

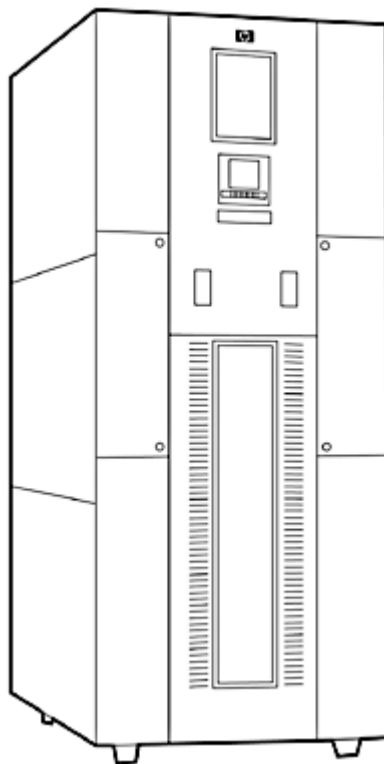
Overview

The family of HP Enterprise Systems Library (ESL) E-Series Tape Libraries offers best-in-class drive and cartridge densities. In a single cabinet, the ESL E-Series contains 322 to 712 LTO cartridges and can scale up to 2136 TB of compressed (2:1) storage capacity with a transfer rate of up to 24.2 TB/hr compressed (2:1). The ESL E-Series achieves drive densities up to 205 TB of compressed (2:1) storage capacity per square foot. The ESL E-Series can be managed as a single library with up to five frames containing up to 3546 Ultrium tape cartridges and up to 44 tape drives.

The ESL E-Series supports a mixture of LTO-5 Ultrium 3280 Fibre Channel and LTO-4 Ultrium 1840 Fibre Channel Fibre Channel technology.

HP ESL and ESL Tape Libraries are fully integrated into HP Extended Tape Library Architecture (ETLA). ETLA protects against SAN event disruptions caused by rogue I/O requests from applications or servers. ETLA provides improved backup and restore reliability by preventing such requests from interrupting the backup or recovery processes. This helps to significantly reduce IT resources and the time spent investigating and resolving backup failures. ETLA simplifies the installation and integration of the library into the SAN by providing a simple point-and-click integration process. It also provides remote management of multiple tape libraries (ESL or EML) from a single pane of glass.

The ESL E-Series Tape Library provides the ability to easily partition the library into up to six logical tape libraries to adapt to ongoing changes that take place in the SAN environment. The ESL E-Series libraries combined with the HP ETLA offer customers with enterprise storage area networks (SAN) superior reliability and expandability ease of integration, and simplicity of installation and operation.



Overview

What's New

- Integration of the HP LTO-5 Ultrium 3280 tape drive with 8Gb Fibre Channel drive interface and increased capacity and performance.
- TapeAssure: Advanced management of drive and media health, utilization, lifecycle, performance monitoring and tracking. Now with detailed media health and usage information included in Command View TL's TapeAssure tab.
- Additional features included in Command View TL 2.7, for further details visit: <http://www.hp.com/go/ETLA>
- In multi-frame configurations a zero drive frame may now be ordered.

Standard Features

- Best-in-Class single-frame and multi frame reliability with 3 million MSBF (mean swaps between failure)
- Best-in-Class Drive Density: up to 24 tape drives in a single frame; up to 44 drives with up to five E-Series frames using the ESL E-Series Cross Link Kit and ESL E-Series Cross Link Expansion Kit
- Best-in-Class Cartridge Capacity: up to 712 Ultrium cartridges in a single frame; Up to 3546 Ultrium cartridges with five frames using the ESL E-Series Cross Link Kit and Cross Link Expansion Kit
- Available in half populated configurations: 322 Ultrium slots
- Easy-to-enable AES 256-bit embedded hardware encryption with compression (LTO-5 and LTO-4 Ultrium drives format only)
- Removable Load Port Magazines
- Smaller Form Factor: 205 TB (compressed 2:1) per square foot with LTO-5 Ultrium 3280 technology and 712 cartridges
- TapeAssure: Advanced management of drive and media health, utilization, lifecycle, performance monitoring and tracking
- Complete, unobtrusive management and control of the entire library system including robotics, drives, Interface Controllers, and Interface Manager card
- Web-based, centralized user interface, in addition to telnet interface on Interface Manager card
- Automation of complex and repetitive library system management tasks
- High SAN availability since management traffic stays out of the data path
- SNMP support including asynchronous alerting
- Integration with major enterprise management applications
- Best-in-class interoperability and security with Advanced Secure Manager ESL

Customer Benefits

- More storage capacity in less floor space.
- Automatic, consistent configuration through Extended Tape Library Architecture (ETLA).
- Reduced cost of ownership with management of all library system components from a single pane of glass.
- Decreases both costs and administrative work through enhanced manageability from any location.
- Provides a high level of encryption security, with compression, for strong backup data privacy to secure confidential information and address compliance quickly. Encryption key management support via HP Data Protector Software and other ISV backup applications.
- Delivers best-in-class interoperability with Enterprise Business Solutions (EBS) without "special" work-arounds. It will work in your environment.
- Simplifies the complex task of setting up library robotics, drives, and Interface Controllers in a SAN.
- Minimizes uncertainty in complex SAN environments by allowing only authorized servers to access tape drives and critical data.
- Eliminates backup server and LAN bottlenecks by allowing data to move directly from disk to tape under the control of your backup application - but without application server overload.
- Provides investment protection by enabling an easy upgrade path as interface technologies change.
- Supports WORM media (using the LTO-5 Ultrium 3280 FC or LTO-4 Ultrium 1840 FC) providing a fail-safe method for permanently storing data records.
- The ESL and ESL tape libraries are factory integrated to reduce installation time and improve the customer experience.

