	See: Core Database
	Logs	N/A	

The following sections describe specific information about the various elements you must consider, such as, the operating system used, the database software, and so on, when you plan a backup and restore strategy for application, software, and configuration files.

7.6.2 Operating System, Software and Configuration Data

Apart from business-critical application data (generally held in databases), you can also back up the system and application software (including configuration files). If you do this, you do not have to reinstall the system and application software if the software becomes damaged.

It is always possible to reinstall the operating system, software, and configuration data. However, reinstallation and configuration can take a long time. Therefore, if a backup of the software and configuration is available, you can reduce the time needed to restore your system after a system failure.

Online Backup

The data contained in the database can be backed up online; however, it is not possible to do the same for the runtime infrastructure. An online backup refers to the system landscape and not the databases that contain the business-critical application, or the infrastructure components.

If you perform a backup while the server is running, open files may not be backed up.

File System Backup versus Full System Backup

A file system backup only applies to specific files or file systems, whereas a full system backup applies to all files and file systems, including the operating system.

After installation of new software components, certain entries in the configuration files of the operating system cannot be found in the file systems in which the software installation occurred.

SAP therefore recommends that you perform a full system backup after installation, and that you back up the file systems of the installed software and the operating system on a regular basis.

7.6.3 Database Backup/Restore for SAP CC 2023

In the environment of SAP Convergent Charging (SAP CC), you must back up your databases regularly to ensure that you can restore and recover it in case of failure. Plan database backups before and after the maintenance of the SAP CC software product when implementing a patch level or a feature package stack (FPS).

SAP recommends that you run the database in archive mode.

This means that all actions on the database that modify data is recorded by the database and written to a transaction log. With regular full backups of your database (either offline or online), as well as a complete set of transaction logs since the last backup, it is possible to restore a crashed database to any point in time before the database crashed.

**SAP CC
2023 Com-
ponent**

	Database	Application Data for Backup and Restore	Backup Method for Application Data
Core Server	Core Database	Business critical original data (master data, customer master data) Technical data (user definitions, audit) Configuration data of the software component (Core Server)	RDBMS supplier relevant methods and tools
BART Server (when available in the SAP system landscape)	BART Database	Business critical data (master data) Business critical data (transactional data): CDR ²¹³ Configuration data of the software component (BART Server)	RDBMS supplier relevant methods and tools
Cockpit	Cockpit Database	Business critical data (master data): rate plans, allowance plans, pricing configurations for the pricing of the chargeable services, and drafts for the pricing specialists Configuration data for the users of the software component (Cockpit)	RDBMS supplier relevant methods and tools

[Backing Up a Database \[page 378\]](#)

[Restoring a Database \[page 379\]](#)

[Moving a Core Database \[page 379\]](#)

7.6.3.1 Backing Up a Database

To ensure recoverability of your SAP CC systems, SAP recommends that you regularly back up the Core Database and BART Database. The procedure depends on the technology of the back-end database system:

- When using SAP HANA, refer to the SAP Note [1642148](#) and to the SAP HANA Administration Guide.
- When using SAP Sybase ASE, refer to the SAP Notes [1585981](#) and [1588316](#), which describe how to set up automatic backups of data and log files.
- When using Oracle, Microsoft SQL Server, or IBM DB2, refer to the normal database procedures in the database official documentation.

→ Recommendation

For SAP Convergent Charging, SAP recommends that you dump transaction logs at least every hour to ensure that the logs do not fill up the devices.

²¹³ Call Detail Record (Telecommunications industry), or more generally Consumption Detail Record

7.6.3.2 Restoring a Database

Restore the Core Database or the BART Database using the normal database procedures.

See the database official documentation for details.

7.6.3.3 Moving a Core Database

For technical reasons, you may need to move an SAP CC Core Database to another one.

Note

Before executing the procedure described below, ensure that both of the databases are the same type (Oracle, MS SQL Server, DB2, HANA, Sybase ASE ...).

Complete the following procedure:

1. Shutdown the SAP CC system.
2. Back up the "source" Core Database.
3. Shutdown the source Core Database and/or ensure it is no more reachable for current Core Database user (change Core Database user's login or password for example).
4. Import the source Core Database into the destination Core Database.
5. Update SAP CC parameters:

1. Edit dispatcher's local `boot.config` file:

- Open the `config` folder of a dispatcher instance of your SAP CC system (`<DRIVE>\usr\sap\<SID>\CCD<XX>\config`)
- Back up the `boot.config` file.
- Edit the `boot.config` file and change the following parameters with the destination Core Database information:

```
SQLHELPER_LOGIN=<DESTINATION_CORE_DATABASE_LOGIN>
SQLHELPER_PASSWORD=<DESTINATION_CORE_DATABASE_PASSWORD>
SQLHELPER_JDBC_URI=<DESTINATION_CORE_DATABASE_JDBC_URI>
```

2. Export the new parameters:

- Open the `script` folder of the previous dispatcher instance of your SAP CC system (`<DRIVE>\usr\sap\<SID>\CCD<XX>\script`)
- Export the configuration parameters with the following command:

```
./config.sh configuration export ./parameters_export.xml all
```

- Edit the `parameters_export.xml` file and for each instance type, change the following parameters with the destination Core Database information:

```
<configParameter name="SQLHELPER_JDBC_URI"
value="<DESTINATION_CORE_DATABASE_JDBC_URI>" />
<configParameter name="SQLHELPER_LOGIN"
value="<DESTINATION_CORE_DATABASE_LOGIN>" />
```

```
<configParameter name="SQLHELPER_PASSWORD"
value="<DESTINATION_CORE_DATABASE_PASSWORD>" />
```

3. Import the new configuration parameters with the following command:

```
./config.sh configuration import ./parameters_export.xml
```

6. Update SAPMNT data:

1. Edit the `boot.config` file from SAPMNT:

- Back up the `<DRIVE>/sapmnt/<SID>/profile/boot/boot.config` file.
- Edit the `<DRIVE>/sapmnt/<SID>/profile/boot/boot.config` file and change the following parameters with the destination Core Database information:

```
SQLHELPER_JDBC_URI=<DESTINATION_CORE_DATABASE_JDBC_URI>
SQLHELPER_LOGIN=<DESTINATION_CORE_DATABASE_LOGIN>
SQLHELPER_PASSWORD=<DESTINATION_CORE_DATABASE_PASSWORD>
```

2. Edit the `DEFAULT.PFL` file from SAPMNT:

- Back up the `<DRIVE>/sapmnt/<SID>/profile/DEFAULT.PFL` file.
- Edit the `<DRIVE>/sapmnt/<SID>/profile/DEFAULT.PFL` file and change the following parameters with the destination Core Database information:

```
database.uri =<DESTINATION_CORE_DATABASE_JDBC_URI>
database.login=<DESTINATION_CORE_DATABASE_LOGIN>
database.password=<DESTINATION_CORE_DATABASE_PASSWORD>
```

7. Ensure that the source Core Database is no more reachable and restart SAP Convergent Charging system. Check SAP CC logs to ensure it is connected to the new Core Database.

7.6.4 SAP CC 2023 Third-Party Components

The following table lists various elements of components and details the necessary data that needs backup or needs to be restored in each category.

Avalara AvaTax for Communications (AFC)

Component	Category	Data for backup and Re-store	Backup Method for Application Data
Avalara AvaTax for Communications (AFC)	X Original application data, data exchange with other systems, data managed by a DBMS, not based on SAP WebAS	<ul style="list-style-type: none">• Application data: backup the data and ensure data consistency with other systems• Software: backup is necessary• Software configuration: backup is necessary• Logs: backup is necessary	File backup

7.7 Periodic Tasks

[Automated Periodic Tasks \[page 381\]](#)

[Required Manual Periodic Tasks \[page 385\]](#)

[Detailed Periodic Tasks \[page 392\]](#)

7.7.1 Automated Periodic Tasks

This chapter describes all automatable tasks required to run periodically to keep the application running smoothly over time. Such tasks may be required on component level and are therefore relevant in each scenario that uses the component.

It is important that you monitor the successful execution of these tasks on a regular basis.

Core Server Tasks

Automated Periodic Task	Scheduling Tool	Recommended Frequency	Description
Business task: Periodic fee management	Cockpit , Admin+ or another application	Every day at midnight	<p>To have valid data for the invoicing and billing processes, SAP CC must compute all the relevant periodic fees. This computation must be compliant with the billing process and potential billing cycles.</p> <ul style="list-style-type: none"> An external scheduler can be plugged by the implementation project team to regularly trigger the activation of periodic fees for provider contracts or subscriptions. Refer to the relevant documentation SAP CC provides an internal scheduler to trigger the automated activation of periodic and one-off fees (see recurring rates and one-shot rates) of subscriptions for end customers. This scheduler does not take into account the provider contracts. Refer to the SAP CC 2023 System Parameter Reference about the configuration of the <code>ACTIVATION_SCHEDULER_ENABLED</code> parameter and other related parameters <p>See the SAP CC 2023 Application Help for more information about the activation process.</p> <div style="border: 1px solid #ccc; padding: 5px; margin-top: 10px;"> <p>Note</p> <p>Consult also the manual triggering of the activation of periodic fees.</p> </div>

Automated Periodic Task	Scheduling Tool	Recommended Frequency	Description
Business task: Subscriber account expiration alert management	Cockpit or Admin+	Every day at midnight Disabled by default	<ul style="list-style-type: none"> See the SAP CC 2023 Application Help for more information about the subscriber account expiration function See the SAP CC 2023 System Parameter Reference about the configuration of the <code>EXPIRATION_ALERT_SCHEDULER_ENABLED</code> parameter and other related parameters
Technical task: Heartbeat mechanism	Cockpit or Admin+	Every 2 seconds or less	<ul style="list-style-type: none"> See the SAP CC 2023 System Parameter Reference for more information about the heartbeat function of the instances of the Core Server See the SAP CC 2023 System Parameter Reference about the configuration of the <code>HEARTBEAT_POLLING_PERIOD</code> parameter and other related parameters
Technical task: Refreshing the data caches (offer level)	Cockpit or Admin+	Every 5 minutes	<ul style="list-style-type: none"> See the SAP CC 2023 System Parameter Reference for more information about the refresh function of offer business objects See the SAP CC 2023 System Parameter Reference about the configuration of the <code>REFRESH_SCHEDULER_ENABLED</code> parameter and other related parameters

Automated Periodic Task	Scheduling Tool	Recommended Frequency	Description
Technical task: Cleanup of rating records	Cockpit or Admin+	Every day at midnight Disabled by default	<ul style="list-style-type: none"> See the SAP CC 2023 Application Help for more information about the obsolete prerating function See the SAP CC 2023 System Parameter Reference about the configuration of the CLEANUP_SCHEDULER_ENABLED parameter and other related parameters
Technical task: Purging expired allowances in contracts	Cockpit or Admin+	Every day at midnight	See the SAP CC 2023 Application Help for more information about the purge mechanism dedicated to expired allowances
Technical task: Transport of change lists		Every day at midnight Disabled by default	See the Detailed Periodic Tasks [page 392] section of this documentation for more information about the transport of change lists

Core Database Tasks

Automated Periodic Task	Task Scheduling Tool	Recommended Frequency	Description
Oracle database periodic optimization	RDBMS ²¹⁴ Tool	Weekly or monthly according to your traffic	See the Detailed Periodic Tasks [page 392] section of this documentation

BART Server Tasks

Automated Periodic Task	Task Scheduling Tool	Recommended Frequency	Description
Managing batch rating and charging sessions	BART Tool (using jobs)	Weekly or monthly according to your business traffic	Jobs can be configured in the BART Server system for scheduling batch rating and charging sessions

²¹⁴ Relational Database Management System

Automated Periodic Task	Task Scheduling Tool	Recommended Frequency	Description
	Specific tool depending on the customer implementation project	Weekly or monthly according to your traffic	The periodic triggering of batch charging operations is managed in an external system connected to the BART Server via the HCI ²¹⁵ technical interface

BART Database Tasks

Automated Periodic Task	Task Scheduling Tool	Recommended Frequency	Description
Oracle database periodic optimization	RDBMS Tool	Weekly or monthly according to your traffic	See the Detailed Periodic Tasks [page 392] section of this documentation
Database cleaning	BART Tool (using jobs)	Weekly or monthly according to your traffic	Jobs can be used for scheduling database cleaning.
Purge and archive of outdated data (CDRs ²¹⁶)	RDBMS Tool	Monthly	See the SAP CC 2023 Administration Guide [page 8] about the procedures to archive transaction data (CDRs). These procedures are automated or can be manual

Diameter Server Tasks

There is no automated periodic task

Note

As of SP 4 for release 5.0, there are no further planned enhancements to the Diameter Server component. Refer to SAP Note [2792189](#).

7.7.2 Required Manual Periodic Tasks

This chapter describes all manual tasks required to run periodically to keep the application running smoothly over time. A manual task needs a person to for each execute in opposite to the scheduled tasks listed above

²¹⁵ HTTP Communication Interface

²¹⁶ Call Detail Record (Telecommunications industry), or more generally Consumption Detail Record

which can be automated using a task scheduler program. Such tasks may be required on component level and are therefore relevant in each scenario that uses the component.

It is important that you monitor the successful execution of these tasks on a regular basis.

⚠ Caution

The periodic tasks are defined by a frequency or must be triggered by an event. For example, a manual task can be necessary after certain executions of a job.

Core Server Tasks

Manual Periodic Task (Core Server)	Tool Supporting this Task	Recommended Frequency or Survey	Description
Monitor and change the sizes of data caches	Admin+	Weekly or Monthly	<p>In a production system, check the cache sizes every week if a lot of provisioning is done in your system landscape, every month otherwise.</p> <p>With the Admin+ user interface, check the values of the SUBSCRIPTION_CACHE_STATUS and SESSION_STATUS indicators.</p> <p>Here are a few signs indicating that you should increase the size of a cache:</p> <ul style="list-style-type: none"> • The remaining free memory is less than 20% of the total memory of the cache • The <i>fmem</i> field is less than 50MB • The <i>miss</i> field is a lot greater than the <i>e</i> field • A NOT_ENOUGH_SPACE
Check for error files in the output data folders (in the SAP Working Directory)			<p>In each Working Directory of the SAP CC system, verify that there is no remaining error file</p>

📌 Note

For defining the new sizes of these data caches, you can use the determination method detailed in the [SAP CC 2023 Administration Guide \[page 8\]](#) documentation without creating new objects. Use the [SUBSCRIPTION_CACHE_STATUS](#), [GUIDING_CACHE_STATUS](#) and [SESSION_STATUS](#) indicators to know how many objects are stored in the caches and you can compute the average size of one object.

Manual Periodic Task (Core Server)	Tool Supporting this Task	Recommended Frequency or Survey	Description
System operation: Purge technical data necessary to the safe operation management	Admin+ (with the <code>purge_id_emptency</code> command)	Daily, weekly or monthly The period must be determined during the implementation project phase	If your SAP CC system landscape provides refill services Note To define the purge period, refer to the SAP CC 2023 Administration Guide [page 8] documentation.
Business task: Periodic fee management	Cockpit , Admin+ or another application	Monthly or business dependent	To have valid data for the invoicing and billing processes, SAP CC must compute all the relevant periodic fees. This computation must be compliant with the billing process and potential billing cycles. <ul style="list-style-type: none"> An external triggering can be plugged by the implementation project team to manually trigger the activation of periodic fees for provider contracts or subscriptions Use the <code>start_activation</code> command or the <code>start_contract_activation</code> command of Admin+ to manually trigger the activation of periodic and one-off fees (see recurring rates and one-shot rates) of subscriptions for end customers See the SAP CC 2023 Application Help for more information about the activation process Note Consult also the automated triggering of the activation of periodic fees.
Maintain the Public Holidays	Core Tool	Yearly	Before the end of the year, maintain the public holidays
Archive the log files		Yearly	You can have to archive the logs. The periodicity depends on the system configuration and on the available space of your platform
Update the VAT ²¹⁷ rates	Setup Tool	Rare and not periodic	You must update the VAT rates known by the SAP CC system for legal reasons
Update the VAT rules	Setup Tool	Rare and not periodic	You must update the VAT rules known by the SAP CC system for legal reasons

²¹⁷ Value Added Tax

Manual Periodic Task (Core Server)	Tool Supporting this Task	Recommended Frequency or Survey	Description
Update the Avalara AvaTax for Communications (AFC) installation for all the taxer instances	Avalara AvaTax for Communications (AFC) Monthly Update	Monthly Before the end of the current month	<p>Every month, before the end of the month, an Avalara AvaTax for Communications (AFC) updated version that contains the tax rates for the next month is sent.</p> <p>This update should ideally be launched before the end of the current month (see Avalara AvaTax for Communications (AFC) Technology Monthly Maintenance [page 394] section of this documentation). Old tax rates are always logged in the new releases of Avalara AvaTax for Communications (AFC).</p> <div style="border: 1px solid orange; padding: 5px; margin-top: 10px;"> <p>⚠ Caution</p> <p>Do not stop all the taxer instances at the same time.</p> </div>
Update the DST ²¹⁸ rules	SapMachine	Rare and not periodic	The daylight saving time rules can change and may impact your business for specific regions
Update the list of ISO ²¹⁹ currencies	Core Tool	Rare and not periodic	The SAP User should import an up-to-date list of ISO currencies
Update the list of SAP currencies	Core Tool	Not periodic	<p>In an integrated SAP Solution scenario with SAP ERP/FI-CA of SAP Business Suite, the SAP user should manually synchronize the SAP CC 2023 system each time the SAP currencies are changed in SAP Convergent Invoicing.</p> <p>For further information, refer to the SAP CC 2023 Administration Guide [page 8] documentation.</p>
	Convergent Invoicing (in S/4HANA Cloud Public Edition)	Not periodic	<p>In an installation scenario integrated with SAP S/4HANA Cloud Public Edition edition, the SAP user should manually replicate the SAP currencies every time they are changed in SAP Convergent Invoicing.</p> <p>For further information, refer to the SAP S/4HANA Integration Guide documentation.</p>
Maintain the master data of the service provider	Core Tool	Not periodic	<p>During the production phase, you may need to change the master data related to the pricing configuration for a service provider.</p> <p>Model the changes of the objects in the pricing catalog, test the changes with a quality landscape, and transport the changes to the production system</p> <div style="border: 1px solid blue; padding: 5px; margin-top: 10px;"> <p>🔗 Example</p> <p>Create a new charge plan for a new option added to the customer services.</p> </div>

²¹⁸ Daylight Saving Time

²¹⁹ International Standards Organization

Manual Periodic Task (Core Server)	Tool Supporting this Task	Recommended Frequency or Survey	Description
Process rerating in case of mistakes in the invoices	Core Tool	Not periodic	
Relaunch the cache warm-up mechanism	Admin+	Rare and not periodic	After a mass creation or maintenance operation of master data related to a very large volume of customers, SAP recommends that you manually trigger the data cache warm-up function of the SAP Business Suite, the SAP user should manually synchronize the SAP CC 2023 system. Use the <code>start_cache_warmup</code> command
<div style="background-color: #f0f0f0; padding: 10px; border: 1px solid #ccc;"> <p>Note</p> <p>See the SAP CC 2023 Application Help for more information about the cache warm-up mechanism and the customer data provisioning processes.</p> </div>			
Add an instance in a running SAP CC system	SAP installer	Rare and not periodic	To run an SAP CC 2023 system optimally, you may need to deploy a new instance on: <ul style="list-style-type: none"> • An existing host • A new host
Add a host for an SAP CC system	SAP installer	Rare and not periodic	To run an SAP CC 2023 system optimally, you may need to prepare and install a new host to move some existing SAP CC system instances or to deploy new necessary instances.
Move an instance	SAP installer	Rare and not periodic	To run an SAP CC 2023 system optimally, you may need to redeploy a productive SAP CC system instance on: <ul style="list-style-type: none"> • An existing host • A new host
Add an SAP ERP/FI-CA system to the customer management area	Several user interfaces are necessary (Setup Tool , Core Tool)	Rare and not periodic	You may need to deploy more SAP systems in the system landscape to: <ul style="list-style-type: none"> • To manage high volume of customer master data and enable load balancing functions • To enable multisite deployments
<div style="background-color: #f0f0f0; padding: 10px; border: 1px solid #ccc;"> <p>Note</p> <p>Refer to the SAP CC 2023 Administration Guide [page 8] for more information about the relevant procedure to:</p> <ul style="list-style-type: none"> • Declare a new JCo²²⁰ destination. • Define a new customer management area. • Apply the changes in the SAP CC system. </div>			

²²⁰ Java Connector

Manual Periodic Task (Core Server)	Tool Supporting this Task	Recommended Frequency or Survey	Description
Add an SAP CRM system to the customer management area	Several user interfaces are necessary (Setup Tool , Core Tool)	Rare and not periodic	<p>You may need to deploy more SAP systems in the system landscape to:</p> <ul style="list-style-type: none"> To manage high volume of customer master data and enable load balancing functions To enable multisite deployments
<div style="border: 1px solid #ccc; background-color: #f9f9f9; padding: 10px;"> <p>Note</p> <p>Refer to the SAP CC 2023 Administration Guide [page 8] for more information about the relevant procedure to:</p> <ul style="list-style-type: none"> Declare a new JCo destination. Define a new customer management area. Apply the changes in the SAP CC system. </div>			
Purging change lists	Admin+ or Core Tool	Weekly, monthly or yearly	See the Detailed Periodic Tasks [page 392] section below for more information about the purge of change lists

Core Database Tasks

Manual Periodic Task (Core Database)	Tool Supporting this Task	Recommended Frequency or Survey	Description
Oracle database periodic optimization	RDBMS ²²¹ Tool		See the Detailed Periodic Tasks [page 392] section of this documentation
Database index reconstruction	RDBMS Tool		
Data purging and archiving			See the Purging and Archiving [page 426] section of this documentation
Purge technical data relating to job operations performed via Web Services	Admin+	<p>According to volume</p> <p>The frequency depends on the quantity of performed job operations</p>	<p>Job operations performed via Web Services create technical data recorded in the WS_JOB table of the Core Database. You need to periodically remove this data to ensure performances of your SAP CC system.</p> <p>Use the <code>purge_job_record</code> command</p>

²²¹ Relational Database Management System

BART Server Tasks

Manual Periodic Task (BART Server)	Tool Supporting this Task	Recommended Frequency or Survey	Description
Update the DST rules	SapMachine	Rare and not periodic	The daylight saving time rules can change and may impact your business for specific regions
Trigger CDR ²²² off-line acquisition	BART Tool	Daily, weekly or monthly	According to the type of business managed by SAP CC, you need to acquire the CDRs related to a day of business traffic
Trigger batch charging	BART Tool	>Daily, weekly or monthly	According to the type of business managed by SAP CC, you request the batch charging operations
	Specific tool depending on the customer implementation project	Daily, weekly or monthly	The manual triggering of batch charging operations is managed in an external system connected to the BART Server via the HCI ²²³ technical interface

BART Database Tasks

Manual Periodic Task (Core Database)	Tool Supporting this Task	Recommended Frequency or Survey	Description
Oracle database periodic optimization	RDBMS Tool	After a campaign of acquisition sessions and rating sessions, it is recommended to perform this task	See the Detailed Periodic Tasks [page 392] section of this documentation
Purge and archive of outdated data (CDRs)	RDBMS Tool	Periodic 40 days by default	See the Purging and Archiving [page 426] section of this documentation. Available for SAP HANA, SAP SybaseASE, Oracle and MS SQL Server only

Diameter Server Tasks

Manual Periodic Task (Core Database)	Tool Supporting this Task	Recommended Frequency or Survey	Description
Update the DST rules	SapMachine	Rare and not periodic	The daylight saving time rules can change and may impact your business for specific regions

²²² Call Detail Record (Telecommunications industry), or more generally Consumption Detail Record

²²³ HTTP Communication Interface

Note

As of SP 4 for release 5.0, there are no further planned enhancements to the Diameter Server component. Refer to SAP Note [2792189](#).

