



IBM System Storage TS3310 Tape Library support for the IBM LTO Ultrium 6 tape drive

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At a glance

The TS3310 Tape Library combines IBM® tape and automation reliability and scalability at open systems prices. Features include:

- A space-efficient design with modular, stackable growth expansion to 41U
- Improved Ultrium™ 6 tape drive data transfer rate, providing up to 160 MB/sec native as compared to Linear Tape-Open™ (LTO™) Ultrium 5 at 140 MB/sec native
- Support for LTO Generation 6 media specification tape cartridge compressed capacity of up to 6.25 TB with 2.5 to 1 compression
- 8 Gbps native switched fabric Fibre Channel attachment Ultrium 6 Tape Drives
- Support for three encryption management methods: Application Managed, System Managed, and Library Managed; System Managed and Library Managed Encryption management is available through the Transparent LTO Encryption feature
- Support for media partitioning and self-describing tape
- Support for mixed generations of Ultrium tape drives and media
- Adherence to LTO Generation 6 media specification
- Support for Ethernet connections between the library and each LTO Ultrium 5 or newer tape drive for reducing the time required to obtain logs and update drive firmware
- Optional path failover for control and data paths
- Rack-mount option
- Capacity on Demand expansion units
- Dual power (additional power supply)
- Support for IBM TS3310 Command Line Interface (CLI) program
- Support for IBM Tape System Reporter (TSR) application

Overview

The IBM System Storage® TS3310 Tape Library consists of IBM System Storage TS3310 Tape Library Model L5B (3576 Model L5B) and IBM System Storage TS3310 Tape Library Model E9U (3576 Model E9U).

The TS3310 Tape Library now incorporates the new IBM LTO Ultrium 6 full-high 8 Gbps dual-port Fibre Channel tape drives feature (#8342) to enhance drive performance over the previous generation IBM LTO Ultrium 5 Tape Drives with

a native data transfer rate of up to 160 MB/sec. Mixed Ultrium generations and attachment tape drive types are supported where drive space is available.

IBM new Ultrium 6 Fibre Channel tape drives are encryption capable. The TS3310 Tape Library incorporates IBM Multi-Path Architecture with logical libraries equal to the number of drives installed.

The TS3310 Tape Library supports the LTO Generation 6 media specification of an over double compressed capacity of up to 6.25 TB with 2.5 to 1 compression (up to 2.5 TB native capacity) compared to previous LTO 5 compressed capacity of up to 3.0 TB with 2:1 compression (up to 1.5 TB native capacity) per tape cartridge. IBM Ultrium 6 Tape Drives can read and write LTO Ultrium 6 and 5 Data Cartridges, and can read LTO Ultrium 4 Data Cartridges.

IBM Ultrium 6 enhancements that help improve performance and reliability include:

- LTO Generation 6 media specification native data transfer rate up to 160 MB/sec
- Support for LTO Generation 6 media specification tape cartridge compressed capacity of up to 6.25 TB with 2.5 to 1 compression per cartridge
- A larger 1 GB internal buffer
- Support for media partitioning and self-describing tape
- LTO Ultrium 6 encryption support

Also new to the TS3310 Tape Library, the IBM Tape System Reporter (TSR) enables administrators to gather usage statistics for multiple TS3500 and TS3310 libraries using a centralized Java-based server application. Administrators can generate custom reports on the health and utilization of tape cartridges, tape drives and tape libraries by querying the TSR database directly or using the optional Windows-based client.

An additional enhancement for the TS3310 Tape Library reduces the time required to obtain logs and update drive firmware for LTO Ultrium 5 and newer tape drives. With the web interface, users can transfer drive logs and drive firmware at very high speeds over an internal Ethernet interface. For tape drives in the base module TS3310 Model L5B, library-to-drive Ethernet cables feature (#6001) is required. For tape drives in the expansion module TS3310 Model E9U, an Ethernet Expansion Blade feature (#3470) is required.