Family Comparison



Overview

	ESL 712e	ESL 322e
Announce Date	February 2004	July 2004
Drive Technology	LTO-5 Ultrium 3280 FC, LTO-4 Ultrium 1840 FC	LTO-5 Ultrium 3280 FC, LTO-4 Ultrium 1840 FC
Maximum Cartridge Count	712 (1 frame) 3546 (5 frame)	322 (1 frame) 3546 (5 frame)
Maximum Drive Count	24 (1 frame) 44 (5 frame)	24 (1 frame) 44 (5 frame)
Maximum Capacity (compressed 2:1)	2136 TB (1frame) 10638 TB (5 frame)	966 TB (1frame) 10638 TB (5 frame)
Maximum Throughput (compression 2:1)	24.2TB/hr (1frame) 44.4TB/hr (5 frame)	24.2TB/hr (1frame) 44.4TB/hr (5 frame)
Interface Manager	Included	Included
ETLA Components: (not included)		
Interface Controller	<ul style="list-style-type: none"> e2400-FC 4Gb Interface Controller (Use 1 for each ESL library containing any number of LTO-4 Ultrium 1840 drives or LTO-5 Ultrium 3280 drives) 	
Internal Network Kit	Use 1 for each ESL library with LTO-5 Ultrium 3280 or LTO-4 Ultrium 1840 drive(s)	
Command View ESL	Requires Purchase of Permanent License (per library)	
Secure Manager ESL	Requires Purchase of Permanent License (per library)	

Product Highlights

Manageability

HP Extended Tape Library Architecture will save library and SAN administrators time and money by simplifying library setup, configuration, and troubleshooting, increasing reliability and robustness of libraries in the SAN, integrating with leading enterprise management applications, and offering advanced features -- such as Access Control (Secure Manager ESL) -- that further increases backup performance and reliability. HP offers a balanced solution - neither piece-meal nor monolithic - that includes a generous initial feature set and allows users to buy only the advanced options they need.

Reliability

As data becomes more and more mission critical, and downtime becomes more costly to the enterprise, customers are requiring high availability consolidated storage solutions which offer hot-plug components and redundancies of key operating subsystems (tape drives and power supplies). With redundant power distribution and power supplies the HP ESL Tape Libraries offer the best in high availability for continuous operation. HP ESL E-Series also offers 3 million MSBF (mean swap between failure) for single frame and also multiple frame solutions.

Data Privacy

To greatly enhance data privacy, HP ESL Tape Libraries are now available with LTO-5 Ultrium 3280 and LTO-4 Ultrium 1840 hardware encrypting tape drives for secure high performance backups meeting consortium specifications for LTO-5 and LTO-4. HP Data Protector Software can enable the drive encryption and provide basic key management capabilities. Additional information regarding ISV's supporting hardware encryption is available on the HP Enterprise Backup Solution website at www.hp.com/go/ebs. The encryption on LTO-5 and LTO-4 media occurs with or without compression, and without speed or capacity penalties. Hardware encryption is not supported on LTO-2 and LTO-3 tapes.

LTO-5 and LTO-4 uses the Advanced Encryption Standard (AES) with the longest and most secure keys -- 256 bits. AES-256 is implemented within Galois Counter Mode (GCM). This is a method of increasing AES security by efficiently adding Message Authentication Codes to ensure the integrity of the backup data stored on tape. The HP LTO-5 Ultrium 3280 and LTO-4 Ultrium 1840 tape drive(s) are designed to be compliant with the emerging standard for tape drive security (IEEE 1619.1).

ESKM: The HP Enterprise Secure Key Manager reduces your risk of a costly data breach and reputation damage while improving regulatory compliance with a secure centralized encryption key management solution for HP LTO-5 and LTO-4 enterprise tape libraries (EML & ESL). In addition, the ESKM provides strong auditable security and reliable lifetime key archival. The ESKM and LTO-5/LTO-4 drive encryption in the ESL library provides a complete and secure privacy solution to protect customers' confidential data.

For further information on the ESKM please visit: www.hp.com/go/eskm

Density

HP ESL Libraries provide optimum density offering more capacity in less physical storage space. The ESL 712e with LTO-5 Ultrium 3280 technology reaches to 205 TB of compressed (2:1) capacity per square foot.

Product Highlights

Scalability

HP ESL 322 Library is scalable to larger cartridge configurations via a licensing key. To increase library capacity, a license key can be purchased that will enable an additional panel/drawer of cartridges to become available for use.

In the HP ESL Libraries, slots are grouped into panels. When you purchase a 322e, left side panels one, two and three are enabled by default. Up to three license keys would be needed (P/N AA942A) for a 322e to become a full slot count library. The first license enables panel four, the second license would enable panel five, and the third license would enable panels six and seven. The following table explains the panel layout:

Panel 1	Upper Left (108 slots)	Panel 4	Upper Right (108 slots)
Panel 2	Middle Left (106 slots)	Panel 5	Middle Right (104 slots)
Panel 3	Lower Left (108 slots)	Panel 6	Lower Right (108 slots)
		Panel 7	Back Wall (0-70 slots)

Number of slots enabled in panel 7 depends on the number of tape drives installed. Each group of four tape drives beyond the first four requires the removal of 14 slots to accommodate the drive cluster. Up to five drive clusters can be added to the base configuration for a total of six drive clusters.

HP ESL Cross Link Kit (PN:AA947A) and ESL Cross Link Expansion Kit (PN: AF903A) allow you to connect up to five 712e libraries together as a single tape library, scaling up to 3546 LTO slots (10638 TB, compressed 2:1) and up to forty-four tape drives.

The ESL E-Series Cross Link Kit requires specific software and firmware supplied on CD with the Cross Link Kit. Software licenses are required only on the first or primary library frame. Small count tape library (322e) is only supported in multi-frame configurations if upgraded to a fully populated tape library and only if it is the first or primary tape library.

NOTE: When installing the Cross Link Kit you will lose one cluster of either tape drives or slots along the back wall of the first ESL cabinet. In an LTO library, the back wall clusters hold 14 slots. To review the Cross Link Kit installation guide and Cross Link Expansion Kit guide, please visit: <http://www.hp.com/go/automated>, ESL E-Series, Manuals.

HP LTO Ultrium Technology

HP LTO (Linear Tape Open) Ultrium Tape Drives use best of breed technology. By taking the best features from other tape technologies and combining them into a single new technology, Ultrium tape drives are in a league of their own. Inclusion of innovative features such as Adaptive Tape Speed (ATS) ensure that Ultrium drives can meet the performance and reliability demands of a library environment. LTO technology is an open industry standard format; thus data written on HP Ultrium Tape Drives can be interchanged directly with Ultrium Tape Drives from other vendors.

Data Rate Matching

Data Rate Matching combines sophisticated buffer management with HP's exclusive Infinitely Variable Adaptive Tape Speed technology, to allow the tape drive to match its transfer rate to the host speed dynamically and continuously across the whole range of transfer rates. This feature ensures that the tape drive continues to stream data regardless of the environment, and brings two big advantages:

- It optimizes backup performance, regardless of the speed of the host or the network.
- It minimizes rewinding and repositioning of the tape, reducing wear and increasing reliability.