7.7.3 Detailed Periodic Tasks

Oracle Database Periodic Optimization

After some time of using SAP CC 2023, it becomes possible and necessary to analyze and optimize the Oracle database tables/indexes of the specific users reserved for SAP CC. To ensure high level of performance with SAP CC, SAP recommends that you optimize the Oracle database usage by regularly launching the commands below.

They can be applied with the Core Database system and the BART Database system. Use the following requests to analyze and optimize the tables by estimating the statistics for a database schema:

```
CONNECT system/manager
EXEC dbms_stats.gather_schema_stats(ownname => '<schema name in uppercase>',
cascade => true, estimate_percent => 10, degree => 8);
ALTER SYSTEM flush shared_pool;
```

The `estimate_percent` and `degree` parameters can be changed according to the accuracy of the estimation required and the degree of parallelism required, ideally set to twice the number of CPUs²²⁴ of the host.

Note that this estimation is only useful when the database has a considerable volume of data stored.

Note

The above procedure can be automated so that it is performed periodically (for example: monthly or weekly) during a specific low traffic period. This process will temporarily decrease the performances of the database and SAP CC 2023.

Time Zones

SAP CC 2023 does not manage time zones but it uses the local time of the host machines. All the hosts of the SAP CC landscape must have the same operating system time zone.

Caution

Once installed, do never change the OS²²⁵ time zone of the machines that host the components of SAP Convergent Charging.

²²⁴ Central Processing Unit

Daylight Saving Time (DST) Updates

SAP CC 2023 manages the DST (also called summertime) by using data provided by the SapMachine. When DST rules are modified or created, you must update your landscape by updating all the JVM²²⁶ installations.

The SapMachine includes both rules for daylight saving times and descriptions of global time zones in a unique container. For updating the DST rules, you have to update your landscape by applying the procedure outlined in SAP Note [1367871](#).

Note that SAP Convergent Charging does not use the data related to descriptions of time zones as it does not manage time zones and uses only the local time of the hosts.

⚠ Caution

Changing the time zone of the host is not a possible workaround for a lack of DST rules. Contact first your SAP Support Team.

Purges of Allowances in Master Data

When using the Allowance Management feature, it is necessary to regularly purge allowance data in provider contracts from the back-end database system to ensure the global performance of the SAP CC systems and avoid latency issues.

This customer data purge mechanism can be executed:

- Manually, using the `start_purge_allowances` command of the [Admin+](#) user interface and specifying the following parameters:
 - A reference date, which is used to determine the list of expired allowances to remove
 - A maximum throughput, which corresponds to the maximum number of provider contracts per second that each rater instance can consider during allowance purge operations, and thus control the impact of these operations on the global performance of the system
- Automatically, using a dedicated scheduler in the SAP CC system. refer to the [SAP CC 2023 System Parameter Reference](#) documentation for more information about the `ALLOWANCES_PURGE_SCHEDULER_ENABLED` system parameter.

Both manual and scheduled executions of the purge operations log the following information when starting and stopping:

- The number of provider contracts whose allowances have been successfully purged
- The number of provider contracts containing allowances which could not be purged
- The number of allowances successfully purged in contracts

Refer to the [SAP CC 2023 Log Message Reference and Error Troubleshooting](#) documentation for more information about the log messages that relates to the allowance purge operations and its mechanism. See the definitions of the `com.sap.SCC.core_server.000508` log message ID.

²²⁵ Operating System

²²⁶ Java Virtual Machine

Note

In addition to the log information, the following indicators are available to know the reference dates of the last manual or scheduled purge operation:

- [ALLOWANCES_PURGE_LAST_TRIGGER](#)
- [ALLOWANCES_PURGE_SCHEDULER_LAST_TRIGGER](#)

Transports of Change Lists

All the transport requests whose status is set to `CREATED` are automatically executed by a dedicated scheduler in charge of transporting all the corresponding change lists to the defined destinations.

For more information about the configuration of this scheduler, refer the [SAP CC 2023 Administration Guide \[page 8\]](#) documentation.

Purges of Change Lists

To avoid latency and ensure the global performance of the system, it is necessary to regularly delete from the Core Database the data related to change lists, which have been transported to remote SAP CC system(s).

Purge operations can be executed:

- **Unitary**, using the *Delete* menu of the [Core Tool](#) user interface and selecting a change list to delete
- **In bulk mode**, using the `purge_change_lists` command of the [Admin+](#) user interface and specifying a reference date which is used to delete the change lists created before this date and associated to already executed transport requests

7.7.3.1 Avalara AvaTax for Communications (AFC) Technology Monthly Maintenance

The monthly update of the Avalara AvaTax for Communications (AFC) installations is required for the **tax calculation of the US Telecommunications taxes**. The update relates to both the software and data of the Avalara AvaTax for Communications (AFC) solution that is the new name for the BillSoft EZTax software product.

You have to update three categories of units:

- The Avalara AvaTax for Communications (AFC) installations (software and application data such as the official descriptions of the transaction types and service types)
- A central repository `CC_EZTAX` used by SAP Convergent Charging
- The relevant SAP CC Core Server systems that include one or more taxer instances)

At the original installation time, the SAP installer of SAP CC has created a specific central repository dedicated to the management of files of Avalara AvaTax for Communications (AFC). It is named CC_EZTAX in the following procedures and may differ in your SAP system landscape.

As an IT administrator, you complete the following procedures.

1. [Maintaining the Avalara AvaTax for Communications \(AFC\) Software and Its Application Data \[page 395\]](#)
2. [Maintaining the CC_EZTAX Central Repository \[page 396\]](#)
3. [Maintaining the Taxer Instances of Your SAP CC Core Server System \[page 397\]](#)

→ Tip

This procedure is not relevant when your SAP CC system landscape does not implement any tax calculation for US Telecommunications taxes based on Avalara AvaTax for Communications (AFC).

How to check if EZTax/AvaTax is enabled in SAP CC?

- As a system administrator or an application administrator, view the values of the [TAX_FRAMEWORK](#) system parameters.
- As a pricing specialist, view the tax settings in a charge customized in a plan.
- As a CSR, view the tax settings in a subscriber account.

How to know where is the CC_EZTAX central repository?

- As a system administrator, view the launch scripts of the taxer instances in your SAP CC Core Server system. They include a JVM option in the launch command. See the `-DeztaxBasePath=` property.

[Maintaining the Avalara AvaTax for Communications \(AFC\) Software and Its Application Data \[page 395\]](#)

[Maintaining the CC_EZTAX Central Repository \[page 396\]](#)

[Maintaining the Taxer Instances of Your SAP CC Core Server System \[page 397\]](#)

7.7.3.1.1 Maintaining the Avalara AvaTax for Communications (AFC) Software and Its Application Data

You need to update your Avalara AvaTax for Communications (AFC) software files and application data on a monthly basis. This piece of software and its application data regularly change and must be updated in the environment of SAP Convergent Charging.

The files are installed on each machine that hosts one or several taxer instances of the SAP CC Core Server systems.

Refer to the maintenance procedures of the official product documentation of Avalara AvaTax for Communications (AFC).

Depending on your technical environments, use the manual installation or use the *Avalara Update Utility* executable.

Refer to the installation instructions and readme information delivered with the Avalara AvaTax for Communications (AFC) software product.

→ Tip

If you are not familiar with the name *Avalara AvaTax for Communications (AFC)*, then note that "Avalara AvaTax for Communications (AFC)" is the new rebranded name of the BillSoft EZTax software product also known as *EZtax* software product.

Next Step

[Maintaining the CC_EZTAX Central Repository \[page 396\]](#)

Parent topic: [Avalara AvaTax for Communications \(AFC\) Technology Monthly Maintenance \[page 394\]](#)

Related Information

[Maintaining the CC_EZTAX Central Repository \[page 396\]](#)

[Maintaining the Taxer Instances of Your SAP CC Core Server System \[page 397\]](#)

7.7.3.1.2 Maintaining the CC_EZTAX Central Repository

⚠ Caution

For Microsoft Windows operating systems (OSs), and from a version older than SAP CC 2023 FPS 0, you need to replace the 32-bit version of the Avalara AvaTax for Communications (AFC) files with the 64-bit version of the Avalara AvaTax for Communications (AFC) files.

You need to monthly update the `CC_EZTAX` central repository that includes Avalara AvaTax for Communications (AFC) software files and some data (application data) required by SAP Convergent Charging. It has been created at the installation time by the SAP installer of SAP Convergent Charging (SAP CC).

This folder must contain the changed files:

- The `transervdesc.txt` file
The `transervdesc.txt` file contains the official descriptions of the transaction types and service types. This application data is known as the *AvaTax transaction/service types* or the *BillSoft EZTax transaction/service types*. This data is used for the tax calculation of the US Telecommunications taxes. You maintain the SAP CC systems with this data. See [Maintaining the Taxer Instances of Your SAP CC Core Server System \[page 397\]](#)
- The subdirectories `db`, `jar`, and `lib`:
 - `db/` contains the Avalara AvaTax for Communications (AFC) database files.
 - `jar/` contains the file `eztax.jar`
 - `lib/` contains the Avalara AvaTax for Communications (AFC) library files depending on the operating system: `*.dll` for Microsoft Windows operating systems or `*.so` for Linux operating systems.

Once you have updated the Avalara AvaTax for Communications (AFC) installations, you update the CC_EZTAX central repository by copying necessary files and directories listed above.

ⓘ Note

- Verify if the CC_EZTAX central repository is shared by several SAP CC server systems: taxer instances of the Core Server system. These systems will be automatically updated when you restart them.
- Verify if the CC_EZTAX central repository is shared by another major version of SAP Convergent Charging. These systems will be automatically updated when you restart them.

→ Tip

Consult the [SAP CC 2023 Installation and Maintenance Guide](#) for details and recommendations.

Next Step

[Maintaining the Taxer Instances of Your SAP CC Core Server System \[page 397\]](#)

Parent topic: [Avalara AvaTax for Communications \(AFC\) Technology Monthly Maintenance \[page 394\]](#)

Related Information

[Maintaining the Avalara AvaTax for Communications \(AFC\) Software and Its Application Data \[page 395\]](#)

[Maintaining the Taxer Instances of Your SAP CC Core Server System \[page 397\]](#)

7.7.3.1.3 Maintaining the Taxer Instances of Your SAP CC Core Server System

On a monthly basis, you need to maintain your SAP CC installations by sequentially restarting the taxer instances, updating the Core Database, and refreshing the running updater instances in the Core Server system.

Prerequisite

The CC_EZTAX central repository must be up-to-date. See [Maintaining the CC_EZTAX Central Repository \[page 396\]](#).

Procedure

As an SAP CC application administrator or system administrator, you complete the following procedure:

1. Stop and restart sequentially all the taxer instances of the running SAP CC Core Server system.
When restarting, each taxer instance will update its local installation folder by copying all these files to the folder: `/config/eztax/...`
2. Use the [Setup Tool](#) user interface of SAP CC for updating the Core Database system with the latest transaction/service types declared in the `transervdesc.txt` file present in the `CC_EZTAX` repository:
 - Use the `eztax importTTypes` command and this file for inserting the new types in the database.
3. Use the [Admin+](#) user interface of SAP CC for updating the the relevant instances of the Core Server system:
 - Start Admin+ and log on as an administrator.
 - Use the `refresh_transerv_list` command for updating the updater instance(s).

⚠ Caution

Do never stop all the taxer instances at the same time. Prefer updating one instance after the other one.

Next Steps

You are done. Plan the next update.

Parent topic: [Avalara AvaTax for Communications \(AFC\) Technology Monthly Maintenance \[page 394\]](#)

Related Information

[Maintaining the Avalara AvaTax for Communications \(AFC\) Software and Its Application Data \[page 395\]](#)

[Maintaining the CC_EZTAX Central Repository \[page 396\]](#)

7.8 Load Balancing

SAP CC 2023 features some load balancing functions. To achieve load balancing, multiple instances of a server system are started at a time on the same or different host machines.

SAP CC 2023 Component	Program	Load Balancing	Description
Core Server	Dispatcher instance	Function included	Several dispatcher instances can be installed. The connected client applications perform the load balancing by using the Java/XML API Reference (Core Library)
	Guider instance	Function included	Several guider instances can be installed
	Rater instance	Function included	Several rater instances can be installed
	Bulkloader instance	Function included	Several bulkloader instances can be installed
	Optional		
	Taxer instance	Function included	Several taxer instances can be installed
	Optional		
	Updater instance	No load balancing is possible	<div style="border: 1px solid #ccc; padding: 5px; background-color: #f9f9f9;"> <p>⚠ Caution</p> <p>Only one instance is active</p> </div>
Diameter Server	Main server program	Implementation tasks required on client application side	<p>Several programs can be installed on several hosts in the system landscape.</p> <p>The connected client applications are responsible for managing load dispatching.</p> <div style="border: 1px solid #ccc; padding: 5px; background-color: #f9f9f9;"> <p>📌 Note</p> <p>As of SP 4 for release 5.0, there are no further planned enhancements to the Diameter Server component. Refer to SAP Note 2792189.</p> </div>
BART Server	Main server program	N/A Batch mode scenario	Load balancing function is only used for real time scenarios

7.8.1 Detailed Load Balancing

The following functions are provided with SAP CC 2023 to ensure the load balancing of the solution.

Core Server

Load Balancing Method (Core Server)	Description	Tools to be Used
Intelligent load balancing management	<p>The primary dispatcher instance of the Core Server is responsible for the load balancing functions of some other instances (guider, rater, and taxer).</p> <p>Once installed and started, these types of instances are immediately taken into account by the primary dispatcher instance and by the other dispatcher instances.</p> <p>The primary dispatcher instance is in charge of the replications and synchronizations of data (data cache management with relevant invalidations)</p>	<p>No specific tool.</p> <p>The primary dispatcher instance of the Core Server has this function</p>
Round robin for accessing the dispatcher instances	<p>The Java based client applications that use services of the Core Server connect seamlessly to one or other dispatcher instances.</p> <p>The load balancing function is embedded in the Java API²²⁷ of SAP CC 2023</p>	<p>The client application uses the Java API of SAP CC 2023</p>

For more information about the primary dispatcher instance of the SAP CC Core Server system, see the [SAP CC 2023 Application Help](#).

Diameter Server

Note

As of SP 4 for release 5.0, there are no further planned enhancements to the Diameter Server component. Refer to SAP Note 2792189.

Load Balancing Method (Diameter Server)	Description	Tools to be Used
Load dispatching made by the client application	<p>Several Diameter Server programs can be installed in the landscape. The Diameter Server is a stateless server that has no application data:</p> <ul style="list-style-type: none">• There is no need to replicate data• Each installed Diameter Server program is autonomous and there is no need of updating simultaneously with data	<p>No specific tool.</p> <p>The primary dispatcher instance of the Core Server has this function</p>

²²⁷ Application Programming Interface

7.8.2 Setup Change

Core Server

If the initial business traffic increased a lot, you may need to add some rater instances of the Core Server to your production landscape. You have to follow the sizing guidelines to determine the instances you need to add. When installing a new instance on an existing or new host, the traffic for rating and charging services will be automatically reorganized with all the running rater instances.

You can also add other types of instances of the Core Server: taxer, guider, and dispatcher.

7.8.3 Troubleshooting

In case of difficulties with the business traffic, you can explore two solutions:

- Fine tune the existing platform
- Add instances and hosts to your landscape

7.9 Scaling SAP Convergent Charging

Scaling SAP Convergent Charging There are two general approaches you can take to scale your SAP Convergent Charging system: scale up and scale out.

- **Scale up** means increasing the size of one physical machine by increasing the amount of RAM available for processing and other settings.
- **Scale out** means combining multiple independent computers into one system. The main reason for distributing a system across multiple hosts (that is, scaling out) is to overcome the hardware limitations of a single physical host, increase the global performance, and achieve high availability (HA). This allows an SAP CC system to distribute the load between multiple instances. In a distributed system, different types of specialized instances are reduded and distributed over the hosts. SAP CC provides several deployment rules, high availability (HA) setups, and scalability rules.

SAP Convergent Charging is scalable by adding or removing instances. As soon as you get at least 2 instances of same type, then you can reach high availability if the distribution of those instances are spread on different hosts.

7.10 User Account Management

SAP Convergent Charging (SAP CC) features some user management functions. You use the SAP CC Core Tool user interface to configure your SAP CC user accounts manually.

Refer to the [SAP CC 2023 Primary Help for Core Tool](#) documentation for more information about the available procedures for user administrators and system administrators.

User assistance:

- Configuring the system: see the [SAP CC 2023 Administration Guide \[page 8\]](#) documentation.
- Configuring the SAP CC users: see [Creating User Accounts for SAP CC Users \[page 227\]](#) and [Users Management via External Systems \[page 229\]](#) in the [SAP CC 2023 Administration Guide \[page 8\]](#) documentation.
- Concept: see the [SAP CC 2023 Application Help](#) documentation.
- Security: see the [SAP CC 2023 Security Guide](#) documentation about roles, authorizations, and SAP CC user accounts.

[Resetting the Password of an SAP CC User \[page 402\]](#)

As a user administrator or a system administrator, I want to reset the current password of an existing SAP CC user.

7.10.1 Resetting the Password of an SAP CC User

As a user administrator or a system administrator, I want to reset the current password of an existing SAP CC user.

Using Core Tool

As a user administrator or a system administrator, you can reset the password of one of my users by using the Core Tool user interface. See [Changing or Resetting Passwords for Your Users](#).

→ Remember

A user cannot reset her or his password by herself or himself.

Users who have forgotten their password, need to contact you as a user administrator as an SAP CC system administrator.

7.11 License Management

SAP CC 2023 features some license management functions.

7.12 Maintaining Certificates

As a system administrator, I want to change security certificates when their validity is about to expire.

Prerequisites

- You have your own securing materials (created with your own software) at the installation time of SAP Convergent Charging (SAP CC).
See also: [Common Procedure for Generating the Securing Materials](#)
- You have the new certificates.

Procedure

→ Recommendation

We recommend that you use a certificate that is already valid at the date of the modification. It prevents any troubles if the SAP CC system instances are restarted unexpectedly.

1. Complete the remaining steps described in the [Securing Communications with the Core Server System](#) section in the installation guide.
Use the PFX file instead of the P12 file.

→ Tip

You can import and link the certificates when the instances are turned off, the Setup Tool user interface directly stores the certificates into the database.

2. For the Admin+, Core Tool, and other SAP CC tools, you have to import the new certificates into the Java Certificate Store of the JVM used by these tools.
3. For Java Certificate Store for client applications or SLD connection: you upload the newer certificates, but the changes will take effect only after restart.
First you need to upload the certificates then restart the system whenever you want, and finally you can delete old certificates.