Also, the IBM TS3310 Command Line Interface (CLI) program can now be used to access the TS3310 library from a CLI. This is in addition to the TS3310 web user interface.

The IBM System Storage TS3310 Tape Library is extremely modular with physical scalability varying from the 5U Model L5B base library to four additional Model E9U expansion units. This automated tape library is designed to provide:

- Space-efficient design with modular, stackable Model E9U Expansion Frame options providing growth, scalability, and flexibility
- IBM LTO Ultrium 6 Fibre Channel dual-port tape drive support and integration
- Support for LTO Ultrium 6 data and WORM tape cartridges
- Support for three encryption management methods:
 - Application managed, system managed, and library managed
 - System managed and library managed encryption is available through the Transparent LTO Encryption feature
- Support for media partitioning and self-describing tape with Linear Tape File System™ (LTFS) Library Edition and LTFS Storage Manager software
- Support for mixed generations of Ultrium tape drives and media
- Path failover, optional for both control paths and data paths
- Capacity on Demand growth options for its expansion modules
- Stand-alone library (up to 14U) or optional rack mounting in an industry-standard 19-inch rack

IBM System Storage TS3310 Tape Library Model L5B is a 5U base library unit, which contains the library control module, fixed tape cartridge storage of 35 slots, a configurable I/O station of 6 slots, a touchscreen display, cartridge handling robotics, and up to two LTO Ultrium 6, Ultrium 5, or Ultrium 4 Tape Drives.

IBM System Storage TS3310 Tape Library Model E9U is an optional 9U expansion module. Each E9U expansion module can accommodate up to four LTO Ultrium 6, Ultrium 5, or Ultrium 4 Tape Drives, additional storage slots, and a configurable I/O station of twelve slots. Up to four TS3310 E9U tape expansion modules can be added to the TS3310 Model L5B Tape Library, either at the time of purchase or as a follow-on upgrade to fill a full 41U rack. For configurations of 23U and above, the TS3310 Tape Library and expansion modules must be installed in a rack. Rack doors are required for any library that has more than 14 drives installed.

Key prerequisites

Appropriate levels of host software are required to attach the TS3310 Tape Library with IBM LTO Ultrium Tape Drives to selected IBM System Servers, HP-UX, Sun, UNIX™, Linux™, and Microsoft™ Windows™ servers.

A current list of supported open system configurations is available from the following website

<http://www-03.ibm.com/systems/support/storage/config/ssic>

In order to use the TS3310 Tape Library CLI, the following prerequisites apply:

- The TS3310 Tape Library must be at a firmware level 587G.GS003 (or higher)
- Java™ 5.0, or later, must be installed

Planned availability date

December 7, 2012

Description

The IBM System Storage TS3310 Tape Library is highly modular with physical scalability varying from the base library 5U control module to additional expansion units of 9U height each. This automated tape library is designed to provide:

- A space-efficient design with modular, stackable growth options, as well as capacity on demand growth options.
- 8 Gbps switched fabric Fibre Channel IBM Ultrium 6 Tape Drives.
- Support for three encryption management methods: Application Managed, System Managed, and Library Managed; System Managed and Library Managed Encryption management is available through the Transparent LTO Encryption feature.
- Support for media partitioning and self-describing tape with LTFS Library Edition and LTFS Storage Manager software.
- IBM patented Multi-Path Architecture with logical library support for single or multiserver attachment of homogeneous or heterogeneous systems or applications.
- Optional path failover for both control paths and data paths.
- Capacity on Demand growth options in its expansion modules.
- Local user interface support with a color touchscreen.
- Stand-alone free-standing library or optional rack mounting in an industry-standard 19-inch rack.