Product Highlights

WORM (Write-Once, Read-Many) Drive and Media Support

Critical to the success of data retention policies in highly regulated environments is the ability to store and manage data in an unalterable state. Following stringent guidelines set forth by regulatory agencies such as the SEC and HIPPA, IT organizations must now integrate new solutions and policies that can verify the integrity of stored data for periods that can extend well beyond seven years.

The LTO-5 Ultrium 3280 and LTO-4 Ultrium 1840 tape drives feature the ability to archive and store data in a non-rewriteable format that meets the most stringent regulatory guidelines. Using a combination of integrated fail-safe features in the drive firmware, cartridge memory, and tape formatting, the tape drives can archive large amounts of data for periods of up to 30 years in a secure, untampered state. Since all LTO-5 Ultrium 3280 and LTO-4 Ultrium 1840 tape drives include support for both rewritable and WORM media, IT organizations can now easily integrate a secure, long-term archiving solution into their current data protection strategy. As compared to other technologies that feature support for WORM storage, the tape drives offer the advantages of:

- A single drive to support all backup and archiving needs
- Two distinctive tape cartridges to easily distinguish and manage both rewriteable and WORM data cartridges
- A specially designed WORM data cartridge with multiple integrated fail-safe features to prevent accidental or intentional overwriting of data
- High-capacity, low-cost HP WORM media that can store up to 3TB (2:1 compression) of data on a single data cartridge
- Support from many backup and archiving software vendors, providing the most comprehensive and mainstream support in the industry
- The LTO open standard that offers greater choice and compatibility across all third- and fourth-generation Ultrium products

NOTE: While all HP LTO-5 Ultrium 3280 and LTO-4 Ultrium 1840 tape drives support LTO Ultrium WORM media, some third- and fourth-generation LTO Ultrium tape drives from other manufacturers may not include read and write support for LTO Ultrium WORM media. For non-HP third- and fourth-generation LTO Ultrium tape drives, please check the manufacturers' specifications to ensure this support is provided if you are using your WORM media. If WORM support is not provided, the drive will eject the WORM tape cartridge immediately upon insertion into the tape drive.

Mixed Media

Extending the E-Series flexibility and investment protection, the HP ESL E-Series tape libraries support mixing drive technology (LTO-5 Ultrium 3280 FC and LTO-4 Ultrium 1840 FCFC).

HP Ultrium Storage Media

HP recommends that you use HP-branded cartridges in the HP ESL E-Series Tape Libraries to assure the highest level of protection for your valuable data. The test program for HP media is the most thorough and comprehensive in the industry.

All HP cartridges must satisfy an exhaustive battery of additional tests that relate directly to real life situations, where real data and real businesses are at stake. The benefit of the HP brand specification for media is consistent quality. Through the testing of thousands of HP drives and HP cartridges, the ideal formulation for backup performance is defined and then continuously monitored. This hugely resource-intensive process is unique to HP and affords deep insight into the HP+HP backup solution for a wide range of environments and duty cycles. Your best choice for ease of support and maximum dependability is to use HP-branded Ultrium cartridges at all times.

HP strongly encourages the use of bar code labels on tapes to track media and ensure optimum library performance and usability. Correctly labeling your media will allow the library to quickly determine media and drive compatibility.

Product Highlights

Removable Magazines To ease the management of cartridges to and from the library, the HP ESL E-Series libraries include user configurable removable magazines. The 712e and 322e can select magazine configurations in 0, 16, 32 or 48 slot count capacity.

LTO-5 Ultrium 3280 FC and LTO-4 Ultrium 1840 FC Interface Controller With LTO-5 Ultrium 3280 and LTO-4 Ultrium 1840 drives, HP delivers dual-port, native fibre SAN connectivity, while HP's Extended Tape Library Architecture (ETLA) continues to provide Secure Manager and partitioning features. One e2400-FC 4Gb Interface Controller is still needed to control the robot.

HP ESL Internal Network Kit The purpose of the ESL Internal Network Kit is to provide a private management network inside the library to connect the Interface Manager (IM) to the LTO-5 and LTO-4 drives.

Software Components

Extended Tape Library Architecture (ETLA) The HP Extended Tape Library Architecture (ETLA) will save library and SAN administrators time and money by simplifying library setup, configuration, and troubleshooting. HP's architecture increases reliability and robustness of libraries in the SAN, and integrates with leading enterprise management applications. Advanced features such as Access Control (HP Secure Manager) further increase backup performance and reliability. HP offers a balanced solution - neither piece-meal nor monolithic - that includes a generous initial feature set and allows users to buy only the advanced options they need.

The HP Interface Manager and Command View for ESL Tape Libraries are the next step in HP's Extended Tape Library Architecture, itself a key component of the HP Adaptive Infrastructure strategy. This architecture delivers tape libraries that are self-aware - self-managed, automatically maintained, continuously available - and network-aware - resilient, secure, and adaptable. HP's high-end tape libraries provide the reliability, interoperability, and advanced functionality required for your enterprise SAN environment.

TapeAssure HP TapeAssure makes managing, optimizing and archiving on the HP EML and ESL E-Series libraries faster and easier. TapeAssure provides comprehensive summaries and detailed information about the status, performance, utilization, and health of all tape drives and media for every HP enterprise library in the SAN. This data can be exported on demand or at scheduled times to a comma-separated-value (CSV) file for analysis with spreadsheet programs or custom scripts.