Related Information

[Securing Communications with the Core Server System Setup Tool](#)
[Common Procedure for Generating the Securing Materials](#)

7.13 Management of Outdated Technical Data

Generated temporary technical data can be regularly removed if not needed anymore. The tasks to be performed for this purpose are listed in the above chapter [Periodic Tasks \[page 381\]](#)

Potential Outdated Technical Data

SAP CC System	Description
Core Server	<p>The SAP CC Core Server System generates technical data files as output results of the business processes (rating, charging, rerating and refilling).</p> <p>The management of these files depends on the scenario for your landscape:</p> <ul style="list-style-type: none">• Standard scenario• Integrated scenario
BART Server	<p>The SAP CC BART Server System acquires and stores technical data named Consumption Detail Record (CDR) in the BART Database. This data is used as input for the offline charging process and may become outdated.</p> <p>See the Purging and Archiving [page 426] section for details.</p>

Core Server: Standard Landscape

SAP CC System	Description	Location
Core Server rater instances	<p>The rater instances of the Core Server system generate voluminous charged item files and refill record files that must be transmitted to a third-party billing system.</p> <p>Depending on the integration between the SAP CC Core Server system and this external system, these files can become outdated.</p> <p>In a scenario with such an external system, you can consult the system configuration of the Core Server to determine if these files are automatically removed by SAP CC or if they should be regularly archived</p>	<p>In the repository <WORKING_DIRECTORY>, the files are temporarily stored in the subfolders:</p> <ul style="list-style-type: none">• /CC_POSTPAID/• /CC_PREPAID/ <p>The <WORKING_DIRECTORY> is a particular shared central repository defined at the installation time. See the SAP CC 2023 Installation and Maintenance Guide for more details.</p>

Note

- The current system configuration may be different from the default configuration. Check the configurations of the rater instances of the SAP CC Core Server system
- Some voluminous error files may exist in these folders. Do not remove them. See the [Troubleshooting of SAP CC \[page 445\]](#) section for details about problems with charged item files or refill record files

Core Server: Integrated Landscape

SAP CC System	Description	Location
Core Server <ul style="list-style-type: none">• rater instances• bulkloader instances	<p>The rater instances of the Core Server system generate voluminous charged item files and refill record files that must be transmitted to a third-party billing system.</p>	<p>In the repository <WORKING_DIRECTORY>, the files are temporarily stored in the subfolders:</p> <ul style="list-style-type: none">• /CC_POSTPAID• /CC_PREPAID <p>The <WORKING_DIRECTORY> is a particular shared central repository defined at the installation time. See the SAP CC 2023 Installation and Maintenance Guide for more details.</p>

In an integrated scenario with SAP ERP and SAP CRM components from SAP Business Suite, these files are used by the SAP CC 2023 Core Server and they are automatically removed by default:

- Charged item files
- Refill record files
- Notification files

Note

- The current system configuration may be different from the default configuration. Check the configurations of the rater instances of the SAP CC Core Server system
- Some voluminous error files may exist in these folders. Do not remove them. See the [Troubleshooting of SAP CC \[page 445\]](#) section for details about problems with charged item files or refill record files

Log files

The log files produced by the SAP CC 2023 server systems are not considered as outdated technical data. Their volume must be checked or monitored.

7.14 Administration: System Audit and Control

[Viewing Some System Information \[page 406\]](#)

[Viewing the System Configuration Settings \[page 407\]](#)

[Viewing Log Messages \[page 408\]](#)

[Viewing Your System Usage and SAP Product Usage \[page 411\]](#)

[Viewing Audited Users Operations \[page 411\]](#)

[Viewing Data Object Changes \[page 412\]](#)

[Viewing License Auditing Reports \[page 412\]](#)

[Viewing Traces \[page 412\]](#)

[Viewing Processing Thread Dumps \[page 413\]](#)

[Viewing Java Thread Dumps \[page 413\]](#)

7.14.1 Viewing Some System Information

Use SAP Solution Manager or SAP CC Admin+ to retrieve information about the SAP CC systems in your SAP system landscape.

The [Admin+](#) user interface allows you to view some system indicators managed by the Core Server system. Use the `get` command to retrieve information about:

Technical Information

SAP CC Core Server	Description	Example
System Information	<ul style="list-style-type: none">• Current date of the instance hosts• Name of the server system• Identifier of the instances• Names of the machine hosting the instances of the SAP CC system	<code>get VERSION</code>

SAP CC Core Server	Description	Example
Installation Information	<ul style="list-style-type: none"> Installation path of the instance of the SAP CC system Installation number 	get INSTALLATION_PATH
Services	Statistics about the different services running in an instance of the SAP CC Core Server system	get SERVICES_STATISTICS

Refer to the [SAP CC 2023 System Parameter Reference](#) for the complete list of indicators and parameters.

Business Information

You can view the following business indicators defined in the SAP CC Core Server system:

SAP CC Core Server	Description	Example
Charging	<ul style="list-style-type: none"> The number of sessions currently stored in the session cache 	get SESSION_COUNT
Activation	<ul style="list-style-type: none"> Last date when the activation process was requested by an SAP CC user and triggered in the SAP CC system 	get ACTIVATION_LAST_TRIGGER
	<ul style="list-style-type: none"> Last date when a scheduled activation on subscriptions was triggered in the SAP CC system 	get ACTIVATION_SCHEDULER_LAST_TRIGGER
Account and Balance Management	<ul style="list-style-type: none"> The last date when the expiration alert mechanism was started 	get EXPIRATION_ALERT_PROCESS_LAST_TRIGGER
	<ul style="list-style-type: none"> The last date when the expiration alert mechanism was triggered by a scheduler of the SAP CC system 	get EXPIRATION_ALERT_SCHEDULER_LAST_TRIGGER
Notification	<ul style="list-style-type: none"> Last date when the expiration alert mechanism was started 	get EXPIRATION_ALERT_PROCESS_LAST_TRIGGER

7.14.2 Viewing the System Configuration Settings

You can inspect the configuration settings of the SAP CC systems in your SAP system landscape. Use the appropriate user interfaces.

System Parameters

You can inspect configuration parameters of the SAP CC systems.

- Use the [Manage SAP CC System Parameters](#) application of [Cockpit](#) or both the [Admin+](#) and [Config Tool](#) user interfaces to view the defined values for a Core Server systems
- Use the [BART+](#) user interface and the [SAP CC 2023 Administration Guide \[page 8\]](#) to view the defined values for a BART Server system
- Use the [SAP CC 2023 Administration Guide \[page 8\]](#) to view the defined values for a Diameter Server system

Note that a system parameter can configure a business feature or a technical feature of SAP Convergent Charging.

Refer to the [SAP CC 2023 System Parameter Reference](#) for the complete list of system parameters.

Other System Configurations

You can inspect some configuration settings that complete the system parameters. Use the [Cockpit](#) and [Setup Tool](#) user interfaces to view the defined configuration.

7.14.3 Viewing Log Messages

You can inspect detailed information available in logs recorded by the SAP CC systems. Error and warning messages require immediate correction plans to resolve the situations. Note that traces can complete the information for specialists.

Note

Refer to the following product documents in our user assistance:

- [SAP CC 2023 Log Message Reference and Error Troubleshooting](#)
- [SAP CC 2023 Primary Help for Admin+](#)
- [SAP CC 2023 Primary Help for BART+](#)

Getting and Viewing Logs of the SAP CC Systems

You can get the log messages generated by the systems of SAP Convergent Charging by using the following procedures:

- To view all the logs and traces in SAP Solution Manager
- To view all the logs and traces in SAP Management Console
- To view the SAP CC system logs and traces in Admin+

- To view the SAP CC system logs and traces in BART+

By default, the file extensions are *.log, *.dump and *.trc. The logs and traces are not mixed. These settings may be customized in your running SAP Convergent Charging system. Refer to the [Log and Trace Files in Your SAP System Landscape \[page 344\]](#) section in this guide.

→ Tip

Support specialists can need detailed information in traces recorded by the systems and applications. See [Viewing Traces \[page 412\]](#).

[Viewing the Logs \(and Traces\) in SAP Solution Manager \[page 409\]](#)

[Viewing the Logs \(and Traces\) in SAP Management Console \(SAP MC, SAP MMC\) \[page 410\]](#)

[Viewing the SAP CC Core Server System Logs and Traces in Admin+ \[page 410\]](#)

[Viewing the SAP CC BART Server System Logs and Traces in BART+ \[page 410\]](#)

7.14.3.1 Viewing the Logs (and Traces) in SAP Solution Manager

View the Logs (and Traces) in SAP Solution Manager

In the Root Cause Analysis Work Center of SAP Solution Manager, use the *System Analysis* report to display the logs and traces of SAP Convergent Charging:

1. Start a system analysis: choose the *System Analysis* report in the navigation area.
2. Select the system cluster that corresponds to your SAP CC platform.
3. Click *Log Viewer*. A window displays all the host machines available in this cluster, the status of the Diagnostic agents, and the declared log stores.
4. Select the host and the log (or trace) files to analyze.

See:

- <http://support.sap.com/solutionmanager> 
- [SAP Solution Manager](#)

7.14.3.2 Viewing the Logs (and Traces) in SAP Management Console (SAP MC, SAP MMC)

View the Logs (and Traces) in SAP Management Console (SAP MC, SAP MMC)

To view the logs (and traces) in your SAP Management Console:

1. Select the SAP CC system by its SID (SAP System Identifier) that is unique in the SAP system landscape.
2. Select the host you want to work with. Right-click and choose the *All Tasks* menu.
3. Then select the *View Developer Traces...* submenu.
4. Select the log (or trace) files to analyze.

See:

- [SAP Management Console](#)
- [SAP Microsoft Management Console](#)

7.14.3.3 Viewing the SAP CC Core Server System Logs and Traces in Admin+

View the SAP CC Core Server system logs and traces in Admin+

To view the SAP CC Core Server system logs and traces in Admin+:

1. Launch the [Admin+](#) user interface and log on to the system.
2. Use the `logs` command to display some log and trace messages.

7.14.3.4 Viewing the SAP CC BART Server System Logs and Traces in BART+

View the SAP CC BART Server System Logs and Traces in BART+

To view the SAP CC BART Server system logs and traces in BART+

1. Launch the [BART+](#) user interface and log on to the system.
2. Use the `logs` command to display some log and trace messages.

7.14.4 Viewing Your System Usage and SAP Product Usage

View Your System Usage and SAP Product Usage

To audit the SAP Product usage of SAP Convergent Charging, you audit the system usage for all the productive systems yearly.

Use the SAP CC Cockpit and SAP CC Core Tool user interfaces to analyze the usage metrics as an SAP system measurement.

- In [Cockpit](#), open the app [Display Usage Metrics](#).
- In [Core Tool](#), use the [Window](#) menu.

Verify your licensing and plan some license extension.

7.14.5 Viewing Audited Users Operations

View Audited Users Operations

When enabled, you can inspect most of the business or technical operations requested by the SAP CC users (both service users and individual users) to plan preventive or corrective actions in the SAP CC systems. You use the audit concept and the SAP CC [Core Tool](#) or [Cockpit](#) (with the [Display User Operations](#) app) user interfaces to view audited operations depending on the system configuration.

See also [Purging and Archiving \[page 426\]](#) section for associated technical operations.

7.14.6 Viewing Data Object Changes

View Data Object Changes

When enabled, you can inspect the changes in the persistent configuration data. You use the audit concept and the SAP CC [Core Tool](#) or [Cockpit](#) (with the [Display User Operations](#) app) user interfaces to view audited information: data object change logs and object snapshots depending on the system configuration.

See also [Purging and Archiving \[page 426\]](#) section for associated technical operations.

7.14.7 Viewing License Auditing Reports

View License Auditing Reports

To audit the SAP Product usage of the SAP CC software product, you can use the SAP CC [Cockpit](#) and [Core Tool](#) user interfaces to generate a license auditing file for the SAP Global License Auditing Services (GLAS) team.

- In [Cockpit](#), open the app [Display System Status](#).
- In [Core Tool](#), use the [Tools](#) menu.

You can also check the validity of the license in Introscope with the [dedicated metrics](#).

7.14.8 Viewing Traces

View Traces

Your support specialists can inspect detailed information available in recorded trace messages. You can perform the procedures to view log messages as detailed in this chapter.

- [Viewing the Logs \(and Traces\) in SAP Solution Manager \[page 409\]](#)
- [Viewing the Logs \(and Traces\) in SAP Management Console \(SAP MC, SAP MMC\) \[page 410\]](#)
- [Viewing the SAP CC Core Server System Logs and Traces in Admin+ \[page 410\]](#)

Consult also:

- [Log and Trace Files in Your SAP System Landscape \[page 344\]](#)
- [Tracing Tools \[page 465\]](#)

7.14.9 Viewing Processing Thread Dumps

View Processing Thread Dumps

Your support specialists can inspect detailed information available in recorded thread dumps. The generated files contain about the execution context of the processing threads that are executed within each instance of the running SAP CC Core Server system. In case a problem occurs during the execution of an operation or if the execution exceeds some defined thresholds, the system generates dump files automatically in addition to logs and traces.

7.14.10 Viewing Java Thread Dumps

View Java Thread Dumps

Your support specialists can inspect detailed information available in recorded thread dumps.

Each instance of an SAP CC system runs in a Java process that executes the SAP CC software. The dumps and dump files contain information about each Java processing thread, including the stack traces.

Procedure: Viewing the dumps of the SAP CC Core Server system in Admin+

- Launch the [Admin+](#) user interface and log on.
- Use the `dump` command to display the dump and stack trace for one or several instances in the SAP CC Core Server system.

Procedure: Viewing the dumps of the SAP CC BART Server system in BART+

- Launch the [BART+](#) user interface and log on.
- Use the `dump` command to display the dump and stack trace.

8 High Availability Operations

High-availability applications allow you to maximize downtime security and minimize downtimes. You can achieve this objective by controlling the growth of redundant data and by implementing suitable logic to control redundant systems.

At SAP, the focus on high availability (HA) is always directed at business applications and their related components. SAP relies on the high availability applications of partner products with regard to the components such as, the operating system, database, and hardware, which are mandatory for implementing the infrastructure.

To gain competitive advantage, you must think of a collaborative business. This means integrating existing heterogeneous system landscapes to include business partners, customers, and suppliers. The responsibilities concerning the use of a high availability application should be divided between customers, partners, and SAP as described below:

- SAP Customer
 - Decision for and against high availability applications
 - Operation of a high availability environment
- SAP Partner
 - Provisions for hardware, infrastructure, and high availability applications
 - Implementation of a high availability application at customer using their own technology or SAP technology
- SAP
 - Supports and provides technologies to enable the implementation of partner high availability applications
 - No certification of high availability applications of individual partners

The trend is towards open system architectures in which end-to-end business processes combined with Web services run on multiple distributed application components. Such environments demand high availability (HA) not only for single components, but also for entire scenarios with highly interconnected systems.

Note

SAP, along with partners, has developed a range of high availability applications, which many customers have already in use. The applications you choose will vary according to your SAP system landscapes and business requirements. Ensure that you discuss your plans with your SAP consultant and hardware partner before implementation.

→ Recommendation

High availability (HA) is a major issue when constructing business systems in order to improve system reliability. There are different approaches that support this objective, for example, system redundancy together with load and balancing tools, backup strategies and cluster management software.

SAP Convergent Charging (SAP CC) is fully designed for high availability. It supports recovery measures ranging from faults and software errors, to disasters that decommission an entire data center. High

availability is the name given to a set of techniques, engineering practices, and design principles that support the goal of business continuity and also ensure that data and services are available to authorized users when needed.

High availability is achieved by eliminating single points of failure (fault tolerance), and providing the ability to rapidly resume operations after a system outage (or a subsystem outage such as an SAP CC system instance composing the SAP CC Core Server system) with minimal business loss (fault resilience). Fault recovery is the process of recovering and resuming operations after an outage due to a fault. Disaster recovery is the process of recovering operations after an outage due to a prolonged data center or site failure. Preparing for disasters may require backing up data across longer distances, and may thus be more complex and costly.

The key to achieving high availability is redundancy, including hardware redundancy, network redundancy, and data center redundancy. SAP CC provides several levels of defense against failure-related outages.

With SAP CC, you can design and implement different high availability (HA) strategies.

8.1 Downtimes

Downtime defines the time during which you cannot use a system or a resource productively. Irrespective of how the SAP system landscape is defined (with or without a high availability application). A breakdown of one or several components always requires action. To cope with these exceptional situations, it is imperative to ensure that the necessary resources are available in the event of malfunctions, problems, queries, such as an SAP specialist or a network administrator.

There are two types of downtimes described in the following sections:

- [Planned Downtimes \[page 416\]](#)
- [Unplanned Downtimes \[page 419\]](#)

Availability is the capacity to function as expected. A service is considered available if it can complete its assigned task at the appropriate time. A service is either available or it is not.

Availability is calculated as follows: $\text{Availability} = 100\% * \text{reached uptime} / \text{planned uptime}$.

High availability (HA) corresponds to a very low downtime. HA rates such as 99.9% availability ("3 nines") or 99.99% availability ("4 nines") correspond to 9 hours or 50 minutes downtimes per year. Systems that provide ultra HA usually provide 99.999% availability ("5 nines"), or roughly five minutes unscheduled downtime per year.

Depending on the high availability rate that you need and your SLO (Service Level Objectives), you design and setup your SAP CC system landscape by choosing its components, its third-party components (RDBMS, hardware, network, storage, data center), and a dedicated architecture. Active-active or active-passive scenarios are possible but do not achieve the same HA level and HA rate. See [High Availability \(HA\) in SAP CC 2023 \[page 422\]](#).

→ Recommendation

To reduce or eliminate downtime for your business (real-time rating and charging of the usage/ consumptions of the chargeable services provided and monetized by your company), you can determine

the high-availability strategies that you want to implement and see how SAP CC provides you with different HA setups. See [High Availability \(HA\) in SAP CC 2023 \[page 422\]](#) and [Single Point of Failure \[page 419\]](#).

8.2 Planned Downtimes

Planned downtime is the time for scheduled maintenance and upgrade during which a system cannot be used for normal productive operations. This time is used for a variety of purposes so that a system can function optimally and reliably, such as:

- System parameter changes
- Update to Support Packages (SPs) or patches
- Hardware maintenance
- Landscape reorganization by adding/removing an instance (to the Core Server system)
- Landscape transfer, by copying a Core Server system from one landscape to another
- Upgrades to new releases of SAP application components, database or operating system
- Database reorganization
- Database backup
- Archiving of business data objects

Note

In case of high-availability (HA) setups, downtimes are not needed. These setups and deployments offer zero downtime or near zero downtime maintenance and operation.

→ Recommendation

Implement a high-availability (HA) setup in your SAP system landscape. See [High Availability \(HA\) in SAP CC 2023 \[page 422\]](#).

Preparation

You must:

- Agree upon a planned downtime in close cooperation between the IT department and the respective departments. This is the only way of defining the timeframe for the necessary downtimes, without restrictions being placed on the way the application works.
A low traffic period is preferable (real-time rating/charging operations).
- Inform all those involved in advance about the upcoming system downtime.
- Keep the downtime as brief as possible.

Possible Maintenance Operations

The following table lists the possible changes in SAP systems and the downtimes, which can be planned in each case to rectify the problem:

Maintenance Operation	Downtime with Non-HA Setups?	Downtime with HA Setups?	Description
Parameter changes	Recommended	No downtime is needed.	<p>90% of parameters are hot modifiable and therefore, no downtime is needed.</p> <p>Consult the SAP CC 2023 System Parameter Reference for details.</p> <p>In case of a HA setup, the downtime is not necessary for the most situations.</p> <p>Always schedule the changes during a low traffic period.</p>
Patch for the Core Server system	Required	No downtime is needed.	<p>Patches can be implemented with the SAP installer tool of SAP CC. Consult their delivery notes to schedule a downtime for your SAP system landscapes.</p> <p>In case of a HA setup, the downtime is not necessary.</p> <p>Always schedule the patch implementation during a low traffic period.</p>
Support Package for SAP CC	Required	No downtime is needed.	<p>Support Packages (SPs) can be installed with the SAP installer of SAP CC. Consult their delivery notes to schedule a downtime for your landscape.</p> <p>In case of a HA setup, the downtime is not necessary.</p> <p>Always schedule the SP implementation during a low traffic period.</p>
Maintenance of the hosts: operating system, memory, storage, and network interface	Required	No downtime is needed.	<p>You must plan a downtime period.</p> <p>In case of a HA setup, the downtime is not necessary.</p> <p>Always schedule the changes during a low traffic period.</p>

Maintenance Operation	Downtime with Non-HA Setups?	Downtime with HA Setups?	Description
Add or remove instances of the Core Server system	No downtime is needed.	No downtime is needed.	<p>No downtime period is necessary.</p> <p>You can simply install and run new instances in the Core Server system. Depending on the system sizing and evolutions, a new host may be required.</p> <p>Ensure that the Core Server system keeps certain symmetry in term of different types of installed instances, their number and their distribution on the hosts.</p>
Copy a Core Server system to another landscape	Required	Required	<p>You must plan a downtime period, as the copy of a Core Server system from one system landscape to another requires to shutdown both source and destination landscapes.</p> <p>For more information, refer to the SAP CC 2023 Installation and Maintenance Guide.</p>
Maintenance of the database system for SAP CC	Conditional Mandatory for SAP HANA Database with Data Migration Manager (DMM)	Conditional Mandatory for SAP HANA Database with Data Migration Manager (DMM)	<p>Consult the documentation of your database system supplier about the maintenance downtime.</p> <div style="background-color: #f0f0f0; padding: 10px; border: 1px solid #ccc;"> <p>→ Recommendation</p> <p>In case of HA setup, disconnect first the SAP CC system from the RAC²²⁸ instance you want to shut down.</p> <p>Use the <code>admin_sql_connections</code> command of the Admin+ user interface.</p> </div>
Upgrade of replaced SAP CC major release to an upper major release	Required	No downtime is needed.	<p>You must plan a downtime period.</p> <p>In case of a HA setup, the downtime is not necessary.</p> <p>Always schedule the changes during a low traffic period.</p>

→ Tip

Implement a high-availability (HA) setup in your SAP system landscape.