The TS3310 Tape Library is an excellent choice, if you are:

- Experiencing growth in online storage requirements
- Considering a tape automation solution for your data storage needs
- Considering an Ultrium tape solution
- Requiring an encryption secured tape solution
- Needing cartridge formatting capabilities such as LTF5 partitioning

IBM System Storage TS3310 Tape Library is designed to offer high performance and capacity to help address the heavy demands of tape storage. The TS3310 Tape Library is highly modular with scalability varying from the base library 5U control module to additional expansion units of 9U height each. This automated tape library incorporates high-performance IBM LTO Ultrium Tape Drives for the midrange to enterprise open systems environment. The LTO Generation 6 media specification tape cartridge physical capacity is up to 6.25 TB compressed physical capacity, more than double the Ultrium 5 Data Cartridge, and drive performance is up to 160 MB/second native data transfer rate with the IBM LTO Ultrium 6 Tape Drives. IBM LTO Ultrium 6 Tape Drives can read and write original LTO Ultrium 6 and 5 data cartridges, and read LTO Ultrium 4 data cartridges. The LTO Ultrium 6 Tape Drives in the TS3310 Tape Library also support LTO Ultrium 6 and 5 WORM cartridges.

IBM System Storage TS3310 Tape Library Model L5B

IBM System Storage TS3310 Tape Library Model L5B is the 5U base library unit which contains the library control module, fixed tape cartridge storage of up to 35 slots, a configurable I/O station of up to 6 slots, a touchscreen display, cartridge handling robotics, and up to two LTO Ultrium 6, Ultrium 5, or Ultrium 4 Tape Drives.

IBM System Storage TS3310 Tape Library Model E9U

IBM System Storage TS3310 Tape Library Model E9U is an optional 9U expansion module that can be stacked on top of or below a base TS3310 L5B Tape Library. Each E9U expansion module can accommodate up to four LTO Ultrium 6, Ultrium 5, or Ultrium 4 drives, additional tape cartridge slots, and a configurable I/O station of 12 slots. Feature #1640, ordered against the Model L5B Tape Library, is a license key that enables the Model E9U Expansion Library to access the remaining half of the cartridge slots and approximately half of the cartridge slots in the next Model E9U Expansion Library.

You can tailor the TS3310 Tape Library to match system physical capacity and performance needs in the base TS3310 L5B and with each TS3310 E9U expansion module, using up to two IBM LTO Ultrium Tape Drives in the TS3310 L5B Base Library and up to four Ultrium Tape Drives in each TS3310 E9U tape module. This is designed to provide enhanced functions, such as fast transfer of data, simultaneous backup, concurrent read/write operations, and high fault tolerance.

TS3310 Tape Library models support LTO Ultrium 6 Tape Drives with 8 Gbps dual-port Fibre Channel for connection to a selected wide spectrum of open system servers.

In addition to LTO Ultrium 6 drive features, the TS3310 is designed to provide:

- Ultrium 6 media and Ultrium 6 WORM media support
- IBM Multi-Path Architecture for single or multiserver attachment of homogeneous or heterogeneous systems or applications
- Optional path failover function for both control paths and data paths
- Standard bar code reader and remote management unit
- Capacity on Demand expansion units
- Support for a local user interface with a color touchscreen
- Free-standing library or optional rack mounting in an industry-standard 19-inch rack

- Support for three encryption management methods: Application managed, system managed, and library managed (system managed and library managed encryption is available through the Transparent LTO Encryption feature)
- Support of cartridge formatting, partitioning, and management like IBM LTFS Library Edition and IBM LTFS Storage Manager
- Support for Ethernet connections between the library and each LTO Ultrium 5 or newer tape drive for reducing the time required to obtain logs and update drive firmware

The TS3310 Tape Library is suitable for use in network attached storage implementations, such as backups and mass storage archives where multi-terabyte capacities are required. Storage and tape management for the TS3310 is provided by software, such as Tivoli® Storage Manager and other compatible software offerings.

The TS3310 is designed for stand-alone operation, but an optional rack-mounting kit allows installation into an ANSI/EIA standard 19-inch rack. If you require extra redundancy in your storage operations, an additional DC power supply option is available. A Remote Manager Unit is designed to allow network control of the TS3310 Tape Library operations.