NOTE: Minimum system requirements apply. For additional details and further information on ETLA or TapeAssure please visit: <http://www.hp.com/go/ETLA> and <http://www.hp.com/go/tapeassure>

Intelligent SAN-Aware Functionality

- Caching and intelligent network behavior to control SAN traffic
- Robust and automated configuration and verification of Interface Controller settings
- SAN-aware event tracking and detection of conflicts
- Persistent history and intelligent analysis of events and logs
- Persistent drive numbering and mapping across component swaps and reboot

Command View for Tape Libraries software Web Interface Features

- Select from a list of multiple supported libraries to manage
- View asset information for the library system
- View health summaries for all components of the library system: drives, robotics, Interface Controllers, and Interface Manager
- View library inventory: slots, media, and drives
- Search for media by barcode label
- View details on drives, robotics, Interface Controllers, and Interface Manager, including WWNs, speeds, and connection types
- Configure hosts/HBA-to-drive mapping and masking settings with Secure Manager ESL
- Automatically discover hosts and HBAs on the SAN or add your own for access control and security purposes
- Upgrade firmware on all library components
- Configure IP network parameters for the management station and Interface Manager cards in each library
- Configure SNMP trap/event destinations to receive alerts asynchronously
- View persistent event logs for the library system

Software Components

Secure Manager for Tape Libraries software

- Easily configure device-level security settings
 - Allow only authorized servers to access tape drives and critical data
 - Manage access control from a single pane of glass, through the library itself
 - Library partitioning - Up to six "virtual" partitions available. Load ports can be configured in only two of the partitions. The other four partitions cannot contain load ports
 - Paths to robotics can be separated between two independent SANs for isolation purposes
-

HP Library and Tape Tools (L&TT)

The ESL Tape Library configurations are supported on HP's industry-leading diagnostic tool - HP Library and Tape Tools (L&TT). L&TT is a single, convenient program that's a snap to install and simple to operate. L&TT's intuitive user interface eliminates the need for training and deploys in less than five minutes. This robust diagnostic tool is designed for both the experienced professional and the untrained administrator. It ensures product integrity through self-diagnostics and fast resolution to device concerns. Additional information on L&TT plus download information can be found at: <http://www.hp.com/support/tapetools>.

Compatibility

HP's Enterprise Business Solutions (EBS) assures that your HP Enterprise Systems Library (ESL) E-Series works with leading servers, operating systems, and backup applications - and not just those sold by HP. Based on a foundation of extensive interoperability testing, EBS 1-2-3 provides a step-by-step methodology for designing, configuring, and implementing your SAN ensuring HP ESL tape libraries work seamlessly in many environments. HP ESL libraries are especially suitable if you have a mixed system environment. For the latest list of servers, workstations, operating systems, and backup software that support HP ESL E-Series, check the tape backup compatibility pages on our web site at: <http://www.hp.com/go/ebs>.

HP Server Compatibility

The HP ESL E-Series Tape Libraries are supported on the following classes of HP systems:

- HP ProLiant servers
- HP-UX Servers
- HP AlphaServers

NOTE: For details on which models work with which systems, including third-party systems, visit <http://www.hp.com/go/ebs> for the latest hardware compatibility information.

OS Support

The HP ESL E-Series Tape Libraries are supported on the following operating systems:

- HP-UX
- AIX
- Linux
- NetWare
- OVMS
- Tru64
- Solaris
- Windows

NOTE: Please visit <http://www.hp.com/go/ebs> for the latest compatibility information.

Software Support

The HP ESL E-Series Tape Libraries are supported on the following ISV's:

- HP Data Protector
- Computer Associates ARCserve
- EMC Legato Networker
- IBM Tivoli Storage Manager
- Symantec VERITAS Backup Exec
- Symantec VERITAS NetBackup

NOTE: Please visit <http://www.hp.com/go/ebs> for the latest compatibility information.

Service and Support, HP Care Pack, and Warranty Information

Warranty and Services Included with the Product **ESL Hardware:** The warranty for this product consists of 1-year onsite, next business day. NOTE The HP ESL Enterprise Tape Library warranty includes support for Customer Self Repair (CSR). The tape library cartridges, terminators, external cables, drives, magazines, controller board and power supplies are mandatory customer self repair parts. This means both the removal and replacement of the above parts are designed for easy replacement; the on-site warranty does not extend to these parts. However, customers may request HP Services to replace these replaceable units (RUs) for an additional charge. Also, customers who purchase an HP Support Agreement have the option to perform CSR or receive onsite support

ESL Software: HP warrants that the Software media will be free of physical defects for a period of ninety (90) days from delivery. HP provides 1-year, 9x5 phone support to enhance the performance and availability of your software. Experienced Response Center engineers provide trustworthy advice on issues such as software features and use, problem diagnosis and resolution, and software defect identification.

For business-critical requirements, the level of support may be increased through a full range of upgrade products. You can learn more about HP's Global Limited Warranty and Technical Support by visiting: <http://h18006.www1.hp.com/products/storageworks/warranty.html>

For increased uptime, productivity and ROI -HP Care Pack packaged services for Storage

These days, you need to get the most out of your storage investment-you can't afford not to. When you buy HP storage products and solutions, it's also a good time to think about what levels of service and support you may need. To help take the worry out of deploying, designing, maintaining, and managing your environment, we've designed a portfolio of service options that are as: flexible, reliable and scalable as your storage. Unlike storage-only vendors, we take a holistic approach to your entire environment, bridging storage, servers, blades, software and network infrastructures with our HP Care Pack packaged services for Storage.

Protect your business beyond the warranty

When it comes to robustness and reliability, standard warranties on today's computing equipment have matured just as the technologies have matured. Good news on some fronts-but also a source of potential problems and subsequent consequences that come from depending on standard warranties alone. Standard warranty protects against product defects and some causes of downtime- but not the business. By using a standard approach to warranty uplifts, such as HP Care Pack Services, you can reduce downtime risks and be more certain of operational consistency for both mission-critical and standard business computing. Simply put, HP Care Pack Services normalize the warranty of combined products - helping you proactively guard against unplanned downtime.

Extending warranties with HP Care Pack Services

For cost-effective upgrading or extending your standard warranty, HP Care Pack Services offer a suite of standard reactive hardware and software support services that are sold separately, or combined as with our Support Plus and Support Plus 24 services. The portfolio also provides a combination of proactive and reactive services, such as Proactive 24 Service and Critical Service. In addition, with HP Proactive Select we offer an innovative approach to service delivery that gives you the flexibility to acquire the specific proactive services you need today, then add services as your needs evolve. HP Proactive Select offers a broad set of technical or per-event type service options - including server, storage, and network, SAN device, and software, environment, installation and education services. Services that you can mix and match depending on your specific requirements, from preliminary planning and equipment delivery to installation, configuration, integration, and testing, through every level of ongoing support. Our HP Care Pack packaged services for Storage assures help when you need it most. And for many products, post-warranty HP Care Pack Services are available when your original warranty has expired.

HP Storage Services: Offering reliability, flexibility and value-just like your storage

HP Storage Services offers a full spectrum of customer care, from technology support to complex migrations to completely managed services. HP Factory Express provides customization, integration and deployment services for turnkey solutions. HP Education offers flexible,

Service and Support, HP Care Pack, and Warranty Information

comprehensive training on storage networking, disk storage systems, and storage software to help your IT staff get the most out of your investments. And HP Financial solutions extend innovative financing and asset management programs to cost-effective buy, manage and eventually retire your older equipment.