See [High Availability \(HA\) in SAP CC 2023 \[page 422\]](#).

²²⁸ Real Application Cluster

8.3 Unplanned Downtimes

Unplanned downtime is the time during which a system cannot be used for normal productive operations due to unforeseen failure in hardware or software components, or operator mistakes.

Unplanned downtime can be extremely costly to an organization. The source of unplanned downtime can be in any of the layers that make up the complete software and hardware environment:

- Front-end and middleware services for connection to the web, including the Internet Transaction Server (ITS), the SAP Web Application Server (SAP Web AS), and the SAP Enterprise Portal
- SAP system services of the individual application components of the SAP Business Suite – such as the Business Warehouse (BW), Business-to-Business Procurement (BBP) – and the SAP kernel
- Underlying hardware and software services, such as the database services, network and operating system services, and various hardware services, including servers, disks, memory, and uninterruptible power supply (UPS)

The risk of unplanned downtimes occurring can be minimized by avoiding single point of failures (SPOFs) in a complex system landscape. For the different components in a complex system landscape, there are several ways of avoiding these SPOFs. Refer to the [Multihost System Recommendations](#) section of the SAP CC 2023 Installation and Maintenance Guide documentation.

8.4 Single Point of Failure

No measures for avoiding unplanned downtimes specified in the following list are a safeguard against logical errors. You can only protect against logical errors by implementing the appropriate backup and recovery measures.

The main Single Points of Failure (SPoF) for SAP CC installations are the following:

- SAP CC Core Server system (and also the SAP CC Diameter Server if required by your implementation scenario)
- RDBMS (for SAP CC Core Database)
- Storage (file system or network storage), containing high volume of item files, SAP CC directories with respective files such as executables, *.ini etc., master data files pending import, and syndicated master data files.
- Hardware

→ Remember

SAP CC, its RDBMS, and its storage are considered to be crucial. A failure of any of these components would harm the productivity of the entire SAP CC services/system.

We therefore need redundancy and the lowest downtime possible here.

SAP CC provides different high-availability setups for different SLO (Service Level Objectives). See [High Availability \(HA\) in SAP CC 2023 \[page 422\]](#).

List of Single Points of Failure (SPoF)

The following tables provide a list of SAP CC components and other critical components, their Single Points of Failure (SPoF), and their corresponding high availability (HA) setup.

SAP CC 2023 Component	Single Point of Failure	Failure Description or Business Impact	HA Setup Description
SAP CC Core Server System	Yes (Dispatcher Instance)	Business critical: no external communication functions, no intelligent management of all other instance types of the SAP CC system (Core Server).	Already included. Several instances must be installed on different hosts. All instances are running and are active. Only one instance (named <i>primary</i>) is responsible for the management of the instance map.
	Yes (Rater Instance)	Business critical: no rating and no charging services, no balance management function.	Already included. Several instances must be installed on different hosts.
	Yes (Guider Instance)	Business critical: no rating and no charging services can be provided.	Already included. Several instances must be installed on different hosts.
	Yes (Taxer Instance)	Business critical: no rating and charging services with US Telecommunications taxes. The VAT ²²⁹ services are still available depending on the configuration of the server.	Already included. Several instances must be installed on different hosts.
	Yes (Updater Instance)	Business critical: no master data can be managed and no refill request can be processed.	Already included. Several instances must be installed on different hosts. All the updater instances are running but only one is active. The other instances are reserved for backup purpose. The interfaced applications must be able to contact all the updater instances. A particular implementation may be required.

²²⁹ Value Added Tax

SAP CC 2023 Component	Single Point of Failure	Failure Description or Business Impact	HA Setup Description
RDBMS and SAP CC Core Database	Yes	Business critical: the SAP CC system (Core Server) is down.	<p>Already included:</p> <ol style="list-style-type: none"> 1. Already included if you use the RAC (Real Application Cluster) edition of Oracle EE or SE. In case of a failure of an instance of the Oracle RAC RDBMS, some events may not be charged on time. The rating/charging operation requests must be reattempted. Already included if you use DB2 pureScale. 2. Already included if you use another HA setup for the other RDBMS suppliers. For example, use the failover mechanism of MS SQLServer.
SAP CC Diameter Server System	Yes (if your business scenario includes some Diameter services)	Business critical: no rating and charging services can be provided via this channel.	<p>Already included.</p> <p>Several server systems must be installed on different hosts in an active-passive mode.</p> <p>All servers are running and are active. The network elements are configured with all the Diameter Server systems.</p>
Other Critical Components	Single Point of Failure	Failure Description or Business Impact	HA Setup Description
Storage (Network Storage/File System)	Yes	Business critical: system is down (no data or files can be created and stored).	<p>SAN or RAID technology</p> <p>Redundant, low latency</p>
Network (Network Elements)	Yes	Business critical: the SAP CC system is down (no communication).	<p>Consider:</p> <p>Redundant cabling</p> <p>Active components (hubs, switches, routers)</p> <p>Network Interface Card (NIC)</p> <p>SAProuter</p> <p>Network File System (NFS)</p>
Data Center	Yes	Business critical: the SAP CC system is down.	Redundant data center

Each of the components listed in the table above, can be a single point of failure in your business scenario. To achieve high availability (HA) for your complete scenario, it is necessary that all components with single points of failure are set up with HA.

Note

The components or subcomponents of SAP CC 2023 that are part of a batch mode scenario (offline charging) are not listed in these tables: BART Server, BART Database, and bulkloader instance of the Core Server system.

8.5 High Availability (HA) in SAP CC 2023


High availability (HA) for SAP CC 2023 is achieved through deploying its components and third-party components (RDBMS, hardware, network, storage, data center) with a specific landscape architecture. Only the components with real-time services for online rating/charging have a HA concept with zero downtime.

A HA concept (active-passive) is available for the service pricing configuration and customer data provisioning.

As of SAP CC 2022 FPS 0, SAP CC Cockpit supports a HA concept based on an active-passive mode.

HA Concepts

Component High Availability (HA)	Description
SAP CC Core Server (System)	<p>To achieve high availability (HA), the SAP Convergent Charging (SAP CC) system (Core Server) relies on a smart technology that is based on multiple system instances that are distributed and redunded on multiple hosts. Fault recovery is supported by already-running instances that will take over the activities of a failed SAP CC system instance. When a client application/system requests a charging operation that relates to the usage/consumption of a chargeable service, a rater instance may shutdown.</p> <p>See the HA Setups [page 423] paragraph below.</p> <p>See the High Availability section of the SAP CC 2023 Application Help documentation for more information about the mechanisms provided to ensure HA installation and operation.</p>
RDBMS and SAP CC Core Database	<p>To achieve high availability (HA), two architectures are possible depending on your high-availability strategy:</p> <ul style="list-style-type: none">• The active-active high availability mode is only achieved with Oracle RAC SE, Oracle RAC EE, or DB2 pureScale database systems• The active-passive high availability mode is achieved for all the RDBMS referenced in the support.sap.com/pam <p>See the HA Setups [page 423] paragraph below.</p>
SAP CC Diameter Server (System)	<p>To achieve high availability (HA), two Diameter Server systems (in active-active mode) and an intelligent network (IN) are necessary.</p> <p>See the HA Setups [page 423] paragraph below.</p>

Component High Availability (HA)	Description
Apache Tomcat Server (System) (for the SAP CC Cockpit web application)	<p>As of SAP CC 2022 FPS 0, SAP Convergent Charging provides a HA setup for the SAP CC Cockpit web application.</p> <p>To achieve high availability (HA), two Apache Tomcat Server systems (in active-passive mode) and an Apache HTTP Server system are necessary.</p> <p>See the HA Setups [page 423] paragraph below.</p> <p>Refer to the Apache Tomcat  official documentation.</p>
SAP CC BART Server (System)	<p>HA is not relevant.</p> <p>This component is only used for the offline charging that is a batch processing mode that does not require high availability (HA).</p>
RDBMS and SAP CC BART Database	<p>HA is not relevant.</p> <p>This component is only used for the offline charging that is a batch processing mode that does not require high availability (HA).</p>
SAP CC Communications Taxing Server (System)	<p>HA is not relevant.</p> <p>The calculation of US taxes by SAP CI is performed in a batch mode that does not require high availability (HA).</p>

How to define and install your landscape for high availability is described in the [SAP CC 2023 Administration Guide \[page 8\]](#) and in the *Implement* section of the SAP Convergent Charging product page: help.sap.com/cc2023.

HA Setups

Component	HA Setup Description
SAP CC Core Server	<p>Several SAP CC system instances must be installed on different hosts in the SAP CC system landscape.</p> <ul style="list-style-type: none"> Consult SAP CC 2023 Installation and Maintenance Guide for applying the determined landscape architecture. Consult the High Availability section of the SAP CC 2023 Application Help documentation for more information about the mechanisms provided to ensure HA for details about the mechanisms performed by the instances of the Core Server system for achieving the high availability.

Component	HA Setup Description
RDBMS for SAP CC Core Database	<p>Depending on your high-availability strategy and required HA level, several HA setups are possible for the RDBMS of the SAP CC Core Database:</p> <ul style="list-style-type: none"> • The active-active high availability mode is only achieved with Oracle RAC SE, Oracle RAC EE, or DB2 pureScale. Consult the documentation provided with this RDBMS. In case of failure of an instance of the Oracle RAC database, you may need to reset the communications with the SAP CC system using the app Display System Status of the Cockpit or the Admin+ user interface. <div style="border: 1px solid #ccc; padding: 5px; margin: 5px 0;"> <p>Note</p> <p>More information about active-active high availability mode is detailed in the Databases Active-Active High Availability section of the SAP CC 2023 Application Help documentation.</p> </div> <ul style="list-style-type: none"> • The active-passive high availability mode is achieved for all the RDBMS referenced in the support.sap.com/pam. Consult the documentation provided with the concerned RDBMS. <div style="border: 1px solid #ccc; padding: 5px; margin: 5px 0;"> <p>Note</p> <p>More information about the active-passive high availability mode is detailed in the Databases Active-Passive High Availability section of the SAP CC 2023 Application Help documentation.</p> </div>
Apache Tomcat Server (for the SAP CC Cockpit web application)	<p>As of SAP CC 2022 FPS 0, SAP CC Cockpit supports a HA setup based on an active-passive mode.</p> <p>Two Apache Tomcat Server systems must be installed on different hosts in the SAP CC system landscape.</p> <p>An Apache HTTP Server system, considered as a load balancer, must be installed and extended with the Apache Tomcat Connector plug-in.</p> <div style="border: 1px solid #ccc; padding: 5px; margin: 5px 0;"> <p>Note</p> <p>For more information about this HA setup, consult the Apache Tomcat Servers Active-Passive High Availability section.</p> </div> <p>Refer to the Implementing High-Availability (HA) Setup for SAP CC Cockpit with Two Apache Tomcat Server Systems section of the SAP CC 2023 Installation and Maintenance Guide documentation for more details about the installation procedures.</p>
SAP CC Diameter Server	<p>SAP Convergent Charging provides one HA setup for this software component:</p> <p>Two SAP CC Diameter Server systems must be installed on different hosts in the SAP CC system landscape.</p> <p>The network elements (e.g. Service Control Points (SCP)) in the intelligent network (IN) must be configured with all the installed Diameter Server systems.</p>

High Availability for Third-Party Components

For more information about high availability for database, operating system, hardware element, network element of disk technology, consult the [SAP NetWeaver Master Data Management Operation Guide](#).

HA Setup Change

Consider the following changes to increase the high availability of SAP CC, improve performance, and eliminate unplanned downtime.

Component	Description of the HA Setup Change
SAP CC Core Server (System)	<p>It is possible to add some instances of the Core Server system to improve the high availability.</p> <p>You have to determine the new instances to be added to the production landscape according to the sizing guidelines and just install and start these new instances:</p> <ul style="list-style-type: none">• Guider• Rater• Taxer <p>It is also possible to add a host in the SAP CC system landscape and deploy some new instances of the running Core Server system. A revision of the initial sizing is necessary to determine the expected instances compliant with the deployment rules, the expected global performance, and the expected high availability rate (for example, 99,99% availability) for the real-time rating/charging operations processing that relate to the usage/consumption of the chargeable service monetized by your company.</p>

9 Purging and Archiving

[Data Purging and Archiving \[page 426\]](#)

[Detailed Purge and Archive in Core Database \[page 426\]](#)

[Detailed Purge and Archive in Cockpit Database \[page 436\]](#)

[Detailed Purge and Archive in BART Database \[page 436\]](#)

[Archiving Logs \[page 442\]](#)

9.1 Data Purging and Archiving

To ensure performance, it is necessary to remove obsolete and/or useless data stored in the back-end databases.

Data purging and archiving allows you to:

- Transfer out-of-date data from the back-end database system to a file system, to later move this data in another consistent and secure storage system.
- Possibly definitively delete this source data, to decrease the global database size and increase the performance of the system.

→ Tip

- Consider also the outdated technical data that is not stored into a back-end database but to the file system. See the [Management of Outdated Technical Data \[page 404\]](#) section.
- The logs generated by SAP CC are not stored into the back-end database. Therefore consider the [log archiving \[page 442\]](#) in this chapter.

9.2 Detailed Purge and Archive in Core Database

→ Remember

The purge and archive functionalities are only available for SAP Sybase ASE, Oracle, and MS SQL Server. They are not available for IBM DB2.

[Candidate Data in Core Server and Core Database \[page 427\]](#)

[Archiving and Purging Expired Allowances' Data \[page 428\]](#)

[Archiving and Purging the Change Lists' Data \[page 431\]](#)

[Archiving and Purging Audit Data \[page 431\]](#)

[Archiving and Purging WS Idempotency Mngt Data \[page 433\]](#)

[Archiving and Purging Technical Data About WS Job Operations \[page 434\]](#)

[Archiving and Purging File Metadata for Item Files \(aka Data Files\) \[page 435\]](#)

[Archiving and Purging Usage Metrics \[page 436\]](#)

9.2.1 Candidate Data in Core Server and Core Database

To keep a constant volume size for the database or to control its maximum size, it is necessary to purge some out-of-date data. This purge can be periodical or not, automated, or manual.

→ Remember

A database that is too large can dramatically decrease the global performance of the SAP Convergent Charging (SAP CC) systems.

You may want to define purges and/or archiving for the following data:

- Allowances' data
- Change lists' data
- Audit data
- WS-idempotency-management data
- Technical data relating to job operations
- File metadata for item files (aka data files)

Allowances' DATA

When the *Allowances Management* feature is used, SAP CC stores different information related to allowances.

[Archiving and Purging Expired Allowances' Data \[page 428\]](#)

No archiving mechanism is provided, but it is possible to purge this data manually (using the [Admin+](#) user interface) or automatically (using a dedicated scheduler).

For further information about this purging mechanism, please refer below.

Change Lists' DATA

SAP CC stores some technical data for change lists into the TRANSPORT_REQUEST, TRAN_DESTINATION, CHANGE_LIST, CHAN_OBJECT and CHAN_OBJECT_SNAPSHOT tables of the Core Database.

[Archiving and Purging the Change Lists' Data \[page 431\]](#)

Audit DATA

SAP CC stores audit information when the auditing features are enabled in the system. No archiving mechanism is provided, but two commands of the [Admin+](#) user interface give the possibility to purge the different audit data recordings related to the Data and Operation Auditing features.

[Archiving and Purging Audit Data \[page 431\]](#)

WS-Idempotency-Management DATA

SAP CC stores information to ensure safe operation of either refilling services invocation or Web Services consumption. This data must be regularly purged to warranty high performance of the SAP CC system.

[Archiving and Purging WS Idempotency Mngt Data \[page 433\]](#)

Refer to the [Periodic Tasks \[page 381\]](#) section in this guide.

The old data is stored in the `WS_IDEMPOTENCY` table of the Core Database.

Technical Data (relating to job operations)

SAP CC stores information about the execution of job operations performed via Web Services, such as the job status. This data is stored in the `WS_JOB` table of the Core Database, and must be regularly purged to ensure the global performance of the SAP CC system.

[Archiving and Purging Technical Data About WS Job Operations \[page 434\]](#)

For further information, refer to the [Periodic Tasks \[page 381\]](#) section in this guide.

File Metadata for Item Files (aka Data Files) DATA

When the scheduler in charge of recording metadata about data files generated by SAP CC is enabled, metadata is stored for each data file generated by rater and bulkloader instances. This data is stored in the `FILE_METADATA` table of the Core Database, which must be regularly purged to ensure the global performance of the SAP CC system.

[Archiving and Purging File Metadata for Item Files \(aka Data Files\) \[page 435\]](#)

For further information, refer to the [Configuring the File Metadata Purge Mechanism and Its Scheduler \[page 134\]](#) section of the [SAP CC 2023 Administration Guide \[page 8\]](#) documentation.

9.2.2 Archiving and Purging Expired Allowances' Data

Allowance data is stored in the following table of the back-end database system (Core Database):

Allowances Data Recording	Generation	Database Table	Reserved Storage Space (Tablespace, Filegroup)
Allowances (in provider contracts)	<ul style="list-style-type: none">Always created, when the <i>Allowance Management</i> feature is implemented in the SAP CC Core Server systemNever (otherwise)	ALLO	ALLOWANCE_DATA

Purges of Allowances in Master Data

When using the Allowance Management feature, it is necessary to regularly purge allowance data in provider contracts from the back-end database system to ensure the global performance of the SAP CC systems and avoid latency issues.

This customer data purge mechanism can be executed:

- Manually, using the `start_purge_allowances` command of the [Admin+](#) user interface and specifying the following parameters:
 - A reference date, which is used to determine the list of expired allowances to remove
 - A maximum throughput, which corresponds to the maximum number of provider contracts per second that each rater instance can consider during allowance purge operations, and thus control the impact of these operations on the global performance of the system
- Automatically, using a dedicated scheduler in the SAP CC system. refer to the [SAP CC 2023 System Parameter Reference](#) documentation for more information about the `ALLOWANCES_PURGE_SCHEDULER_ENABLED` system parameter.

Both manual and scheduled executions of the purge operations log the following information when starting and stopping:

- The number of provider contracts whose allowances have been successfully purged
- The number of provider contracts containing allowances which could not be purged
- The number of allowances successfully purged in contracts

Refer to the [SAP CC 2023 Log Message Reference and Error Troubleshooting](#) documentation for more information about the log messages that relates to the allowance purge operations and its mechanism. See the definitions of the `com.sap.scc.core_server.000508` log message ID.

Note

In addition to the log information, the following indicators are available to know the reference dates of the last manual or scheduled purge operation:

- `ALLOWANCES_PURGE_LAST_TRIGGER`
- `ALLOWANCES_PURGE_SCHEDULER_LAST_TRIGGER`

Purge operations related to expired allowances data can be executed:

1. Automatically, using a dedicated scheduler of SAP Convergent Charging (SAP CC)

→ Remember

By default, the purge is triggered every day at midnight.

You can also implement the HCI API.

2. Manually, using the `start_purge_allowances` command of the Admin+ user interface
You can also implement the HCI API.

Operations

[Manually Purging the Expired Allowances \[page 430\]](#)

[Configuring the Allowances Purge Mechanism and Its Scheduler \[page 132\]](#)

Additional Information

[start_purge_allowances](#)

[Manually Purging the Expired Allowances \[page 430\]](#)

When necessary, you manually purge the allowances (in provider contracts, shared allowances) that are expired in customer master data.

Related Information

[Configuring the Allowances Purge Mechanism and Its Scheduler \[page 132\]](#)

9.2.2.1 Manually Purging the Expired Allowances

When necessary, you manually purge the allowances (in provider contracts, shared allowances) that are expired in customer master data.

An allowance is expired when its validity end date/time - shifted by the retention period - is passed.

→ Tip

Get the values of the [ALLOWANCES_PURGE_LAST_TRIGGER](#) indicator to know the date/time of the last manual purge operation by a system administrator.

Using Admin+

Use the [start_purge_allowances](#) command of the Admin+ user interface.

→ Recommendation

If this technical operation is a mass operation in your environment, specify a maximum throughput (provider contracts or subscriptions per second and by rater instance of the SAP CC system) so that your running system remains stable. With this option, you tune the performance of your system.

Related Information

[start_purge_allowances](#)

9.2.3 Archiving and Purging the Change Lists' Data

Purges of Change Lists

To avoid latency and ensure the global performance of the system, it is necessary to regularly delete from the Core Database the data related to change lists, which have been transported to remote SAP CC system(s).

Purge operations can be executed:

- **Unitary**, using the *Delete* menu of the [Core Tool](#) user interface and selecting a change list to delete.
- **In bulk mode**, using the `purge_change_lists` command of the [Admin+](#) user interface and specifying a reference date which is used to delete the change lists created before this date and associated to already executed transport requests.

9.2.3.1 Manually purge_change_lists

Using Admin+

Use the `purge_change_lists` command of the Admin+ user interface.

Related Information

[purge_change_lists](#)

9.2.4 Archiving and Purging Audit Data

To manage the security and audit level of your systems, the Data and Operation Auditing features give the possibility to track the operations that are requested by your SAP CC users, to log changes to persistent

configuration data, and to record the before and after versions of the different data objects impacted by these user operations.

Audit data is created according to the system configuration of your running SAP Core Server system. For example, view the [AUDIT_ACTIVATION](#) and [AUDIT_OBJECT_ACTIVATION](#) parameter values to know the current system settings.

All this data is stored in the following tables of the back-end database system (Core Database):

Audit Data Recording	Generation	Database Table	Reserved Storage Space (Tablespace, Filegroup)
Object change logs	Always created	OBJECT_CHANGE_LOG	OBJECT_CHANGE_DATA
Object snapshots	Depends on the system configuration	OBJECT_SNAPSHOT	OBJECT_CHANGE_DATA
Operation execution recordings	Depends on the system configuration	USER_OPERATION	CATALOG_DATA

As the auditing functions can lead to a large number of recorded audit data, they may significantly impact the performance of the whole SAP CC system. SAP highly recommends that you perform manual purging operations regularly.

Depending on your security policy, you may need to plan the archiving of this audit data.

Archiving Out-of-Date Audit Data Recordings

To archive the audit data recordings, refer to the database documentation.

Purging Out-of-Date Audit Data Recordings

To purge out-of-date audit data recordings, you use the following commands of the [Admin+](#) program user interface:

- `purge_user_operations`, which gives the possibility to purge the out-of-date data related to the execution of user operations, stored in the `USER_OPERATION` table
- `purge_object_change_logs`, which gives the possibility to purge the out-of-date data related to both the object change logs and their associated object snapshots, stored in the `OBJECT_CHANGE_LOG` and `OBJECT_SNAPSHOT` tables

Note

- To decrease the volume of audit data recordings, you can fine configure the audit domains that define the auditable objects and auditable user operations. Depending on your business and technical requirements, you may exclude some elements from the auditing functions. Consult the [SAP CC 2023 Administration Guide \[page 8\]](#) documentation about the [AUDIT_OBJECT_DOMAIN](#) and [AUDIT_DOMAIN](#) system parameters.
- For more information about the Data Object Auditing feature and the User Operation Auditing feature, refer to the [SAP CC 2023 Application Help](#) documentation. You may consider some options.

Related Information

[purge_user_operations](#)

9.2.4.1 Manually purge_user_operations

Using Admin+

Use the [purge_user_operations](#) command of the Admin+ user interface.

Related Information

[purge_user_operations](#)

9.2.4.2 Manually purge_object_change_logs

Using Admin+

Use the [purge_object_change_logs](#) command of the Admin+ user interface.

Related Information

[purge_object_change_logs](#)

9.2.5 Archiving and Purging WS Idempotency Mngt Data

9.2.5.1 Manually Purging Idempotency Data

When necessary, you manually purge the WS-idempotency-management data that is recorded and stored into the database.

Using Admin+

Use the `purge_idempotency` command of the Admin+ user interface.

Related Information

[purge_idempotency](#)

9.2.6 Archiving and Purging Technical Data About WS Job Operations

9.2.6.1 Manually purge_job_record

Using Admin+

Use the `purge_job_record` command of the Admin+ user interface.

Related Information

[purge_job_record](#)

9.2.7 Archiving and Purging File Metadata for Item Files (aka Data Files)

Purge operations related to metadata of data files can be executed:

1. Automatically, using a dedicated scheduler of SAP Convergent Charging (SAP CC)
You can also implement the HCI API.
2. Manually, using the `purge_file_metadata` command of the Admin+ user interface
You can also implement the HCI API.

Operations

[Configuring the File Metadata Purge Mechanism and Its Scheduler \[page 134\]](#)

[Manually Purging the File Metadata \[page 435\]](#)

Additional Information

[purge_file_metadata](#)

[Manually Purging the File Metadata \[page 435\]](#)

When necessary, you manually purge the file metadata that is recorded for each item file (aka data file) and stored into the database.

9.2.7.1 Manually Purging the File Metadata

When necessary, you manually purge the file metadata that is recorded for each item file (aka data file) and stored into the database.

Metadata is stored for each item file (aka data file) generated by the rater and bulkloader instances in the system.

Using Admin+

Use the `purge_file_metadata` command of the Admin+ user interface.

Related Information

[purge_file_metadata](#)

9.2.8 Archiving and Purging Usage Metrics

Recording	Generation	Database Table	Reserved Storage Space (Tablespace, Filegroup)
Usage metrics (SAP system measurement)	Depends on the system configuration	METRIC_RECORD	CATALOG_DATA

Archiving Out-of-Date Usage Metric Recordings

To archive the usage metric recordings manually, refer to the database documentation.

As of SP 2 of release 5.0, you can open the app [Display Usage Metrics](#) in SAP CC [Cockpit](#) to export all the recorded usage metrics to a spreadsheet file that you can use as an archive

Note that the data purge is automated: after a retention period, the SAP CC system cleans the database daily (by default).

Purging Out-of-Date Usage Metric Recordings

The system purges the usage metrics regularly (daily) and automatically.

Operations

[Configuring the Product Usage Purge Mechanism and Its Scheduler \[page 136\]](#)

9.3 Detailed Purge and Archive in Cockpit Database

The Cockpit Database system does not require any purge. The RDBMS manages the data.

9.4 Detailed Purge and Archive in BART Database

BART Server and BART Database

The following procedures enable the database administrator (DBA)²³⁰ to purge and archive out-of-date data. The candidate data is the consumption detail records (CDRs) that represent multiple consumptions of the chargeable service. It is also explained how to reuse archived data. The purge can be periodical or not, automated or manual. The old data to be purged is stored in the CDR table of the database.

The archive period cannot be less than the retention period configured at installation time (see `PARTITION_DAYS` on the `PARTITION_PURGE` table). Consult the [SAP CC 2023 Administration Guide \[page 8\]](#) documentation for more information.

Legal and local policy may also apply.

Note

- Refer to the purge and archive tables in the database schema to know the current configuration of the purge and archive process.
- You must be connected as DBA to your RDBMS²³¹ to use the following procedures.
- Important: The BART Server system must be shut down while purging or archiving the BART Database.

Archive

Purge

Restore from Archives

9.4.1 With SAP HANA

SAP HANA

The following table describes the procedures to use for configuring data purge and archive:

²³⁰ DataBase Administrator

²³¹ Relational Database Management System

Procedure	Description
MANAGE_PURGE	<p>This procedure performs a purge without archiving the purged data.</p> <div style="border: 1px solid #ccc; background-color: #f0f0f0; padding: 5px;"> <p>⚠ Caution</p> <p>This procedure definitively removes the data.</p> </div>
MANAGE_ARCHIVE	<p>This procedure archives the data in a CSV file.</p> <div style="border: 1px solid #ccc; background-color: #f0f0f0; padding: 5px;"> <p>⚠ Caution</p> <p>Do not use this procedure if the archived database is not stored on a safe storage system (SAN or local RAID1-5 drive).</p> </div>
IMPORT FROM CSV FILE <file> INTO CDR WITH FAIL ON INVALID DATA	<p>This statement imports the data from a CSV²³² file into the database</p> <div style="border: 1px solid #ccc; background-color: #f0f0f0; padding: 5px;"> <p>📄 Note</p> <p>For more information, consult the documentation of the <code>IMPORT FROM CSV</code> statement in the SAP HANA SQL and System Views Reference, available at: http://help.sap.com/hana_appliance.</p> </div>

MANAGE_PURGE: The following arguments are required for the `MANAGE_PURGE` procedure:

- `toDate` (date): the maximum consumption date (excluded) of the CDRs to purge
- `retentionPeriod` (integer): the period during which CDRs must be kept for rerating, expressed in days
- `checkCDR` (integer):
 - 0 means: Do not check the status of the CDRs to be purged
 - 1 means: Check the status of the CDRs to be purged

MANAGE_ARCHIVE: The following arguments are required for the `MANAGE_ARCHIVE` procedure:

- `toDate` (date): the maximum consumption date (excluded) of the CDRs to purge
- `retentionPeriod` (integer): the period during which CDRs must be kept for rerating, expressed in days
- `checkCDR` (integer):
 - 0 means: Do not check the status of the CDRs to be purged
 - 1 means: Check the status of the CDRs to be purged
- `archiveDirectory`: the directory where the data will be archived
 - The directory must exist and be writable
 - The exported data will be located in the file `<archiveDirectory>/export/<schema>/CD/CDR_ARCHIVE/data`
 - If the file already exists, its content is replaced

IMPORT FROM CSV: The `IMPORT FROM CSV` statement must be executed with the path of the CSV file, which contains the data to import.

²³² Comma Separated Value

9.4.2 With SAP Sybase ASE

SAP Sybase ASE

The following table describes the procedures to use for configuring data purge and archive:

Procedure	Description
MANAGE_ARCHIVE	<p>Use this procedure to copy the data to be purged into data files in a given directory</p> <div><p>Note</p><ul style="list-style-type: none">The archived partitions are removed from the databaseThis procedure can also be used to remove data without archiving them into data files (using the <code>purgeWithNoArchive</code> argument described below)</div> <div><p>Caution</p><p>Do not use this procedure if the archived database is not stored on a safe storage system (SAN or local RAID1-5 drive).</p></div>
IMPORT_ARCHIVE	<p>This procedure allows the DBA to re-import into the same database an existing archive</p>

The following arguments are required for the `MANAGE_ARCHIVE` procedure:

- `destinationDirectory` (nvarchar 1024, mandatory)
 - Destination directory in which archives are stored
- `checkCDR` (integer, default 1):
 - 0 means: Do not check the status of the CDRs to archive
 - 1 means: Check the status of the CDRs to archive
- `force` (integer, default 0):
 - 0 means: stop the procedure if CDRs are in status (0, 1, 7) for those dates (result of the request to check CDRs)
 - 1 means: do not stop the procedure if CDRs are in status (0, 1, 7) for those dates
- `purgeWithNoArchive` (integer, default 0):
 - 0 means: archive and remove the partitions)
 - 1 means: only remove the partition

The following arguments are required for the `IMPORT_ARCHIVE` procedure:

- `fromDate` (varchar)

- toDate (varchar)
- archiveDBName (varchar)

9.4.3 With Oracle

With Oracle SE, Oracle EE

This table describes the package procedures to use for configuring data purge and archive.

Package procedure overview	Description
BART_ARCHIVE_PURGE.MANAGE_PURGE	<p>This procedure enables administrators to perform a purge. It detaches automatically the tablespace as a transportable tablespace to archive the data.</p> <p>Store the purged data (transportable tablespace) and the data dump file (.dmp) on a removable backup medium.</p>
BART_ARCHIVE_PURGE.MANAGE_PURGE_WITHOUT_ARCHIVE	<p>This procedure enables administrators to perform a purge without archiving the purged data</p> <div style="border: 1px solid #ccc; background-color: #f9f9f9; padding: 5px;"> <p>⚠ Caution</p> <p>This procedure definitively destroys the data.</p> </div>
BART_ARCHIVE_PURGE.IMPORT_ARCHIVE	<p>This procedure allows the DBA to re-import into the same schema an existing archive container that has been previously detached from this schema</p> <div style="border: 1px solid #ccc; background-color: #f9f9f9; padding: 5px;"> <p>ℹ Note</p> <p>Copy the archive to the SAN (in the appropriate directory) before applying this procedure and keep a backup copy for you.</p> </div>
BART_ARCHIVE_PURGE.CLEAN_IMPORTED_ARCHIVE	<p>This procedure deletes all the partitions that have been re-created from existing archives</p> <div style="border: 1px solid #ccc; background-color: #f9f9f9; padding: 5px;"> <p>⚠ Caution</p> <p>This procedure destroys the data. You must have a backup of the archive before applying the procedure.</p> </div>

The following arguments are required for the BART_ARCHIVE_PURGE.MANAGE_PURGE procedure:

- checkCDR (integer, default 1):
 - 0 means: Do not check the status of the CDRs to archive

- 1 means: Check the status of the CDRs to archive
- `force` (integer, default 0):
 - 0 means: stop the procedure if CDRs are in status (0, 1, 7) for those dates (result of the request to check CDRs)
 - 1 means: do not stop the procedure if CDRs are in status (0, 1, 7) for those dates

The following arguments are required for the `BART_ARCHIVE_PURGE.MANAGE_PURGE_WITHOUT_ARCHIVE` procedure:

- `checkCDR` (integer, default 1):
 - 0 means: Do not check the status of the CDRs to archive
 - 1 means: Check the status of the CDRs to archive
- `force` (integer, default 0):
 - 0 means: stop the procedure if CDRs are in status (0, 1, 7) for those dates (result of the request to check CDRs)
 - 1 means: do not stop the procedure if CDRs are in status (0, 1, 7) for those dates

The following arguments are required for the `BART_ARCHIVE_PURGE.IMPORT_ARCHIVE` procedure:

- `fromDate` (varchar)
- `toDate` (varchar)

9.4.4 With Microsoft SQL Server

Microsoft SQL Server

This table describes the package procedures to use for configuring data purge and archive.

Procedure	Description
<code>MANAGE_ARCHIVE</code>	<p>Use this procedure to copy the data to be purged in a new empty database.</p> <p>Manually detach this database to create an archive of the data including the old partitions. Store the archive on a removable backup medium</p>
<code>MANAGE_PURGE</code>	<p>This procedure removes the already archived partitions from the current database.</p> <div style="border-left: 2px solid orange; padding-left: 10px; margin-top: 10px;"> <p>⚠ Caution</p> <p>Do not use this procedure if the archive database is not stored on a safe storage system (SAN or local RAID1-5 drive).</p> </div>

Procedure	Description
IMPORT_ARCHIVE	This procedure allows the DBA to re-import into the same database an existing archive.

The following arguments are required for the `MANAGE_ARCHIVE` procedure:

- `checkCDR` (integer, default 1):
 - 0 means: Do not check the status of the CDRs to archive
 - 1 means: Check the status of the CDRs to archive
- `force` (integer, default 0):
 - 0 means: stop the procedure if CDRs are in status (0, 1, 7) for those dates (result of the request to check CDRs)
 - 1 means: do not stop the procedure if CDRs are in status (0, 1, 7) for those dates
- `archiveDBName` (varchar)

The following arguments are required for the `IMPORT_ARCHIVE` procedure:

- `fromDate` (varchar)
- `toDate` (varchar)
- `archiveDBName` (varchar)

9.5 Archiving Logs

Depending on the configuration of your SAP CC systems, the volume of the logs can increase. You have to monitor their sizes and determine a policy for archiving all the logs produced.

Consult the [Log and Trace Files in Your SAP System Landscape \[page 344\]](#) and [Log and Trace Files in SAP CC 2023 \[page 344\]](#) sections for details about the locations of these files.

10 Software Change Management

Software Change Management standardizes and automates software distribution, maintenance, and testing procedures for complex software landscapes and multiple software development platforms. These functions support your project teams, development teams, and application support teams.

The aim of Software Change Management is to establish consistent, solution-wide change management that allows for specific maintenance procedures, global rollouts (including localization), and open integration with third-party products.

10.1 Transport and Change Management

SW change and transport management is based on the classic SAP 3-tier approach involving a development landscape for implementation, a quality assurance layer for consolidating all changes and the production environment at the end. Implementations are carried out in the development landscape and should be automatically released to the consolidation level on release.

10.2 FPS and Patch Implementation

For detailed information, see the installation guide.

10.3 Release and Upgrade Management

When a new release of SAP Convergent Charging (SAP CC) is generally available (GA), you can plan an upgrade project to benefit from this new version of your SAP software product. You can find details regarding the SAP CC upgrade in the installation guide.

Related Information

[Upgrading SAP Convergent Charging](#)

10.4 Quality Management and Test Management

For quality and test management in SAP Convergent Charging (SAP CC) environments, we recommend the approach of other SAP application environments: multi-tier landscapes. We recommend that you use at least 2 tiers (development system and productive system). A better approach is to use a 3-tier environment (development system, quality assurance system, and production system). For more information, see Transport and Change Management for multi-tier landscapes. The different systems can be installed / upgraded separately.

Customer implementation in the term of SAP CC means system integration and data modeling.

The changes performed in the development system should be tested in the quality assurance system, before they are brought to the production SAP CC system.

11 Troubleshooting of SAP CC

This chapter provides a central starting point for problem solving with SAP Convergent Charging. It provides guidance on how to deal with issues that may come up when implementing or operating SAP Convergent Charging applications and systems (server systems, user interfaces, and other programs).

[Getting Assistance \[page 445\]](#)

[Root Cause Analysis and Exception Management in SAP Solution Manager \[page 447\]](#)

[Troubleshooting and Root Cause Analysis Using CA Introscope for SAP \[page 448\]](#)

[Problem Determination \[page 452\]](#)

[System Troubleshooting \[page 454\]](#)

[Troubleshooting and Performance Analysis \[page 457\]](#)

[Troubleshooting SAP CC User Interfaces \[page 460\]](#)

[Troubleshooting User Sessions \[page 464\]](#)

[Troubleshooting SAP System Performance with Java GC Logs \[page 465\]](#)

[Tracing Tools \[page 465\]](#)

[Advanced Troubleshooting Using Thread Dump Files \[page 474\]](#)

[Errors and Exceptions \[page 479\]](#)

[Error Reason Codes \[page 480\]](#)

[Tips and Troubleshooting Solutions \(Administration and Operations Guide of SAP CC 2023\) \[page 483\]](#)

Read tips and troubleshooting solutions related to the administration of this version of SAP Convergent Charging Cockpit.

11.1 Getting Assistance

You can use the Troubleshooting sections in the SAP CC documents to get help in unexpected situations when working with the following domains:

Domain	Description	Documentation
Installation Troubleshooting	<ul style="list-style-type: none">• Preparations• Initial installation• Post-installation activities	Refer to the SAP CC 2023 Installation and Maintenance Guide documentation

Domain	Description	Documentation
Software Maintenance Troubleshooting	<ul style="list-style-type: none"> Implementation of a support package (SP) Implementation of a patch level 	Refer to the SAP CC 2023 Installation and Maintenance Guide documentation
Upgrade Troubleshooting	<ul style="list-style-type: none"> Preparations Implementation validation Upgrade processing Post-upgrade activities 	Refer to the SAP CC 2023 Installation and Maintenance Guide documentation
Development and Integration Troubleshooting	<ul style="list-style-type: none"> Java development and integration Web Services integration 	<ul style="list-style-type: none"> Refer to the Java/XML API Reference (Core Library) documentation Refer to the SAP CC 2023 Web Services Documentation (SOAP) documentation
Configuration Troubleshooting	<ul style="list-style-type: none"> Technical configuration Business configuration 	Refer to the SAP CC 2023 Administration Guide [page 8] documentation and the primary help of the different user interfaces
Performance and Health Troubleshooting	<ul style="list-style-type: none"> Systems Communications Charging policy processing Internal functions 	Refer to the current documentation
User Troubleshooting	<ul style="list-style-type: none"> SAP users 	Refer to the SAP CC 2023 Primary Help for Core Tool documentation
Log Troubleshooting	<ul style="list-style-type: none"> Technical configuration Business configuration <ul style="list-style-type: none"> System Master Data 	Refer to the SAP CC 2023 Log Message Reference and Error Troubleshooting documentation
Components	<ul style="list-style-type: none"> Server systems Java Virtual Machines (JVM, J2EE) User interfaces System landscapes Back-end database 	Refer to: <ul style="list-style-type: none"> SAP Solution Manager <code>hs_err_pid<process id>.log</code> file in the working directory to be analyzed User interfaces primary help documentation SAP CC 2023 Log Message Reference and Error Troubleshooting the current documentation
Advanced Troubleshooting	<ul style="list-style-type: none"> Tracing by Support Team 	Refer to the Support Desk Management [page 489] section of the current documentation

11.2 Root Cause Analysis and Exception Management in SAP Solution Manager

Analyzing the root cause of an incident in multi-technology system landscapes with distributed systems requires a systematic top-down approach.

A root cause analysis is triggered by an incident in IT Service Management or by solution monitoring (system monitoring or business monitoring).

The objective is to identify and provide:

- Immediate corrective action (workaround) to restore service operations as quickly as possible with minimal disruption to end users by isolating the area of concern
- Complete solution to the issue at hand

Use the Root Cause Analysis (RCA) functions in SAP Solution Manager to manage the end-to-end analysis, system analysis, host analysis, and database analysis.

A dedicated work center is the central access to functions and methods for monitoring your SAP solutions and accelerating problem solving. This improves the availability of your SAP CC 2023 systems. See [SAP Solution Manager](#) for more information.