HP Storage Services, the trusted business technology experts who manage your technology in action, because when technology works, business works. <http://www.hp.com/hps/storage>

NOTE: Care Pack Services availability may vary by product and country.

HP Care Pack Services are sold by HP and HP Authorized Service Partners:

- Services for customers purchasing from HP or an enterprise reseller are quoted using HP order configuration tools.
- Customers purchasing from a commercial reseller can find HP Care Pack Services at <http://www.hp.com/go/lookuptool>

Deployment and Per Event Service Descriptions

HP Installation & Startup for HP

- Provides for the implementation of HP ESL (Enterprise Storage Library) products in SAN environments, including the installation of a Fibre Channel Interface Controller
- Minimizes implementation-related disruptions to your environment and helps ensure increased system reliability and more effective data management

Due to the complexities involved with the initial installation of an enterprise Library into a SAN environment, Hewlett Packard requires that the Installation & Start-up service (HA114A1) is purchased.

The Tape Library Installation & Start Up covers pre-installation preparation activities, installation and configuration of the library into the customers SAN. Installation of: Command View ESL license installation (if applicable); Secure Manager ESL license installation (if applicable); configuration of hosts (up to 5, additional hosts handled via HA114A1 5B2 per additional 10) and switches; verification testing and customer orientation.

Recommended Services

3-Year HP Support Plus 24

For a higher return on your storage investment, HP Support Plus 24 provides integrated hardware and software support services designed specifically for your technology. Available 24x7, this 3-year combined reactive support option delivers onsite hardware support and over-the-phone software support around-the-clock. Leverage the full strength of HP Technology Services - customers can trust the services professionals at HP to work collaboratively with them, putting our strategic and technical know-how to work across their entire infrastructure.

- Improve uptime with responsive hardware and software services
- Enjoy consistent service coverage across geographically dispersed sites
- Update HP software at a predictable cost
- Increase customer satisfaction-with no interoperability gaps

<http://h20195.www2.hp.com/V2/GetPDF.aspx/5981-6638EN.pdf>

HP ESL, MSL, EML Tape Libraries Installation and Startup

Deployment of your HP Enterprise Storage (ESL) Library products in SAN environments, including the installation of a Fibre Channel Interface Controller.

- System installation and setup by an HP technical specialist
- Verification prior to installation that all service prerequisites are met

Service and Support, HP Care Pack, and Warranty Information

- Delivery of the service at a mutually scheduled convenient time
- Provides product installation according to the product specifications
- Offers deployment activities that are designed to bring the Fibre Channel-based tape library into operation
- Helps improve performance
- Makes the most of the value of the HP ESL, MSL, and EML libraries in an IT environment by leveraging HP knowledge in implementing Fibre Channel-based systems and solutions
- Helps reduce implementation-related disruptions in the IT environment
- Helps increase system reliability and provides more effective data management

<http://h20195.www2.hp.com/v2/GetPDF.aspx/5981-7355EN.pdf>

Optional Services

HP Backup and Recovery Solution Service

For customers who need help implementing their backup software:

Rapid recovery from system downtime can hinge on the efficiency of your backup and recovery management environment - and on how well that environment is integrated with your storage infrastructure. But integration processes can be time-consuming and complex, and your IT resources are already stretched thin. Where can you find the expert help you need?

For fast, effective integration of your backup solution into an existing or new storage infrastructure, turn to the storage experts at HP Services. Our Backup and Recovery Solution Service (BRSS) provides end-to-end management of your backup integration process. The BRSS team works with you to analyze your business and IT environment; develop a comprehensive integration plan and timetable; design an architecture that suits your critical requirements; install backup software; implement your solution; and validate your configuration.

<http://h20195.www2.hp.com/V2/GetPDF.aspx/5982-7442EN.pdf>

eSupport

HP eSupport is a portfolio of technology-based services that assist you with managing your business environment - from the desktop to the data center.

Support Portal

The HP support portal provides one-stop access to the information, tools and services you need to manage the daily operations of your IT environment.

Features include:

- Access to self-solve tools (including search technical knowledge base)
- Efficient logging and tracking of support cases
- Collaboration with other business and IT professionals
- Download of patches and drivers
- Access to diagnostic tools
- Proactive notification of relevant information

Access to certain features of the support portal requires an HP service agreement. To access the support portal, visit <http://www.hp.com/support>

Service and Support, HP Care Pack, and Warranty Information

Customer Technical Training

Consider education as an integral part of your strategy to get the best return on investment for your HP storage solution. HP offers a variety of training courses on storage software, networking, archiving and disk storage systems. Our classes are available in many delivery modalities from traditional instructor-led courses at one of our 80 training centers worldwide to on-site training customized to your needs or online. www.hp.com/learn/storage

HP Services Awards

HP Services continues to be recognized for service and support excellence by customers, partners, industry organizations and publications around the world. Recent honors and awards reflect our services team's dedication, technical expertise, professionalism and uncompromising commitment to customer satisfaction. For a list of all our awards, please visit: <http://h20219.www2.hp.com/services/cache/433028-0-0-225-121.htm>

Additional Services Information

For more information about HP Care Pack Services for Storage, please visit: <http://www.hp.com/hps/storage>

If you have specific questions, contact your local HP representative. Contact information for a representative in your area can be found at "Contact HP" <http://www.hp.com>

Configuration Information

Step 1 - "Product" - Base Configuration

Select one:

Model Name	Model Description:	Part Number
ESL 712e	<p>Zero drive, 712 LTO cartridge base library includes:</p> <ul style="list-style-type: none">● One drive cluster: capable of handling up to four tape drives● One card cage● Six 8-slot Removable Magazines● Interface Manager: management card● FC robotics <p>What's included in the box:</p> <ul style="list-style-type: none">● Serial cable to attach to a diagnostic port● 2 Ethernet cables for internal connections● HP ESL E-Series Documentation CD● HP ESL E-Series Tape Library Unpacking and Installation Guide● Q2009-67000 HP LTO-4 and Q2011-67000 LTO-5 RW barcode label sample kits● Q2010-67000 HP LTO-4 and Q2012-67000 LTO-5WORM barcode label sample kits● Media and Bar Code Ordering Sheet● Warranty and Safety information	AA934C
ESL 322e	<p>Zero drive, 322 LTO cartridge base library includes:</p> <ul style="list-style-type: none">● One drive cluster: capable of handling up to four tape drives● One card cage● Six 8-slot Removable Magazines● Interface Manager: management card● FC robotics <p>What's included in the box:</p> <ul style="list-style-type: none">● Serial cable to attach to a diagnostic port● 2 Ethernet cables for internal connections● HP ESL E-Series Documentation CD● HP ESL E-Series Tape Library Unpacking and Installation Guide● Q2009-67000 HP LTO-4 and Q2011-67000 LTO-5 RW barcode label sample kits● Q2010-67000 HP LTO-4 and Q2012-67000 LTO-5WORM barcode label sample kits● Media and Bar Code Ordering Sheet● Warranty and Safety information	AA939C

NOTE: Customers are required to also purchase the necessary number of add-on drives, host bus adapters, SCSI cables, media, country specific power cords (pair) and applications software licenses in order to complete the library solution.

NOTE: Installation services will be quoted as part of each library order.

Configuration Information

Step 2 - Required Options

Select each required option with quantities specified.

Model Name	Model Description with Parts Shipped:	Quantity	Part Number
ESL E-Series Drive Cluster	Single Drive Cluster capable of holding one to four drives. Parts shipped include: <ul style="list-style-type: none"> One Ethernet cable Power Cable 	One for every four drives	AA938A
ESL E-Series LTO-5 Ultrium 3280 FC Drive Upgrade Kit	Single tape drive, installed into drive cluster. Parts shipped include: <ul style="list-style-type: none"> Installation poster One Ethernet cable 	1 to 24 drives (44 with expansion)	AW678A
ESL E-Series LTO-4 Ultrium 1840 FC Drive Upgrade Kit	Single tape drive, installed into drive cluster. Parts shipped include: <ul style="list-style-type: none"> Installation poster One Ethernet cable 	1 to 24 drives (44 with expansion)	AH194A
ESL Internal Network Kit	24-port switch used with LTO-5 Ultrium 3280 and LTO-4 Ultrium 1840 drives	One per ESL library with LTO-5 Ultrium 3280 or LTO-4 Ultrium 1840 drive(s)	AH997A
ESL E-Series e2400-FC 4G Interface Controller	Single controller card for use with Native Fibre Ultrium Tape Drives, 2 FC X 4 FC ports. Parts shipped include: <ul style="list-style-type: none"> Four Fibre Channel cables One Ethernet cable <p>NOTE: HP strongly recommends customers purchase the installation service HA113A1#5DP "Installation-Interfaces for libraries" when selecting the ESL E-Series e2400-FC 4G Interface controller as an upgrade option.</p>	One e2400-FC 4Gb Interface Controller per ESL Library with LTO-5 Ultrium 3280 or LTO-4 Ultrium 1840 drives)	AD576A
Command View for ESL, License	Permanent License for Command View for ESL	One per library	343374-B21

NOTE: #0D1 will appear after this part number on your sales order when factory integration is indicated.

Configuration Information

Step 3 - Additional Options

Select each option with quantities specified.

Model Name	Model Description with Parts Shipped:	Quantity	Part Number
Licensed Capacity Panel Upgrade for ESL E-Series (322e and 286e)	License key to upgrade capacity in the ESL 322e or SDLT 286e libraries. This license enables one additional panel/drawer of slots <ul style="list-style-type: none"> License Key Installation Guide 	One license per panel/drawer is needed. Up to three per library as needed	AA942A
ESL E-Series Ultrium Removable Magazine Kit	Six 8 slot magazines for ESL 712e or ESL 322e to be used in removable load ports NOTE: For customers converting a library from fixed load port to a removable load port need to ALSO order the Removable Magazine conversion kit.	As many as needed	AA944A
ESL E-Series Ultrium Mixed Media Kit	Three Ultrium LTO slot panels to convert left side of an SDLT base library frame (ESL 630e SDLT) to a mixed media environment. NOTE: Will require CE installation.	One per library as needed	AD546A
Secure Manager for ESL, License	Permanent License for Secure Manager for ESL. Parts shipped include: Installation Guide NOTE: This software is highly recommended for all E-Series libraries, but is required in order to use the Partitioning or Mixed Media features.	One per library as needed	343376-B21
ESL E-Series Cross Link Kit	The Kit includes the extensible cross link rail and cam mechanism that extends the Cross Link cartridge shuttle for robotic access. It also includes a Cross Link controller in cluster five position of the primary, or first, tape library and takes the same power as a cluster controller. In addition the motor assembly, sensor, cables and belt are included. NOTE: Will require CE installation.	One per two libraries	AA947A
ESL E-Series Cross Link Expansion Kit	The Kit includes the expansion track assembly, belt, screws, straps, brackets, cosmetic plate, Ethernet cables, wrench and Install Guide.	Up to three to support five library frames	AF903A

Multi-Frame (Cross Link) ESL E-Series Reference						
	1	2	3	4	5	Max. Total = 5
Type allowed	322e A, 712e	712e	712e	712e	712e	
Cross Link kit required	1					Only 1 needed
Extension kit required			1 +	1	+1	Max. Total = 3
Min drives, per frame	1	0 ^B	0 ^B	0 ^B	0 ^B	Min. Total = 1
Max drives, per frame	20 ^C	24 ^C	8 ^C	8 ^C	8 ^C	Max. Total = 44
Command View TL and Secure Manager	1 CV, 1 SM					Only 1 needed for whole system
Installation and start-up service	1					Only 1 needed
Additional day start-up service		1	1 +	1 +	1 +	Max. Total = 4



Configuration Information

Additional 1/2 day start-up service		1	1 +	1 +	1 +	Max. Total = 4
NOTES:						
CAUTION: All drive clusters -- except the last cluster in the last frame -- should have 4 drives each. Otherwise, "phantom" drives will be reported, leading to configuration errors.						
	A 322e as the 1st frame must be fully licensed up to maximum slots					
	B Library has to be filled with drives in the sequential order, before spilling over to the next frame the last cluster in the previous frame must have 4 drives. You can have empty clusters in the last frame present					
	C Total drives in all frames must be <45					