Work Center and Reports	Description
Root Cause Analysis Work Center	<p>This work center is the central access to functions and methods for monitoring your solutions and accelerating problem solving.</p> <p>This improves the availability of your solutions</p>
End-to-End Analysis	Provides tools to perform cross-component root cause analysis
System Analysis	<p>Provides tools to perform system-specific root cause analysis:</p> <ul style="list-style-type: none">• You can use Log Viewer to display and verify to the logs and traces of the monitored SAP CC 2023 systems:<ul style="list-style-type: none">• Core Server• BART Server• You can use the monitoring consoles of CA Introscope to display and verify performance view<ul style="list-style-type: none">• Core Server

Note

Consult the other work centers used for SAP CC on <http://support.sap.com/solutionmanager>.

→ Recommendation

Implement and use Root Cause Analysis in SAP Solution Manager for root cause analysis of SAP CC 2023. Follow the Customizing activities outlined in SAP Solution Manager.

11.2.1 Working with the Root Cause Analysis Work Center in SAP Solution Manager

To troubleshoot problems with SAP CC landscape, you start the Root Cause Analysis work center in SAP Solution Manager by using SAP Logon and SAP Easy Access.

Prerequisites

The *Technical Monitoring* are implemented. See [Technical Monitoring and Alerting Using SAP Solution Manager \[page 325\]](#).

Display the Logs and Traces of SAP CC 2023

- Start a system analysis: choose the *System Analysis* report in the navigation area.
- Select the system cluster that corresponds to your SAP CC platform.
- Click *Log Viewer*. A window displays all the host machines available in this cluster, the status of the Diagnostic agents, and the declared log stores.
- Select the host and the log or trace files to analyze.

Display the Performance Monitors of SAP CC 2023

- Start a system analysis: choose the *System Analysis* report in the navigation area.
- Select the system cluster that corresponds to your SAP CC platform.
- Click *CA Introscope* and select the monitoring console you want to use: *CA IS Workstation* or *CA IS WebView*. A window displays the user interface.

Refer to next section for more information about troubleshooting and root cause analysis with CA Introscope for SAP.

11.3 Troubleshooting and Root Cause Analysis Using CA Introscope for SAP

During the production operation phase, you can use [CA APM Introscope \[page 328\]](#) to monitor manually the performance and health of the SAP CC Core Server systems in the SAP system landscape. You can use the information delivered by the monitoring consoles to analyze the SAP CC systems and take appropriate actions when necessary.

You work with the predefined dashboards and alerts as the starting point for troubleshooting. In CA IS Workstation Console, you view the performance and health metrics in graphical viewers.

→ Recommendation

Install and use CA Introscope for SAP for technical monitoring and root cause analysis of SAP CC Core Server. Follow the setup procedure outlined in SAP Note [1453216](#). Refer to the [installation considerations \[page 329\]](#) in the [Technical Monitoring Using CA Introscope for SAP \[page 328\]](#) section.

Also, implement and use Root Cause Analysis in SAP Solution Manager for root cause analysis of SAP CC Core Server to benefit from extended supportability tools.

11.3.1 Troubleshooting Using CA IS Workstation Console and Investigator

To troubleshoot problems with SAP CC, you use Console and Investigator in the CA Introscope user interfaces (IS Workstation, IS WebView).

- Start the [CA IS Workstation User Interface \[page 331\]](#).
- Open a monitoring console to display the monitoring dashboards.
- Select a graph in a console dashboard that displays abnormal metric values.
- Move the cursor over a point on the graph to open a tooltip. This tooltip displays information about the metric name, exact value of the metric, minimum and maximum values for the metric across the period represented by the data point.
- Press **F2** to pin the tooltip.
- Click the hyperlink to open this metric directly in CA IS Workstation Investigator.

Consult the documentation of CA Introscope for more information about the user interfaces:

- Working with Console
- Working with Investigator

11.3.2 Working with Investigator

Investigator displays all the metrics defined for SAP CC. The IS Enterprise Manager system collects or computes these performance metrics.

Consult the [SAP CC 2023 Performance Metric Reference](#) documentation about the complete metric hierarchy. This user assistance details the performance and health metrics and provides troubleshooting information.

The *Investigator* window displays the Metric Browser. A root node corresponds to the system landscape, subnodes correspond to the hosts installed in the landscape.

Information about SAP CC systems and system instances is available in the `SAP Convergent Charging` nodes. This node is available in each host machine that belongs to the same SAP CC Core Server system. The node name is: `<SID>_<INSTANCE_ID>_SCCCoreServer`.

❖ Example

- DEV_rater#1_SCCCoreServer
- TST_rater#1_SCCCoreServer2

Consider the following elements dedicated to SAP CC. The list may change depending on the:

- Type of SAP CC system instance
- Version of the installed module management

Monitoring

Function	Description
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Frontend	Provides the lists of metrics that relate to the front-end activities:
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- *BulkReader*: the file system activities that read in bulk mode:
 - Business data resulting from the convergent charging and refilling operations
- *HTTP*: the public communications via the HTTP Communication Interface (HCI) technical interface) of SAP CC
 - Service operation requests; each type of request is identified by a unique technical key that is the name of a Java class in the SAP CC Core Server system. Refer to the [Java/XML API Reference \(Core Library\)](#) documentation for the list of the operations that are available in HCI.

❖ Example

CreateChargePlanOp1Impl: relates to the creation operation request of a charge plan in the pricing catalog stored in master data of a service provider.

- *InternalMessage*: the inter-instance communications via the Message TCP technical interface of SAP Convergent Charging
 - Administration requests, metric requests, rater instance activation request, rater refreshing requests
- *Message*: the public communications via the Message TCP technical interface of SAP Convergent Charging, this includes:
 - *Handler*: details per technical request handler
 - *Operation*: details per service operation
- *WebService*: the public communications via the Web Services technical interface of SAP Convergent Charging. This node includes a subnode for each Web service and the list of service operations requested by connected applications or systems

❖ Example

Webservicename

Monitoring

Function Description

Backends	<p>Provides the lists of metrics that relate to the back-end activities:</p> <ul style="list-style-type: none">• <i>InternalMessage</i>: the inter-instance communications via the Message TCP technical interface of SAP Convergent Charging• <i>POSTPAID_CIT_WRITER (BulkWriter)</i>: the file system activities that write data in bulk mode:<ul style="list-style-type: none">• Business data resulting from the convergent charging and refilling operations: postpaid charged items• <i>XXX (BulkWriter)</i>: the file system activities that write data in bulk mode:<ul style="list-style-type: none">• Data temporarily stored in file and resulting from business or technical operations• <i>XXX (YYY DB)</i>: the database where XXX and YYY the db techno (Oracle DB, MS SQL Server DB, ...)<ul style="list-style-type: none">• SQL: per statement details• <i>Message</i>: the public communications via the Message TCP technical interface of SAP Convergent Charging
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JMX	<p>Provides the lists of JMX metrics of SAP Convergent Charging: the <code>com.highdeal</code> node includes the following entries.</p> <ul style="list-style-type: none">• <i>Cache</i>: performance metrics about the data caches available in each instance of the SAP CC Core Server system
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❖ Example

Provisioning cache

🕒 Note

All the metrics that are visible in the Sensor node, are deprecated. They correspond to the service statistics information available in the Admin+ user interface and the `SERVICES_STATISTICS` system indicator. Refer to the [SAP CC 2023 System Parameter Reference](#) documentation for more information about this indicator. Consult the primary help of Admin+ to view manually the information with the `get` command

Monitoring


Function Description

SAP CC	<p>For an SAP CC system instance, provides the alphabetical lists of metrics that relates to:</p> <ul style="list-style-type: none">• Connection: performance data related to the availability of the High-speed Messaging Infrastructure (HMI) that is the low level technical layer of the Message TCP technical interface• Logic Tree: performance data related to the processing of logic trees. The logic trees are executed during charging and activation operations. They include the pricing elements: price plan of the charges, the refill logic, and the allowance logic• Message: performance and health data about the public communications via the Message TCP technical interface of SAP Convergent Charging. Metrics are organized per service and then per operation, and include information such as response times, number of responses and number of errors in different categories• Queue: performance and health data of main processing queues and their associated execution threads. The queues are used for inter-thread, non-blocking, asynchronous communication. The queues shall be considered regarding throughput, latency and reliability• Scheduler: performance and health data about the internal schedulers enabled in the SAP CC Core Server system• Transaction: performance and health data about the technical transactions (commits and rollbacks) managed by an instance in a running SAP CC Core Server system• Warm-Up: performance and health data about the data cache warm-up processing. The data is only for caches using partitioning and direct memory
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Consult the CA Introscope documentation for more information about the basic elements: [CA Introscope](#).

More Information

Consult the secondary help available when you click:

- The title of a dashboard
- The  icons next to the graphs

Consult also the CA APM Workstation User Guide in the product documentation of CA Introscope. Refer to the relevant bookshelf from CA Support.

Consult the SAP and CA communities.

11.4 Problem Determination

A Problem Occurs

When a problem occurs, the user gets an error message:

- All the graphical user interfaces (Core Tool, BART Tool), can display a message and an action for the power user

- All the SAP CC systems record logs and traces with fatal error, error, or warning severity levels when they detect an anomaly
- Error codes and Java exceptions are provided by the systems when an operation request is sent by a connected external system that uses the technical interfaces of SAP CC. When interfacing an external system (Java development or Web Services integration), the development consultants and the implementation project teams

These messages provide answers to many problems and assist you with most of the problem isolation and resolution. Corrective or preventive actions to be planned are suggested to resolve the problem or to prevent a future issue.

Collection of Information

To collect information related to your problem:

- Logging: log messages to permanently record the events and status of a software system
- Tracing: trace messages to analyze a software system in detail from a programmers standpoint as exceptional procedure

Try to Reproduce

Sometimes you can try to reproduce the unexpected behavior on a quality landscape.

You can increase temporarily the volume of log and trace information recorded by the SAP CC systems.

Advanced Collection

You can increase temporarily the volume of information by using the following functions:

- Traces (SAP CC system)
- Debug mode (Admin+ tool)
- Verbose mode (Core Tool)

Problem Isolation

The table below lists the typical problems that you can encounter with SAP CC:

- Connection issues
- Requested operation cannot be processed by the system
- Master data becomes unsynchronized
- Other business data becomes unsynchronized (currency, ...)

- Input data is not received
- Output data is not sent
 - Charged items
 - Billable items
 - Acquired chargeable items
- Notifications are not sent
- User rights and authorization
- Unusual service times

11.5 System Troubleshooting

As a system administrator or an application administrator, you must monitor the SAP CC systems.

They must manage the issues and potential issues signaled by a log message with an error or warning severity.

- They can use the [SAP CC 2023 Log Message Reference and Error Troubleshooting](#) documentation to plan their investigations
- They can increase temporarily the volume of log messages recorded by the SAP system by changing online the log severity thresholds to INFO for all the instances of the system

Procedure

1. Launch the SAP CC [Admin+](#) user interface and log on
2. Set up the severity thresholds for logs to the INFO level
 - Use the `set` command and apply immediately and permanently these changes for all the instances of the system:

```
set LS_APP_SEVERITY INFO all all
set LS_SYS_SEVERITY INFO all all
```

Note

You can change temporarily the settings for one single instance of the system:

```
set LS_SYS_SEVERITY INFO memory<instanceID>
```

[Troubleshooting of a Core Server System \[page 455\]](#)

[Troubleshooting of a BART Server System \[page 456\]](#)

[Troubleshooting of an SAP CC Cockpit/Apache Server \[page 457\]](#)

11.5.1 Troubleshooting of a Core Server System

→ Remember

SAP Convergent Charging (SAP CC) provides a rating and charging solution for high-volume processing in service industries. It delivers pricing design capabilities, high performance rating, and convergent balance/allowance management. Capable of operating in real time and in batch mode, it includes hybrid prepaid/postpaid charging capabilities, unrivaled marketing agility for service pricing, carrier-grade scalable performance, and high availability.

The Core Server system is this rating engine. The rating engine is at the heart of the information system of a company that monetizes its chargeable services or physical goods. Especially for companies offering digital services in a real-time rating and charging environment (online charging scenarios).

[Troubleshooting when SAP CC Core Server Is Not Starting \[page 455\]](#)

An instance that composes the Core Server system is not starting. There could be multiple reasons that can be temporary or permanent, due to SAP CC or due to another components in the highly-interconnected SAP system landscape.

[Tips and Troubleshooting Solutions \(Core Server\) \[page 455\]](#)

11.5.1.1 Troubleshooting when SAP CC Core Server Is Not Starting

An instance that composes the Core Server system is not starting. There could be multiple reasons that can be temporary or permanent, due to SAP CC or due to another components in the highly-interconnected SAP system landscape.

There could be multiple reasons, but please check the below notes to identify a few issues.

11.5.1.2 Tips and Troubleshooting Solutions (Core Server)

[Fatal Issue: Database is not ready \[page 456\]](#)

11.5.1.2.1 Fatal Issue: Database is not ready

Symptoms

An instance of the SAP CC Core Server system failed to start. Its logs contain the following error message:

```
Exception: Database is not ready  
SQL manager is not able to connect to <DB_JDBC_URI> as <DB_USER>
```

Reasons

An instance fails to connect to the back-end database, resulting in the abortion of the instance startup. This kind of database connection failure is mainly due to incorrect database settings such as incorrect login, password, or JDBC URI.

The instance cannot start.

Solutions

Check and modify the database connection settings that are configured for your Core Server system.

See Also

[Modifying the Database Connection Settings \[page 57\]](#)

11.5.2 Troubleshooting of a BART Server System

[Troubleshooting when SAP CC BART Server Is Not Starting \[page 457\]](#)

The BART Server system is not starting. There could be multiple reasons that can be temporary or permanent, due to SAP CC or due to another components in the SAP system landscape.

[Tips and Troubleshooting Solutions \(BART Server System\) \[page 457\]](#)

11.5.2.1 Troubleshooting when SAP CC BART Server Is Not Starting

The BART Server system is not starting. There could be multiple reasons that can be temporary or permanent, due to SAP CC or due to another components in the SAP system landscape.

11.5.2.2 Tips and Troubleshooting Solutions (BART Server System)

11.5.3 Troubleshooting of an SAP CC Cockpit/Apache Server

[Troubleshooting when the Cockpit Is Not Starting \[page 457\]](#)

[Tips and Troubleshooting Solutions \(SAP CC Cockpit/Apache Server\) \[page 457\]](#)

11.5.3.1 Troubleshooting when the Cockpit Is Not Starting

11.5.3.2 Tips and Troubleshooting Solutions (SAP CC Cockpit/Apache Server)

11.6 Troubleshooting and Performance Analysis

Slow communications or unexpected internal activities may be the root causes or participate to an existing issue. In some cases, most notably performance issues, a problem can have its roots in a number of seemingly unrelated components. You narrow down the probable root cause by proceeding with your analysis.

This section introduces what steps you can take to identify and resolve specific performance issues and what you can do to enhance the performance of your monitored SAP CC systems in the following areas:

- Host resources (CPU²³³, memory, disk)
- Size and growth of data structures
- Transactional problems
- SQL²³⁴ statement performance
- Security, authorization and licensing
- Configuration

Prerequisites

- [Technical Monitoring and Alerting Using SAP Solution Manager \[page 325\]](#)
- [Technical Monitoring Using CA Introscope for SAP \[page 328\]](#)

General Symptoms

By observing the general symptoms shown by the monitored SAP CC system such as poor performance, high memory usage, garbage collections, you can start to narrow down the possible causes as a first step in analyzing the performance issue.

Symptom	Description
High Memory Consumption	You observe that the amount of memory allocated by the SAP CC system instance is higher than expected
Out of Memory Situations	You observe trace files or error messages indicating an Out of Memory (OOM) situation

²³³ Central Processing Unit

²³⁴ Structured Query Language

Symptom	Description
Permanently Slow System	<p>Issues with overall system performance can be caused by a number of very different root causes. Typical reasons for a slow system are:</p> <ul style="list-style-type: none"> • resource shortages of CPU • memory • disk I/O • network performance as an SAP CC system is a cluster of instances distributed on several hosts and connected to other interfaced front-end and back-end systems and applications • other running processes <div style="border: 1px solid #ccc; background-color: #f9f9f9; padding: 10px; margin-top: 10px;"> <p>Note</p> <ul style="list-style-type: none"> • Operating system tools can also provide valuable information on disk I/O load. Check your OS • Standard network analysis tools can also be helpful to determine whether the network is the main bottleneck </div> <p>Another reason for poor performance, which in many cases cannot be detected by the SAP CC system instance itself, are other processes running on the same host that are not related to SAP Convergent Charging. You can use the operating system tools to check for such processes. Note that SAP only supports production systems running on dedicated hardware.</p>
Sporadic Issues	<p>If performance issues only appear infrequently, the problem may be related to other tasks running on the SAP CC system at the same time.</p> <p>These tasks include not only maintenance related tasks, or remote replication (network I/O), but also Java tasks</p>

Refer to the [SAP CC 2023 Performance Metric Reference](#) documentation about the complete metric hierarchy. This user assistance details the performance and health metrics and provides troubleshooting information about the observed mass symptoms.

Isolated Symptoms

When the performance issue seems to relate to a single element, you may use the performance traces and targeted tracing function.

❁ Example

For example, the excessive response times of few charging operations lead to business errors. The usage and consumption of a digital service by a particular end customer of the service provider cannot be

charged. In this case, the processing of the charging operations may involve a specific contract (or subscription) configured in customer master data.

The customer data or the defined charging and tariff policy may be the root cause of this abnormal situation:

- A large mapping table
- A charge plan or an allowance plan assigned to the provider contract

In this situation, the fine analysis of performance traces may help you to narrow down the possible causes and to detect the root cause.

Refer to the [Tracing Tools \[page 465\]](#) section in the current documentation:

- Working with Business Process Tracing
- Working with Traces in the Core Server System
- Working with End-To-End Tracing

Web Service Operations

As of SAP CC 2020 FPS 1, the [SAP CC 2023 Web Services Documentation \(SOAP\)](#) `synchronizeAllCatalogsForCharging` has a direct impact on the performance of the SAP CC Core Server system. At charging time, this operation consists in switching the active and the passive caches for each rater and bulkloader instances, performing simultaneously an exclusive lock shared between the charging and the switching process.

Even if this switch is a short operation, all the charging traffic is blocked meanwhile. Too many calls to this web service operation under a high charging throughput can lead to poor performance.

11.7 Troubleshooting SAP CC User Interfaces

During the production operation phase or the project implementation phase, you troubleshoot problems that may arise with the user interfaces of SAP Convergent Charging.

Troubleshooting Problems with the User Interfaces

To troubleshoot problems that relate to the SAP CC user interfaces, you can:

- [Display the Tomcat console \(Cockpit\) \[page 463\]](#) that may provide logs or traces
- [Display the Operating System \(OS\) console \[page 464\]](#) (Microsoft Windows) that may provide logs or traces
- View the operation requests and responses between the SAP CC user interface and the connected SAP CC system:
 - Use the XML²³⁵ verbose mode in Core Tool

²³⁵ eXtended Markup Language

- Use the debug mode in Admin+ and BART+
- Use the logging and tracing functions

The following table lists the supportability functions:

User Interface	OS Console	Logging and Tracing	Operation Requests
Core Tool	<ul style="list-style-type: none"> • Not visible by default (Microsoft Windows) 	<ul style="list-style-type: none"> • Available • Disable by default 	XML verbose option
BART Tool	<ul style="list-style-type: none"> • Visible by default (Linux operating systems) 	<ul style="list-style-type: none"> • Available • Disable by default 	N/A
CAT Tool		<ul style="list-style-type: none"> • Available • Disable by default 	N/A
Admin+	Visible by default	N/A	Debug mode
BART+		N/A	Debug mode

Troubleshooting of Core Tool

To troubleshoot problems with the [Core Tool](#) user interface, you can:

- Display and view the operating system (OS) console. See [Displaying the Operating System Console \(Microsoft Windows\) \[page 464\]](#).
- Enable the logging and tracing functions. See [Enabling the Traces for Troubleshooting \[page 462\]](#).
- Enable the recording of XML²³⁶ messages and included operation requests exchanged between a user interface and its connected SAP CC system.

Communications with the SAP CC System

To troubleshoot the [Core Tool](#) user interface, you can easily record the messages exchanged by the user interface and the connected Core Server system. These records allow you to see and understand the requested business operations, their responses, and the respective contents.

Refer to the primary help and the [Preferences](#) menu for more information about the XML verbose mode.

Note

Refer to the [Java/XML API Reference \(Core Library\)](#) documentation for more specification information about the HTTP²³⁷ Communication Interface (HCI) technical interface of SAP CC, the formats of the XML/HTTP messages, and the detailed contents of the operation requests.

²³⁶ eXtended Markup Language

²³⁷ HyperText Transfer Protocol

Troubleshooting of Admin+ and BART+

To troubleshoot the [Admin+](#) and [BART+](#) user interfaces, you can easily enable the debug mode in the console user interfaces.

Refer to the primary help and the `debug` command for more information.

[Disabling the Traces for Troubleshooting \[page 462\]](#)

[Enabling the Traces for Troubleshooting \[page 462\]](#)

[Displaying the Tomcat Console \(Cockpit\) \[page 463\]](#)

[Displaying the Operating System Console \(Microsoft Windows\) \[page 464\]](#)

11.7.1 Disabling the Traces for Troubleshooting

Procedure: Disable the Traces for Troubleshooting

1. Edit the relevant launch script depending on the operating system and the graphical user interface of SAP CC.
2. Change the instruction that sets up the variable `<LOGS_ENABLED>` to `false`.
3. Save the script file.
4. Start your SAP CC user interface again.

→ Recommendation

In Microsoft Windows, you can disable the OS console that is displayed when launching the SAP CC graphical user interface.

11.7.2 Enabling the Traces for Troubleshooting

Procedure: Enable the Traces for Troubleshooting

To troubleshoot a graphical user interface of SAP CC, you can easily record the logs and traces to destination files and to the operating system (OS) console.

ⓘ Note

Consult the [SAP CC 2023 Application Help](#) for more information about the logging and tracing functions, which provide you with extended supportability tools.

→ Recommendation

In a productive SAP system landscape, contact your SAP Support Team. A support specialist adapts the temporary configuration settings to your requirements.

1. Edit the relevant launch script depending on the operating system and the SAP CC graphical user interface.
2. Depending on your operating system, change the instruction that sets up the variable `LOGS_ENABLED`:

Environment	Script File and Technology	New Script Instruction
Microsoft Windows	<code>core_tool.bat</code>	<code>SET LOGS_ENABLED=true</code>
	<code>bart_tool.bat</code>	
	<code>cat_tool.bat</code>	
Linux operating systems	<code>core_tool.sh</code>	<code>LOGS_ENABLED=true</code>
	<code>bart_tool.sh</code>	
	<code>cat_tool.sh</code>	

3. Check the variable `LOG_FILE_PATH`. You must have the write permission on the working directory.
4. Save the file.
5. Start your SAP CC user interface again.
6. Try to reproduce the problem.
7. Once the problem is resolved, disable the traces by changing the variable back to `false`.

ⓘ Note

You can set up some other options of the logging and tracing functions. For example, you can change the size of the generated files.

Refer to the [SAP CC 2023 System Parameter Reference](#) documentation for detailed information about each option. See the following system parameters:

- Log messages: [LS_APP_SEVERITY](#) and [LS_SYS_SEVERITY](#)
- Trace messages: [LS_TRC_SEVERITY](#)

11.7.3 Displaying the Tomcat Console (Cockpit)

Cockpit gives you the possibility to display the Tomcat console:

1. Make a copy of the `sap_cc_cockpit_<NAME>.properties` file (where `<NAME>` corresponds to the name of the deployed Cockpit web application) and edit the script

→ Tip

Consult the [Configuring Cockpit \[page 238\]](#) section of the [SAP CC 2023 Administration Guide \[page 8\]](#) documentation for more information about the property file of the Cockpit application.

2. Set the `ld.console.enabled` property of the property file to `true`
3. Save the modified property file

11.7.4 Displaying the Operating System Console (Microsoft Windows)

Procedure: Display the Operating System Console (Microsoft Windows) with the SAP CC GUIs

You can enable the Microsoft Windows console by changing the launch scripts (*.bat).

1. Make a copy of the command file and edit the script
2. Change the Java executable from `javaw.exe` to `java.exe`

❖ Example

To display the operating system (Microsoft Windows) console when starting the Core Tool user interface, replace the line in the `core_tool.bat` launch script file:

```
SET JAVA=%SAPCC_JAVA_HOME%/bin/javaw
```

With the following line:

```
SET JAVA=%SAPCC_JAVA_HOME%/bin/java
```

11.8 Troubleshooting User Sessions

In case of user session failure, you can use the `search_user_session` and `delete_user_session` commands of the [Admin+](#) user interface.

When a session is deleted, the objects opened in "edition" mode during this user session are released and can be modified within another session.

See: [SAP CC 2023 Primary Help for Admin+](#)

Related Information

[delete_user_session](#)

11.9 Troubleshooting SAP System Performance with Java GC Logs

On large-scale installations, GC tuning can improve the performance of SAP Convergent Charging systems.

In-depth garbage collection (GC) tuning and analysis of GC logs can also assist in troubleshooting performance problems with an SAP CC system.

Your support specialists can inspect detailed information available in recorded Java GC log files. These specialists can recommend that you enable the generation of Java GC log files. See [Enabling the Generation of Java GC Logs \[page 142\]](#).

See also: [Log Files of the Java Garbage Collection \(GC\) \[page 349\]](#)

11.10 Tracing Tools

Using tracing assumes that a problem is already noticed by a log message, by a complaining user or by non-functioning services or functions of the monitored SAP CC systems or by connected applications and systems. Tracing is an exceptional procedure performed or supervised by a support specialist from your SAP Support Team.

A support specialist can use the information provided by the trace messages. These voluminous messages include information about the location of the failure inside the SAP CC systems:

- At runtime, you change manually the trace severity threshold to `PATH` and the log severity thresholds to `INFO`. See the instructions in [Working with Traces in the Core Server System \[page 466\]](#)
- You setup a tracing session to arm the targeted tracing function. It triggers automated trace generation for the next charging operation. See the instructions in [Working with Business Process Tracing \[page 468\]](#)
- Additionally, SAP CC supports the SAP Passport technology to receive and manage passports via the Web Services technical interface. See the instructions in [Working with End-to-End Tracing \[page 469\]](#)

⚠ Caution

Do not perform these procedures in a production system landscape without the direct supervision of a support specialist from your SAP Support Team.

This chapter gives you an overview of the available tracing tools.

Consult the [SAP CC 2023 Application Help](#) documentation for more information about the logging and tracing features, targeted tracing, or performance traces.

[Working with Traces in the Core Server System \[page 466\]](#)

[Working with Business Process Tracing \[page 468\]](#)

[Working with End-to-End Tracing \[page 469\]](#)

[Working with Performance Traces \[page 470\]](#)

[Traces in the BART Server System \[page 471\]](#)

11.10.1 Working with Traces in the Core Server System

Preparations: Determining the Appropriate Settings

You identify and define the system parameter values:

- Determine the severity threshold for trace messages that is relevant for your issue: INFO or PATH. Consult the [SAP CC 2023 System Parameter Reference](#) for more information about the thresholds. See the user assistance available about the [LS_TRC_SEVERITY](#) system parameter.
- Determine if additional tracing domains are expected to facilitate the investigations and the troubleshooting. By default, you must deactivate these domains. Your support specialists or experts from the operation team recommend the appropriate values. Consult the [SAP CC 2023 System Parameter Reference](#) for more information. See the user assistance available about the [LS_TRC_DOMAIN](#) system parameter.

❁ Example

The tracing domains are specialized.

- To check communication via the Web Services technical interface, you use the WS additional tracing domain
 - To check data cache function or data lock function, you use the CACHE or LOCK additional tracing domain
 - To check performance traces, you use the PERF additional tracing domain
- Determine if you need traces from all the instances of the SAP CC system or just from certain instance types (rater, dispatcher, ...)
 - Determine when to perform the procedure: determine the period or the cause event that is relevant

→ Recommendation

- Refer to the [SAP CC 2023 System Parameter Reference](#) for more information about each option
- Consult the [SAP CC 2023 Application Help](#) for more information about the logging and tracing functions, which provide you with extended supportability tools

Procedure of the Technical operation

⚠ Caution

In a productive system landscape, first contact your SAP Support Team.

Do not perform this procedure, except under the direct supervision of a support specialist from your SAP Support Team.

1. Launch the SAP CC [Admin+](#) user interface and log on
2. Retrieve and write down the current configuration information:
 - Use the `get` command:

```
get LS_APP_SEVERITY
get LS_SYS_SEVERITY
get LS_TRC_SEVERITY
get LS_TRC_DOMAIN
```

3. Set up the severity thresholds for logs to the information level (INFO)
 - Use the `set` command and apply immediately and permanently these changes for all the instances of the system:

```
set LS_APP_SEVERITY INFO MEMORY all
set LS_SYS_SEVERITY INFO MEMORY all
```

4. Select the additional tracing domains according to the preparation task. Use the `set` command and apply immediately and permanently these changes for all the instances of the system.
 - By default you must deactivate the additional tracing domains:

```
set LS_TRC_DOMAIN NONE MEMORY all
```

- Apply the recommendation provided by your SAP Support Team:

```
set LS_TRC_DOMAIN SQL MEMORY all
```

5. Set up the severity threshold for traces to PATH level (or INFO level):
 - Use the `set` command and apply immediately and permanently these changes for all the instances of the system:

```
set LS_TRC_SEVERITY PATH MEMORY all
```

6. Restore the previous settings or reset to the recommended settings. Use the `get` command and the `set` commands and apply immediately and permanently these changes for all the instances of the system:

- Use the `get` command to retrieve the initial values of the configuration parameters of the SAP CC system at the startup time:

```
get LS_APP_SEVERITY PERSISTENT all
get LS_SYS_SEVERITY PERSISTENT all
get LS_TRC_SEVERITY PERSISTENT all
get LS_TRC_DOMAIN PERSISTENT all
```

- Use the `set` command to restore the previous settings

ⓘ Note

- You can change temporarily the settings for one single instance of the system:

```
set LS_TRC_SEVERITY PATH memory <instanceID>
```

11.10.2 Working with Business Process Tracing

The support specialists from your SAP Support Team can use the targeted tracing function when isolated irregularities or performance issues occur during a particular charging operation.

With [Admin+](#), they recommend that you setup a tracing session for an identified subscriber account and for a defined period. The SAP CC system triggers the predefined targeted tracing automatically when it detects a new charging operation request that relates to the selected subscriber account. The relevant rater instance increases the trace severity threshold locally and generates the trace messages belonging to the PERF and DATA tracing domains.

See the [SAP CC 2023 Application Help](#) documentation for more information about:

- supported operations
- supported technical interfaces
- targeted tracing function
- business process tracing

Preparation

You determine the subscriber account to work with. It may relate to failed charging operations. You can use the thread dump to facilitate this determination.

Procedure of the Technical Operation

⚠ Caution

In a productive system landscape, first contact your SAP Support Team.

Do not perform this procedure, except under the direct supervision of a support specialist from your SAP Support Team.

1. Launch the [Admin+](#) user interface and log on
2. Use the `start_trace_session` command to arm the targeted tracing
3. Wait for the next charging operation request that relates to the specified subscriber account in the master data of the service provider
4. Transmit the trace files to your support specialists or operation team experts

Next

To troubleshoot the problem, the analysis of the traces facilitates the identification of the:

- Execution errors

- Execution path
- Execution subpaths concerning the different steps of the process execution

11.10.3 Working with End-to-End Tracing

The SAP CC system supports the SAP Passport received from interfaced systems (or applications) via the Web Services technical interface. The SAP CC system interprets the received passports and triggers the customized targeted tracing automatically. All the relevant instances increase the trace severity threshold locally and generate the trace messages depending on the custom passport.

Note

You can combine end-to-end tracing with business process tracing (or system process tracing) to generate supplementary traces temporarily. These traces can relate to back-end systems (or frontends). Simply configure the passport.

See the [SAP CC 2023 Application Help](#) documentation for more information about the targeted tracing function and end-to-end process tracing.

Technical Operation: Customizing the Targeted Tracing (Trace Severity Threshold, Generated Traces)

In your interfaced system or test system, you set up the trace flags in the SAP Passport sent to SAP Convergent Charging:

1. Determine the tracing domains you need in the generated traces:

SAP CC Tracing Domain	Corresponding Trace Flag in SAP Passport
All the domains different from tracing domains already associated to a trace flag: SQL ²³⁸ , JCO ²³⁹ , DATA, PERF, HCI ²⁴⁰ , and WS ²⁴¹	C function Trace
DATA	ABAP Trace (bit 7)
JCO	RFC ²⁴² Trace (bit 3)
PERF (performance traces)	SAT (bit 10)
SQL	SQL Trace (bit 0)
WS and HCI	WebService (bit 11)

2. Set up the appropriate bits in the trace flag property included in the SAP Passport sent to the SAP Convergent Charging Core Server system

²³⁸ Structured Query Language

²³⁹ Java Connector

²⁴⁰ HTTP Communication Interface

²⁴¹ Web Services

²⁴² Remote Function Call

- Determine the temporary severity thresholds you need for your targeted tracing:

Increased Severity Threshold in SAP CC	Corresponding Trace Flag in SAP Passport
WARNING	No trace flag is used; it is the default behavior of the targeted tracing function in SAP CC
PATH	ABAP Condens. 1 (bit 8)
INFO	ABAP Condens. 2 (bit 9)
DEBUG (highest severity threshold level)	Both ABAP Condens. 1 and ABAP Condens. 2

- Set up the appropriate bits in the trace flag property in the SAP Passport transmitted to the SAP CC system

Result

If you successfully set the trace flags in the SAP Passport, the SAP CC system records all subsequent activities for an operation request and the trace messages corresponding to the following domains are available:

- No domain (always)
- SQL Domain
- JCO Domain
- HCI and WS Domains
- PERF Domain
- DATA Domain

When the service operation request is replied, you can work with the recorded trace messages.

To continue the troubleshooting operation, locate the traces and transmit them to the support specialists from your SAP Support Team for further investigation and analysis.

11.10.4 Working with Performance Traces

Performance traces are additional trace messages recorded in the standard trace files of the SAP CC systems. They belong to the PERF specialized tracing domain. All the typical configuration options apply to these traces: format, file rotation, file size. To facilitate the research, each trace message contains the Transaction ID set in the custom or predefined SAP Passport.

The support specialists from your SAP Support Team help you generating these traces and continue the investigations (issue location, root cause analysis).

See the [SAP CC 2023 Application Help](#) documentation for more information about performance traces.

Note

Depending on your implementation, the performance traces may also relate to few charging operations that are out of scope of your business case. For technical reasons, they relate to other charging operations. Do not consider these trace entries during your investigations.

11.10.5 Traces in the BART Server System

Use the [BART+](#) user interface and perform the procedure.

⚠ Caution

In a productive system landscape, first contact your SAP Support Team.

Do not perform this procedure, except under the direct supervision of a support specialist from your SAP Support Team.

11.10.6 Traces in Graphical User Interfaces

For troubleshooting purposes, you can temporarily enable the logging and tracing functions in the graphical user interfaces of SAP CC:

- [Core Tool](#)
- [BART Tool](#)
- [CAT Tool](#)

The procedure plans that you modify the launch script corresponding to your OS²⁴³ environment and to your SAP CC GUI²⁴⁴.

Prerequisites

You determined:

- the relevant launch script file
- the temporary configuration settings

Procedure: Preparing

To troubleshoot problems with the SAP CC user interfaces, SAP recommends that you:

- Define the DEBUG severity threshold for the generation of traces
- Concentrate the recording of all the logs and traces to the same fileset destination, which is a rotating fileset
- Set up the file generation with the TRACE file format





²⁴³ Operating System




²⁴⁴ Graphical User Interface

Note

- SAP Support Team can adapt the recommendations
- Refer to the [SAP CC 2023 System Parameter Reference](#) documentation for detailed information about each option, in the [Logging and Tracing Settings](#) section

The table defines the necessary Java options to set up in the launch scripts:

Options	Recommended Value	Comment
LS_APP_SEVERITY	INFO	
The severity threshold for the generation of log messages related to the business processing (application level)		
LS_SYS_SEVERITY	INFO	
The severity threshold for the generation of log messages related to the bsystem processing (system level)		
LS_TRC_SEVERITY	DEBUG	
The severity threshold for the generation of trace messages		
<div><h3> Note</h3><p>Ask your SAP Support Team if another severity threshold is necessary.</p></div>		
LS_APP_DESTINATION	LDF1	
LS_SYS_DESTINATION	LDF1	
LS_TRC_DESTINATION	LDF1	
LS_TRC_DOMAIN		Set up this option without specifying any particular trace domain to include in the traces. The user interface records the standard traces
<div><h3> Note</h3><p>Ask your SAP Support Team.</p></div>		
LDF1_ENABLED	true	
LDF1_FILE_NAME	myfilename.trc	Depends on your installation
The file path, name, and extension of the files in destination fileset		
<div><h3> Example</h3><ul style="list-style-type: none">• /tmp/mycoretool.trc• \temp\mycoretool.trc</div>		
<div><h3> Note</h3><ul style="list-style-type: none">• This file mostly includes traces. The file extension is *.trc• Ask your SAP Support Team</div>		

Options	Recommended Value	Comment
LDF1_FORMATTER The format of logs and traces generated in the destination	TRACE	 Note Ask your SAP Support Team about the expected file format for further analyses and investigations.
LDF1_FILESET_SIZE The number of files for the rotations in the destination fileset	2	 Note Ask your SAP Support Team about the number of reused files.
LDF1_FILE_SIZE	3000000	 Note Ask your SAP Support Team about the file size recommended in your SAP system landscape.

11.10.7 Traces in IEC Applications

For troubleshooting purposes, you can temporarily enable the logging and tracing functions in the Import/Export Connector (IEC) applications of SAP CC.

Procedure: Enabling the Traces for Troubleshooting

- Copy the relevant launch script of your IEC application: `iec.bat`, `iec.sh`, `iec_remote.bat` or `iec_remote.sh`
- Change the value of the trace severity threshold:
 - Locate the line in the script file that defines the `LS_TRC_SEVERITY` script variable. The final command reuses this variable as argument and Java option when launching the IEC program
 - Set up the value to `DEBUG`

Topic	Script File Technology	Default Line in Script File	Recommended Value for Troubleshooting
Microsoft Windows	*.bat	SET LS_TRC_SEVERITY=INF O	SET LS_TRC_SEVERITY=DEB UG
Linux operating systems	*.sh	LS_TRC_SEVERITY=INF O	LS_TRC_SEVERITY=DEB UG

- Save the file
- Restart your IEC application with this new launch script

5. Try to reproduce the problem

Note

- The default value is `INFO`
- Consult the primary help for more information about the launch scripts to run an IEC depending on your operating system and system landscape
- Consult the [SAP CC 2023 Application Help](#) for more information about the severity levels
- You may need to add some entries to define the destination of the logs and traces (`LS_APP_DESTINATION`, `LS_SYS_DESTINATION`, and `LS_TRC_DESTINATION=LDC,LDF2`)

Other Options

Other options are available to manage the traces and logs generated by an IEC application. Refer to the [SAP CC 2023 Administration Guide \[page 8\]](#) for more information about all the possible values: [Logging and Tracing \[page 283\]](#) section.

Example

The launch scripts include a line that triggers the execution of the program. This line includes Java options (`-Dxxx`) where `xxx` is the technical name of the Java option.

For example, the option `-Dld.console.enabled=true` activates recording of logs and traces in the OS²⁴⁵ console depending on the selected destinations for logs or traces.

```
exec $JAVA -Dsun.nio.ch.useIPv6Stack -Duser.language=en -Dld.console.enabled=true
-Dls.trc.severity=$LS_TRC_SEVERITY -Dls.trc.domain= -Dfile.encoding=UTF-8
-classpath $CLASSPATH com.highdeal.iec.launcher.HttpLauncher -repositoryDir=../
iec-repository $1 $2 $3 $4 $5 $6 $7 $8 $9
```

You can manage the destinations of the logs and traces by specifying the following Java options:

- `ls.app.destination=LDC,LDF1`
- `ls.sys.destination=LDC,LDF1`
- `ls.trc.destination=LDC,LDF2`

11.11 Advanced Troubleshooting Using Thread Dump Files

Your support specialists can inspect detailed information available in recorded thread dump files. These specialists can recommend that you enable the generation of thread dump files. See also [Enabling the Generation of Thread Dump Files \[page 218\]](#).

[Working with Thread Dump Files \[page 475\]](#)

[Detailed Content of a Thread Dump File \[page 477\]](#)

²⁴⁵ Operating System

For expert troubleshooting purposes, the thread dump files have a specialized format based on XML standards.

11.11.1 Working with Thread Dump Files

The support specialists from your SAP Support Team can setup supportability tools based on thread dump files when a problem occurs during the execution of an operation or when the execution exceeds some defined thresholds:

Trigger Domain in SAP CC	Triggers Based on Exceeded Thresholds	Other Triggers	How To Activate...
Scheduled Time		A reached "scheduling period"	Set up the THREAD_DUMP_TRIGGER_PERIOD system parameter.
CPU ²⁴⁶	The CPU processing time		Set up the THREAD_DUMP_THRESHOLD_CPU_TIME system parameter.
Rating Contexts	A reached number of rating contexts that are used by a processing thread		Set up the THREAD_DUMP_THRESHOLD_RATING_CONTEXTS system parameter.
Remote Function Calls (RFCs)	The execution time when calling a RFC function module in a remote system		Set up the THREAD_DUMP_THRESHOLD_RFC_TIME system parameter.
Back-End File System	A reached number of written output items		Set up the THREAD_DUMP_THRESHOLD_OUTPUT_ITEMS system parameter.
Back-End Database	The execution time of a SQL query		Set up the THREAD_DUMP_THRESHOLD_SQL_TIME system parameter.
SAP CC System Errors		<ul style="list-style-type: none"> A timeout of a given charging operation request An unsupported exception which occurred 	Enabled by default
Startup/Shutdown		A shutdown operation request is received by the SAP system	Enabled by default

²⁴⁶ Central Processing Unit

Trigger Domain in SAP CC	Triggers Based on Exceeded Thresholds	Other Triggers	How To Activate...
Troubleshooting		<p>A dump operation request is received from:</p> <ul style="list-style-type: none"> Admin+ user interface (dump command used by an SAP CC user) Administration API (manual, scheduled, or custom trigger) 	An individual user enter the dump command in Admin+ (or another interfaced user interface). A service user requests the HCI Administration APIs.