Related Options

	Description	Part Number	
ESL E-Series Tape Library Upgrade Kits	ESL E-Series LTO-5 Ultrium 3280 FC Drive Upgrade Kit	AW678A	
	ESL E-Series LTO-4 Ultrium 1840 FC Drive Upgrade Kit	AH194A	
	ESL E-Series Drive Cluster	AA938A	
	ESL E-Series Internal Network Kit	AH997A	
	ESL E-Series e2400-FC 4G Interface Controller	AD576A	
	ESL E-Series Ultrium Removable Magazine Kit	AA944A	
	ESL E-Series SDLT Removable Magazine Kit	AA945A	
	ESL E-Series Ultrium Mixed Media Kit	AD546A	
	ESL E-Series SDLT Mixed Media Kit	AD547A	
	ESL E-Series Cross Link Kit	AA947A	
ESL E-Series Cross Link Expansion Kit	AF903A		
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HP Command View for Tape Libraries	Command View for ESL, License NOTE: Please reference the Extended Tape Library Architecture QuickSpecs for more information at http://www.hp.com/go/automated	343374-B21	
<hr/>			
HP Secure Manager for Tape Libraries	Secure Manager for ESL, License NOTE: Please reference the Secure Manager ESL QuickSpecs for more information at http://www.hp.com/go/automated	343376-B21	
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Media	HP LTO-5 Ultrium 3TB RW Data Cartridge (1 pack)	C7975A	
	HP LTO-5 Ultrium 3TB WORM Data Cartridge (1 pack)	C7975W	
	HP LTO-5 Ultrium RW Bar Code Label Pack (100 pack)	Q2011A	
	HP LTO-5 Ultrium WORM Bar Code Label Pack (100 pack)	Q2012A	
	HP LTO4 Ultrium 1.6TB RW Data Cartridge (1 pack)	C7974A	
	HP LTO4 Ultrium 1.6TB WORM Data Cartridge (1 pack)	C7974W	
	HP Ultrium 800GB RW Data Cartridge (1 pack)	C7973A	
	HP Ultrium 800GB WORM Data Cartridge (1 pack)	C7973W	
	HP Ultrium 400GB data cartridge (1 pack)	C7972A	
	HP Ultrium Universal Cleaning Cartridge (1 pack)	C7978A	
	HP LTO4 Ultrium RW Bar Code Labels (100 pack)	Q2009A	
	HP LTO4 Ultrium WORM Bar Code Labels (100 pack)	Q2010A	
	HP Ultrium 3 RW Bar Code Labels (100 pack)	Q2007A	
	HP Ultrium 3 WORM Bar Code Labels (100 pack)	Q2008A	
	HP Ultrium 2 Bar Code Labels (100 pack)	Q2002A	
	HP SDLT 600 GB Data Cartridge	Q2020A	
	HP SDLT 600 Bar Code Labels	Q2006A	
	Non-Custom Labeled Data Cartridges		
	NOTE: Non-Custom labels will come pre-labeled with a pre-determined number sequence.		
	HP LTO-5 Ultrium 3TB RW Non Custom Labeled Data Cartridge (20 pack)	C7975AN	
	HP LTO4 Ultrium 1.6TB RW Non-Custom Labeled Data Cartridge (20 pack)	C7974AN	
	HP Ultrium 800GB RW Non-Custom Labeled Data Cartridge (20 pack)	C7973AN	
	HP Ultrium 400GB Non-Custom Labeled Data Cartridge (20 pack)	C7972AN	

Related Options

Custom labeled Data Cartridges

NOTE: Custom labeled products allow customers to customize a specific sequence printed on each label.

HP LTO-5 Ultrium 3TB RW Custom Labeled Data Cartridge (20 pack)	C7975AL
HP LTO-5 Ultrium 3TB RW Eco Pack (No Case) Data Cartridge (20 pack)	C7975AC
HP LTO-5 Ultrium 3TB WORM Custom Labeled Data Cartridge (20 pack)	C7975WL
HP LTO4 Ultrium 1.6TB RW Custom Labeled Data Cartridge (20 pack)	C7974AL
HP LTO4 Ultrium 1.6TB WORM Custom Labeled Data Cartridge (20 pack)	C7974WL
HP Ultrium 800GB RW Custom Labeled Data Cartridge (20 pack)	C7973AL
HP Ultrium 800GB WORM Custom Labeled Data Cartridge (20 pack)	C7973WL
HP Ultrium 400GB Custom Labeled Data Cartridge (20 pack)	C7972AL

Host Bus Adapters and Controllers for ProLiant Servers

NOTE: For a complete list of supported HBA's, please visit: <http://www.hp.com/go/ebs>.

Host Bus Adapters and Controllers for Alpha Servers

NOTE: For a complete list of supported HBA's, please visit: <http://www.hp.com/go/ebs>.

Fibre Channel Cables

NOTE: Additional Fibre Channel Cables are required. Order one cable per Interface Controller, selecting cable length and converter type to match the appropriate environment.

2m Multi-mode OM3 LC/LC FC Cable	AJ835A
5m LC/LC Multi-Node OM3 FC cable	AJ836A
15m LC/LC Multi-Node OM3 FC cable	AJ837A
30m LC/LC Multi-Node OM3 FC cable	AJ838A
50m LC/LC Multi-Node OM3 FC cable	AJ839A

Power Cord

NOTE: THIS PRODUCT CAN ONLY BE USED WITH AN HP APPROVED POWER CORD FOR THE CUSTOMER'S SPECIFIC GEOGRAPHIC REGION. ORDER TWO POWER CORDS FOR EACH LIBRARY. ALL CORDS ARE RATED AT 250 VAC AND 16 AMPS.

WARNING: Use of a non-HP approved power cord may result in (1) use of a power cord that does not meet individual country specific safety requirements; (2) a power cord with insufficient conductor ampacity that could result in overheating with potential personal injury and/or property damage; and/or (3) an unapproved power cord could fracture resulting in the internal contacts being exposed which potentially could subject the user to a shock hazard. Use ONLY an HP approved power cord for your particular country. HP disclaims all liability in the event a non-HP approved power cord is used.

HP Power Cord, North America , NEMA L6-20P Plug	AF593A
HP Power Cord, North America, NEMA L6-30P	E7805A
HP Power Cord, Universal PDU, C20 Plug	E7804A
HP Power Cord, Custom Applications, No Plug	E7806A
NOTE: This power cord should only be installed by a qualified electrician	
HP Power Cord, Europe, IEC309 Plug	AF581A
HP Power Cord, Europe, CEE 7/7 Plug	AF576A
HP Power Cord, China, GB16C Plug	AF584A
HP Power Cord, Israel, C-19 straight 2.5 meter length Plug	AF583A

Related Options

HP Power Cord, Brazil, AR20S Plug	AF592A
HP Power Cord, Australia/New Zealand, AS3112-3	AF577A
HP Power Cord, Argentina, IRAM 2073	AF578A
HP Power Cord, S. Africa, SABS 164	AF579A
HP Power Cord, Italy/Chile, CE123-50	AF580A
HP Power Cord, India/Bangladesh/Pakistan, IS1293	AF582A
HP Power Cord, Taiwan, CNS690	AF585A
HP Power Cord, UK/SING/HK	359615-031
HP Power Cord, North America , NEMA L6-20P Plug	AF593A

Technical Specifications

Dimensions	Form Factor	Free standing	
	Physical (HxWxD)	75 x 30 x 50 in (191 x 76 x 127 cm)	
	Shipping (HxWxD)	80 x 48 x 56 in (203.2 x 121.9 x 142.2 cm)	
Weight	Out of box (24 drives)	1,294 lbs (483 kg)	
	Shipping (24 drives)	1,459 lbs (544.6 kg)	
SCSI Identification	Product ID	ESL E-Series	
	Vendor ID	HP	
Control Panel	Library Status		
	Load Port controls		
	Library Diagnostics		
	Basic Library Operations		
	Library, Drive, Interface Controller remote manageability will be handled via Command View for Tape Libraries		
Drive Host Interface	Fibre Channel, 8Gb/4Gb/2Gb Multi-mode optical, LC connector (LTO-5) or 4Gb/2Gb/1Gb Multi-mode optical, LC connector (LTO-4)		
Robotic and Host Interface	Fibre Channel, 4Gb/2Gb/1Gb Multi-mode optical, LC connector		
Configurations	Drives installed in library	ESL 712e Cartridges	
	1-4	712	
	5-8	698	
	9-12	684	
	13-16	670	
	17-20	656	
	21-24	642	
Drive Performance (1Kb = 1,000 bytes)		LTO-5 Ultrium 3280 FC	LTO-4 Ultrium 1840 FC
	Native Data transfer rate	140 MB/s with LTO 5 media 120 MB/s with LTO 4 media 80 MB/s with LTO 3 media	120 MB/s with LTO 4 media 80 MB/s with LTO 3 media 35.6 MB/s with LTO 2 media
	Data transfer rate, compressed (assumes 2:1 data compression)	280 MB/s with LTO 5 media 240 MB/s with LTO 4 media 160 MB/s with LTO 3 media	240 MB/s with LTO 4 media 160 MB/s with LTO 3 media 71.2 MB/s with LTO 2 media
	Data rate matching range	47-140 MB/s	40-120 MB/s
	Data access time (from BOT)		46 seconds typical for LTO 2 media 52 seconds typical for LTO 3 media 62 seconds typical for LTO 4 media
	Rewind time from EOT	38 seconds typical for LTO 3 media 46 seconds typical for LTO 4 media 47 seconds typical for LTO 5 media	< 124 seconds for LTO 4 media < 102 seconds for LTO 3 media < 92 seconds for LTO 2 media
	Rewind tape speed	< 96 seconds for LTO 5 media < 93 seconds for LTO 4 media < 78 seconds for LTO 3 media	7 m/s for (LTO 3 and LTO 2 media)
	Average load time	<19 seconds (RW) <22 seconds (WORM)	<19 seconds (RW) 22 seconds (WORM-initialized) Uninitialized WORM media can take up to 70 seconds

Technical Specifications

	Average unload time	<19 seconds (RW) <22 seconds (WORM-initialized) Uninitialized	<19 seconds (RW) 22 seconds (WORM-initialized) Uninitialized WORM media can take up to 70 seconds
Maximum Storage Capacity	Native Capacity		ESL 712e 5319 TB
	Compressed Capacity		10638TB TB
	NOTE: Compressed data listed above is assuming 2:1 compression.		
Input/Output Port	ESL 712e	6 removable magazines (each with 8 cartridge slots)	
	ESL 322e	6 removable magazines (each with 8 cartridge slots)	
Initialization (cartridge inventory) time	Less than 3 minutes, fully loaded with labeled cartridges		
Cartridge Swap Time	18 to 20 seconds, consisting of two Move Medium commands		
Input Requirements	Auto-range to domestic and international AC voltages		
	Nominal / Range Line Frequency	50 Hz / 60Hz	
	Range Line Voltage	200 VAC to 240 VAC	
	Typical Input Current	8A max	
Power Requirement	Two IEC 320 C19 male connector inside back door		
Power Consumption	VA max 1600W (Standard 2N power)		
External Cables	See "Related Options" Section		
Connectors	FC	LC Connector	
Drives Supported	Native Fibre Drives: LTO-5 Ultrium 3280 FC and LTO-4 Ultrium 1840 FC		
Maximum Number of Drives	24 drives in a single frame 44 drives with expansion cabinets		
Acoustic Noise	Sound Power Level	Operating 7.3 Bel Idle 7.3 Bel	
Reliability (Library Only)	MTBF	250,000 power-on hours 100% duty cycle	
	MSBF	3 million load/unload cycles (rated)	
	MTTR	Less than 30 minutes	
Relative Humidity (non-condensing)	Operating	Operating: 20% to 80% non-condensing	
	Shipping	Shipping & Storage: 5% to 95% non-condensing	
Temperature Range	Operating	Dry Bulb: 15° to 32° C/59° to 90° F Wet Bulb: 25° C (77° F) maximum	
	Shipping	Dry Bulb: -40° to 66° C/-40° to 151° F Wet Bulb: 46° C (115° F) maximum	
Regulatory Compliance	Safety	UL60950-1:2003, 1st ED. (USA); IEC 60950:1999 3rd ED; 60950:2000 (international)	
	EMC	CISPR 22/class A, CISPR 24, FCC/Class A	
	Country Regulatory Compliance	For country specific compliance contact your local sales representative.	
	Regulatory Model Number	LVLDC-0301	

Technical Specifications

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The only warranties for HP products and services are set forth in the express warranty statements accompanying such products and services. Nothing herein should be construed as constituting an additional warranty. HP shall not be liable for technical or editorial errors or omissions contained herein.

For tape drives and media, 1 GB = 1 billion bytes. Actual formatted capacity is less.