This advanced function improves the troubleshooting capabilities of your running SAP CC Core Server systems. It gives you valuable insight about the execution context of the threads when a problem occurs, and doing so helps you quickly determining the root cause and fixing the problem.

Check that the `THREAD_DUMP_ENABLED` system parameter is set to `TRUE`.

See also: [THREAD_DUMP_ENABLED](#)

Require the Dump of Processing Threads

In certain situations, you need to get the thread dump immediately. Use the `dump` command of Admin+.

See also: [dump](#)

Enable a Trigger Period

In certain situations, you need to schedule the recording of a few thread dump files after a given period and for a given period.

Set up the `THREAD_DUMP_TRIGGER_PERIOD` system parameter for this instance. The change must be effective immediately.

Enable the Triggering for Threshold-Based Events

In certain situations, you need to schedule the recording of a thread dump file after a given threshold is reached and for a given running instance in the SAP system. This specific threshold can be a threshold time, a quantity .

Set up the system parameter that corresponds to your troubleshooting case. The change must be effective immediately:

- `THREAD_DUMP_THRESHOLD_CPU_TIME`

- THREAD_DUMP_THRESHOLD_OUTPUT_ITEMS
- THREAD_DUMP_THRESHOLD_RATING_CONTEXTS
- THREAD_DUMP_THRESHOLD_RFC_TIME
- THREAD_DUMP_THRESHOLD_SQL_TIME

Analyse the Thread Dump Files

Your support specialists analyze the thread dump files for expert troubleshooting.

See [Detailed Content of a Thread Dump File \[page 477\]](#).

→ Tip

For more information about this function and available options, refer to the description of the [Thread Dump File Generation Troubleshooting Settings](#) group available in the [SAP CC 2023 System Parameter Reference](#) product documentation and user assistance.

11.11.2 Detailed Content of a Thread Dump File

For expert troubleshooting purposes, the thread dump files have a specialized format based on XML standards.

Every thread dump file contains information related to the execution context of threads running within a given instance of the Core Server system, formatted using an XML representation.

Depending on the trigger that is responsible for the creation of the dump file, this information may contain the following elements:

- Information about the instance (identifier, start date, and so on)
- Thread dump contextual information (process identifier, generation duration, generation reason, SAP CC version, and so on)
- JVM arguments and properties
- A list of threads, each thread containing:
 - The stack trace of the thread
 - Information about the thread itself, such as name, priority, status, start date, duration, used CPU
 - A list of operations, each operation containing information such as XML query, XML result, start time, duration and the number of used rating contexts
 - A list of logic calls, each logic containing information such as logic type, logic name, rate type, rate name, execution start date, execution duration, the list of impacted distributed counters and the number of used rating contexts
 - A list of incoming requests pending in the queue, each request containing information such as request identifier, request status, source, read time, timeout duration
 - Information about the RFC sent to SAP Convergent Invoicing, such as the name of the corresponding JCo destination, beginning and ending of JCo stateful sequences with timestamps, RFC execution with start date, duration and row count
 - Information about the SQL transactions, containing information such as commit start date and duration

- Information about the memory transaction, that contains:
 - A list of memory-impacted subscriber accounts containing information such as SUAC identifier, number of counters/contracts/mapping tables/range tables, type of performed operation (creation/modification/deletion), list of charging sessions, list of reservations made on associated distributed counters
 - A list of memory-impacted charging contracts containing information such as contract identifier, type of contract (root/linked), number of associated counters, number of associated allowances and type of performed operation (creation/modification/deletion)
 - A list of memory-impacted subscriber mapping and range tables containing information such as table identifier and type of performed operation (creation/modification/deletion)
 - A list of shared allowances containing information about associated distributed counters such as counter name, value, counter and status

📌 Note

If the memory impact is a modification, the following information is also available:

- Number of created, updated or deleted counters
- Information about notifications (number of notifications, start time and duration)
- Information about renew reservations notifications (number of received renew reservation notifications, receipt time and duration)
- Information about spending statuses (number of sent spending statuses, sending start time and duration)
- Information about the use of the Session Database (when enabled)
- Information about the used file writers (name, writing start time and duration, list of created items)

[rfc \(Thread Dump\) \[page 478\]](#)

11.11.2.1 rfc (Thread Dump)

As of SAP CC 2020 FPS 2, the SAP CC system instances generate a new XML element named `rfc` in thread dump files. It contains information about requested Remote Function Calls (RFCs) through the SAP JCo technology. For example, it includes information about the RFC sent to SAP Convergent Invoicing, such as the name of the corresponding JCo destination, beginning and ending of JCo stateful sequences with timestamps, RFC execution with start date/time, duration, and row count.

See also: [THREAD_DUMP_THRESHOLD_RFC_TIME](#)

The following information is included (if applicable when the thread dump is generated):

- The name of the JCo destination used
- A `statefulSequenceBegin` XML element, which represents the start of the JCo stateful sequence - with the date/time when it was started
- Zero or more `functionCall` XML elements, which represent function calls

With:

 - The name of the function

- The number of rows added as input (if applicable)
- The date/time when the function was called
- And the duration of the function execution (if it ended)
- A `statefulSequenceEnd` XML element, which represents the end of the JCo stateful sequence, with the date/time when it was ended

11.12 Errors and Exceptions

Core Server

There are three types of errors or exceptions that can be generated when the client application or when the connected SAP CC Core Server system encounters a problem. They can be signaled in three possible ways.

Problem	Core Server	Saved in Server System Logs
Client application side failure	Never	Never. The client application has to manage the generation of logs
Business errors	Always returned Nested exceptions and error messages give more information about the precise nature of the error/problem	Depends on API ²⁴⁷ error type and on log settings. The INFO log level shows all errors.
Core Server side failure	Always returned	Depends on API ²⁴⁸ error type and on log settings. The INFO log level shows all errors.

Exceptions are generated when an error occurs. An exception contains a description of the overall possible reason for the error. The exception can contain nested exceptions giving further details about the possible causes of the error. Exceptions are described in the [Java/XML API Reference \(Core Library\)](#) documentation.

Note

The Core Tool user interface and the BART Server system are client applications regarding to the Core Server system. They catch the errors and exceptions signaled by the Core Server system.

²⁴⁷ Application Programming Interface

²⁴⁸ Application Programming Interface

Core Tool

The Core Tool user interface catches the exceptions signaled by the connected Core Server system and warns the power user.

11.13 Error Reason Codes

Core Server Error Reason Codes (for Non-Business Errors)

The SAP CC Core Server Error Reason Codes (for Non-Business Errors) system signals the non-business errors with one single Java class of error message: `com.hgideal.hci.serverFailureException`.

General Failures	Back-End Database	Technical Functions
<p>All reasons relative to general server system failure and data cache management</p> <p>❖ Example</p> <ul style="list-style-type: none"> SERVER_SHUTTING_DOWN INCOMPATIBLE_CONFIGURATION 	<p>All reasons relative to back-end databases</p> <p>❖ Example</p> <ul style="list-style-type: none"> DATABASE_FAILURE DATABASE_FAILOVER 	<p>All reasons relative to the <i>Audit</i> functions</p>
Internal Communications	Communications with Interfaced Systems	Business Functions
<p>All reasons relative to inter-instance communications between instances in an SAP CC system</p> <p>❖ Example</p> <ul style="list-style-type: none"> INTER_INSTANCE_COMMUNICATION_FAILURE SERVER_TO_CLIENT_COMMUNICATION_FAILURE 	<p>All reasons relative to the:</p> <ul style="list-style-type: none"> <i>Message TCP</i> technical interface <i>HTTP Communication Infrastructure (HCI)</i> technical interface 	<p>All reasons relative to the:</p> <ul style="list-style-type: none"> <i>Access control</i> functions and customer master data identification <i>Guiding</i> functions <i>Bulk loading</i> functions

Error Codes

The table below lists the available reason codes and their possible cause. Refer to the [Java/XML API Reference \(Core Library\)](#) documentation for more detailed information and specification:

Reason Code	Description
ACCESS_COMPATIBILITY_FAILURE	Reason code for old use of accesses (in subscriptions)
AUDIT_FAILURE	Reason code when the operation cannot be audited
CACHE_INVALIDATION_FAILURE	Reason code when the updater instance did not succeed to update in a synchronous way, the data caches belonging to rater instances of the SAP CC system
CANNOT_LOCK_RESOURCE	Reason code when the Core Server cannot lock resources into the database after having tried SQLHELPER_MAX_REDO attempts
CURRENCY_IS_NOT_DEFINED	Reason code when a currency is unknown because the currency is not defined
DATABASE_FAILOVER	Reason code when the Core Server system is failing over due to a database failure
DATABASE_FAILURE	Reason code when a failure occurred with the database
HCI_CONCURRENCY_OPERATION	Reason code relative to a service invocation on HCI ²⁴⁹ APIs ²⁵⁰ , which is in concurrency with another
HCI_SERVICE_VIOLATION_PROTOCOL	Reason code when XML ²⁵¹ stream received by the HCI servers (updater and dispatcher) is not conformed to the HCI protocol
HCI_UNSUPPORTED_SERVICE	Reason code relative to a service invocation on HCI APIs, which is not supported
INCOMPATIBLE_CONFIGURATION	Reason code when the Core Server cannot load its configuration due to out of rank parameter values or missing parameter values
INTER_INSTANCE_COMMUNICATION_FAILURE	Reason code for networking/communication issues between rater or updater instances of the Core Server
IO_FAILURE	Reason code when the Core Server encountered some IO failure
MESSAGE_QUEUE_FULL	Reason code relative to fulfilling of queues implemented by message protocol
MESSAGE_UNSUPPORTED_SERVICE	Reason code relative to a service invocation on message, APIs which is not supported
OFFER_CACHE_BUSY_WHILE_REFRESHINGOFFER_CACHE_BUSY_WHILE_REFRESHING	Reason code when the subscription cannot be charged because its related offer is temporary inaccessible due to cache refreshing process
SERVER_SHUTTING_DOWN	Reason code when the SAP CC is shutting down
SERVER_TIMEOUT_OCCURED	Reason code when the SAP CC cannot execute the API with the required timeout
SERVER_TO_CLIENT_COMMUNICATION_FAILURE	The server encountered communication or network issues while trying to reply to the client

²⁴⁹ HTTP Communication Interface

²⁵⁰ Application Programming Interface

²⁵¹ eXtended Markup Language

Reason Code	Description
SLEEPING_BULK_LOADER	Reason code when the backup rejects a rating request due to the restarting of the original rater regarding the partition ID
STATEFUL_SERVICE_VIOLATION_PROTOCOL	The message sent to the stateful API is not conformed to the stateful protocol
STATELESS_SERVICE_VIOLATION_PROTOCOL	The message sent to the stateless API is not conformed to the stateless protocol
SWITCH_BACK_TO_RATER	Reason code when the backup rejects a rating request due to the restarting of the original rater instance regarding the partition ID
TAX_CACHE_BUSY_WHILE_REFRESHING	Reason code when the subscription cannot be charged because taxes are temporary inaccessible due to cache refreshing process
UNSUPPORTED_FAILURE	Reason code when the server system failure is unknown or not supported by SAP CC
	<div style="background-color: #f0f0f0; padding: 5px;"> <p>Note</p> <p>Contact your SAP Support Team</p> </div>
UNSUPPORTED_JAVA_FAILURE	Reason code when the server system failure is a Java error and is not supported
	<div style="background-color: #f0f0f0; padding: 5px;"> <p>Note</p> <p>Contact your SAP Support Team</p> </div>

When a non-business error occurs in the server system, consult the `serverFailureException` in the [Java/XML API Reference \(Core Library\)](#) for an up-to-date list and an indication of the possible causes

Exception Management

Message TCP

When the communication between your client application and the SAP CC system fails, your application handles the following exception: `com.highdeal.cnd.message.CommunicationFailureException`

The available reasons are:

- The communication between your client application and the Core Server system is closed or is closing
- The connection queue is full
- The communication has been interrupted due to timeout specified by the client application
- The timeout set by the client has expired
- The sent or received message cannot be managed by the communication protocol because it is too long

Refer to the [Java/XML API Reference \(Core Library\)](#) documentation for more information about the possible causes and suggested actions.

❖ Example

SAP Convergent Mediation and SAP CC BART Server handle this exception.

Web Services

Refer to the [SAP CC 2023 Web Services Documentation \(SOAP\)](#) documentation for more information about the Web Services technical interface and the error and exception handling for each service operation.

Refer to the [SAP CC 2023 Error Code Reference](#) documentation for more information about the possible errors and actions to solve your issues.

HCI

When a business error occurs in the connected SAP CC Core Server system, your client application handles the following exceptions:

- `OperationFailureException`
- `OperationFailureErrorException`

An exception is available for each operation request. Refer to the [Java/XML API Reference \(Core Library\)](#) documentation for an up-to-date list and an indication of the possible causes.

When a non-business error occurs in the connected Core Server system, consult the `ServerFailureException` and `ServerErrorException` exceptions in the [Java/XML API Reference \(Core Library\)](#) documentation for an up-to-date list and an indication of the possible causes.

It means that the operation request did not succeed and no change is performed into the back-end database system.

The SAP CC system records these exceptions and associated details to the logs and traces.

11.14 Tips and Troubleshooting Solutions (Administration and Operations Guide of SAP CC 2023)

Read tips and troubleshooting solutions related to the administration of this version of SAP Convergent Charging Cockpit.

Find here some troubleshooting cases with their symptoms and possible resolutions.

Live search, sort, and filter information in the table:

Symptom	Category	Resolution
A User Working Session Is Locked [page 484]	User Management	Resetting Working Session for a User [page 485]
Unusual Service Times for Charging Services [page 485]	Charging Services	Displaying Service Time Statistics [page 485]
Master Data Is Not Available in Rating Instances [page 485]	Charging Services	Manually Refreshing the Rating Instances [page 485]

Symptom	Category	Resolution
Charged Item Files Partially or Not Loaded into SAP ERP/FI-CA [page 486]	Charging Services	Inspecting the Erroneous Item Files/ Control Files and Resuming the System Operations [page 487]
Failover Recovery (Oracle RAC) [page 486]	Database System (Backends)	Recovering the Connections to the Primary Oracle RAC Instances [page 486]

Client Application of the Core Server System

Your Java-based client applications use the Java APIs²⁵² of SAP CC. Those APIs include functions that can generate errors and exceptions.

Possible errors:

- Cannot communicate with Core Server system
- Cannot communicate with the back-end database system
- Element (or object) already used
- Timeout error
- No response from server system
- Core Server system identifies not enough time to get a response from database before timeout
- Bad configuration
- Ignorable tag exception
- Core Server system not reachable is displayed

Possible reasons:

- Bug
- Connection closed
- Message too long
- Client timeout
- Server not reachable
- Integration errors
- Client side errors (incorrect use of APIs)
- Incorrect use of Core Tool

11.14.1 A User Working Session Is Locked

²⁵² Application Programming Interface

11.14.1.1 Resetting Working Session for a User

As a system administrator, you may have to reset the user working session locks in the SAP CC Core Server system when this function is enabled and when a user has crashed his working session.

To reset the working session for a user:

1. Launch the [Admin+](#) user interface and log on to the application.
2. Use the [delete_user_operations](#) command.

11.14.2 Unusual Service Times for Charging Services

11.14.2.1 Displaying Service Time Statistics

Procedure

Your Java-based client application interacts with the batch or stateful service clients of SAP CC to perform charging operations. Those charging clients perform operations whose latencies can increase unusually.

When such a situation occurs, you can display some service time statistics for one or all connected SAP CC charging clients, using the following commands of the [Admin+](#) user interface:

- `list_clients`, which displays the list of connected SAP CC charging client(s)
- `fetch_client_statistics`, which display the service time statistics for one or several connected SAP CC charging client(s)

11.14.3 Master Data Is Not Available in Rating Instances

In the Core Server system, an internal scheduler (or an external scheduler) is responsible for the data distribution inside the system.

11.14.3.1 Manually Refreshing the Rating Instances

In a development or test system landscape, you can force the refresh operations (data distribution) in order to speed up the overall processing.

See:

- Core Tool: See "Refresh Rating Instances"
- Admin+: `refresh_raters`

11.14.4 Failover Recovery (Oracle RAC)

11.14.4.1 Recovering the Connections to the Primary Oracle RAC Instances

As a system administrator, you may have to switch the connections established by SAP CC with the database backup instance (due to failover) to the primary instance of the database.

To recover the connections with the primary instances of Oracle RAC:

1. Repair the primary instance(s) of the Oracle RAC database.
2. Launch the [Admin+](#) user interface and log on to the SAP system.
3. Use the `admin_sql_connections` command to reconnect all the rater instances and the guider instances of the SAP CC Core Server system to the repaired instance of Oracle RAC.
4. Determine the impacted instances of the SAP CC Core Server system: view the values of the [SQLHELPER_JDBC_URI](#) parameters.
5. When relevant, use the `refresh_sql_connections` command to reconnect the other types of instances of the SAP CC Core Server system.

11.14.5 Charged Item Files Partially or Not Loaded into SAP ERP/FI-CA

Charged Item Files Partially or Not Loaded into SAP ERP/FI-CA

	Description
Symptom	<p>There are some item files with the file extensions <code>*.err.zip</code>, <code>*.err.gz</code>, or <code>*.err.csv</code> remaining in the directories of the running bulkloader instances of the SAP CC Core Server system.</p> <p>These data files contain contain business processing data named "items". They are critical for the business.</p>

Description	
Possible reason	They include charged items that have not been converted into billable items (BITs) and not loaded to the SAP ERP/FI-CA systems for billing and invoicing purposes.
Possible resolution	Inspecting the Erroneous Item Files/Control Files and Resuming the System Operations [page 487]

11.14.5.1 Inspecting the Erroneous Item Files/Control Files and Resuming the System Operations

In case of error, the item file to be loaded is renamed with .err extension. An error messages are recorded into corresponding control file.

1. Open these control files.
2. See the error messages.
3. Try to solve the problems (connection lost with the SAP ERP system, invalid billable items).

Both technical issues or business issues can cause the errors.

4. When the problems are solved, manually change the file extension of the erroneous item file to *.arc.zip or *.arc.csv.

The Core Server system will automatically try to load again the files into SAP ERP.

11.14.6 Problems with JCo RFC Communications

[Troubleshooting JCo RFC Communications \[page 487\]](#)

11.14.6.1 Troubleshooting JCo RFC Communications

To temporarily troubleshoot the JCo²⁵³ RFC²⁵⁴ communications between the running SAP CC system and the SAP CRM system or the SAP ERP system you can enable the JCo trace management.

Caution

SAP SE recommends that you take particular care when enabling JCo traces, as the performance of the whole SAP CC system may reduce significantly. In case you must be enable JCo traces on a production landscape, contact your support specialist.

²⁵³ Java Connector

²⁵⁴ Remote Function Call

Once you determined the appropriate JCo trace levels that are relevant for your investigations, execute the following procedure:

1. Launch your [favorite user interface \[page 22\]](#) and identify as the administrator of the Core Server system.
2. Check or set up the path for the generated traces by modifying the value of the `JCO_TRACE_PATH` parameter.
3. Modify the value of the following system parameters for each concerned dispatcher instance and bulkloader instance in the SAP system:
 - `JCO_TRACE_LEVEL`, which gives the possibility specify the level of JCo traces to generate
 - `JCO_JRFC_TRACE_LEVEL`, which gives the possibility enable or disable the generation of JCo RFC traces
 - `JCO_CPIC_TRACE_LEVEL`, which gives the possibility specify the level of JCo CPIC traces to generateFor further information about these system parameters, [Logging and Tracing \[page 150\]](#) section of this documentation.

Caution

At the end of your investigations, do not forget to disable the generation of JCo traces by setting the value of the `JCO_TRACE_LEVEL` system parameter back to 0 for the concerned instances.

12 Support Desk Management

Support Desk Management enables you to set up an efficient internal support desk for your support organization that seamlessly integrates your end users, internal support employees, partners, and SAP Active Global Support specialists with an efficient problem resolution procedure.

For support desk management, you need the methodology, management procedures, and tools infrastructure to run your internal support organization efficiently.

[Remote Support Setup \[page 489\]](#)

[Problem Message Handover \[page 489\]](#)

12.1 Remote Support Setup

All issues are reported through SAP Solution Manager.

Issues are analyzed by your SAP Support Team. Level 1 and Level 2 support are handled by SAP.

Connect to SAP at the following location: <https://support.sap.com/access-support>

12.2 Problem Message Handover

To create SAP support messages for your installation, you must specify an application component.

In case of any problems with the SAP Convergent Charging not covered by your local communities or local technical support, open a support message on component "IS-CC" on SAP Support Portal at the following location: <https://support.sap.com/incident> - *Report an Incident*.

When you report an incident, report also following information that is necessary to reproduce the error:

- The Support Package and Patch Level of the SAP CC 2023 application where the problem happens

→ Tip

Consult our SAP communities of experts.



Consult the SAP Knowledge Base Articles and our SAP Notes.

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