The IBM LTO Ultrium 6 Tape Drive supports the LTO Generation 6 media specification 2.5 TB Data Cartridge, designed for increased tape speeds and high-density data recording.

Ultrium 6 Tape Drives

The TS3310 Tape Library supports the IBM LTO Ultrium 6 Tape Drive. The IBM LTO 6 Tape Drive is the sixth-generation LTO Ultrium tape drive in the IBM System Storage LTO Ultrium family of products. Ultrium 6 Tape Drives and LTO 6 cartridges can be resident in the same TS3310 Tape Library with Ultrium 5 and 4 tape drives and with Ultrium 5 and Ultrium 4 data cartridges. The Ultrium 6 Tape Drive offers the following significant improvements over the Ultrium 5 Tape Drive:

- **Increased performance:** Maximum tape drive throughput native data rate performance is up to 160 MB/sec. Data tracks are written 16 at a time. IBM LTO 6 Tape Drives can read and write LTO Ultrium 5 Data Cartridges at Ultrium 5 capacities and rates, and read LTO Ultrium 4 Data Cartridges at Ultrium 4 capacities and rates.

Note: Although the Ultrium 6 Tape Drive provides the capability for excellent tape performance, other components of the system may limit the actual performance achieved. Also, although the compression technology used in the tape drive can typically double the amount of data that can be stored on the media, the actual degree of compression achieved is highly sensitive to the characteristics of the data being compressed.
- **Increased tape cartridge capacity:** The TS3310 Tape Library supports the LTO Generation 6 media specification tape cartridge physical capacity is up to 6.25 TB compressed physical capacity, more than double that of the Ultrium 5 Data Cartridge. This is achieved by increasing the linear density, track density, and the media length. The IBM Ultrium 6 tape itself is an advanced Barium Ferrite tape developed to help provide durability and capacity.
- **Encryption:** The IBM System Storage TS3310 Tape Library will support data encryption on the base Ultrium 6, Ultrium 5, or Ultrium 4 drive with Ultrium 6, Ultrium 5, or Ultrium 4 media, meeting LTO Generation 6 media specification and Application Managed Encryption. System Managed and Library Managed Encryption are supported with the Transparent LTO Encryption feature (feature #5900). IBM Tivoli Key Lifecycle Manager v1 (TKLM) is required with this feature.
- **Attachment options:** The Ultrium 6 Tape Drive comes with 8 Gbps Fibre Channel attachments for connection to a wide spectrum of open system servers. The dual-ported IBM LTO Ultrium 6 Fibre Channel Tape Drive comes with two LC Duplex connectors.
- **WORM media support:** IBM 3589 LTO 6 WORM Tape Cartridges are designed for archiving and data retention applications, as well as those applications requiring an audit trail and support LTO Generation 6 media specification

compressed capacity of up to 6.25 TB. These cartridges work with the IBM LTO Ultrium 6 Tape Drive to help prevent the alteration or deletion of user data. IBM LTO 6 WORM Tape Cartridges can be ordered as unique 3589 models with the following features:

- Prelabeling with the ability to specify a starting volume serial number and color coding
- Packaging in individual jewel cases or in bulk
- Cartridge memory built into every cartridge to enhance functionality and media reliability by storing access history and media performance information for use by the tape drive every time the cartridge is accessed
- Half-inch Barium Ferrite tape with a 6.25 TB WORM compressed capacity in a single cartridge
- **Larger internal data buffer:** There is a 1 GB internal data buffer in the Ultrium 6 Tape Drive, compared to 512 MB for Ultrium 5.
- **Digital speed matching:** The Ultrium 6 Tape Drive is designed to perform dynamic speed matching (at one of fourteen speeds: 160.0, 150.8, 141.5, 132.3, 123.1, 113.8, 104.6, 95.4, 86.2, 76.9, 67.7, 58.5, 49.2 or 40.0 MB/s) to adjust the drive's native data rate as closely as possible to the net host data rate (after data compressibility has been factored out). This helps reduce the number of backhitch repositions and improve throughput performance. Speed matching on Ultrium 6 ranges from 40 to 160 MB/sec versus 40 to 140 MB/sec on Ultrium 5.
- **Giant Magneto Resistive (GMR) head design:** Use of flat lap head technology in GMR heads from the Enterprise Tape Drives for Ultrium 6 helps minimize contact, edge damage, debris accumulation, and wear on the tape as it moves over the read/write heads.
- **Dual-stage 16-channel head actuator:** The actuator is designed to provide precision head alignment to help support higher track density and improved data integrity. Track following skew actuator supports flangeless tape guide rollers and dynamic skew to enable the head to follow skew tape motion and improve linear actuation.
- **Power management:** The Ultrium 6 Tape Drive power management function is designed to control the drive electronics to be either completely turned off or in a low-power mode when the circuit functions are not needed for drive operation. Improvements specifically in idle mode are improved over Ultrium 5.

Proven IBM LTO Ultrium features enhanced in the IBM LTO Ultrium 6 Tape Drive include:

- **Independent tape loader, threader motors, and positive pin retention:** These are designed to help improve the reliability of loading and unloading a cartridge, and to retain the pin even if tension is dropped. An independent loader motor, coupled with the positive pin retention, is designed to cause the tape to thread with a higher level of reliability.
- **Graceful dynamic braking:** In the event of a power failure, reel motors are designed to maintain tension and gradually decelerate instead of stopping abruptly, helping reduce tape breakage, stretching, or loose tape wraps during a sudden power outage.
- **Servo and track layout technology:** There are 2,176 data tracks in Ultrium 6 versus 1,280 data tracks in Ultrium 5. The high-bandwidth servo system features a low-mass servo to help more effectively track servo bands and improve data throughput with damaged media in less-than-optimal shock and vibration environments.
- **Surface Control Guiding Mechanism:** The Surface Control Guiding Mechanism patented by IBM is designed to guide the tape along the tape path in the Ultrium 6, 5, and 4 Tape Drives. This method uses the surface of the tape, rather than the edges, to control tape motion. This helps reduce tape damage (especially to the edges of the tape) and tape debris, which comes from the damaged edges and can accumulate in the head area.
- **Robust drive components optimized for automation environments:** Using some of the most robust components available, such as all metal clutch, steel ball bearings in loader, robust leader block design, and single circuit card, these Ultrium features help to enhance reliability and prolong the life of drives.

- **Adaptive read equalization:** This feature is designed to automatically compensate for dynamic changes in readback signal response.
- **Dynamic amplitude asymmetry compensation:** This is designed to optimize readback signals for linear readback response from MR read head transducers.
- **Separate writing of multiple filemarks:** Separate writing of multiple filemarks is designed to cause any write command of two or more filemarks to cause a separate data set to be written containing all filemarks after the first. This feature helps improve performance if a subsequent append overwrites somewhere after the first filemark. A write of multiple filemarks typically indicates a point where an append operation might occur after the first of these filemarks and this change helps prevent having to rewrite datasets containing customer data and the first filemark, if such an append occurs.
- **LTO Data Compression (LTO-DC):** The Ultrium 6 uses LTO-DC which is an implementation of a Lempel-Ziv class 1 (LZ-1) data compression algorithm. LTO-DC is an extension of Adaptive Lossless Data Compression (ALDC) and an improvement over previous IBM lossless compression algorithms. IBM patented "Scheme-Swapping" compression is designed to look ahead at incoming data and determine the most efficient storage method (either ALDC or pass-thru mode) to help provide optimal data compression and increase data throughput. The compression ratio for LTO Ultrium 6 is 2.5 to 1.
- **LTO Cartridge Memory (LTO-CM):** Contained within the LTO Ultrium data cartridge is the LTO-CM, which is a passive, contactless silicon storage device that is physically a part of the cartridge. The LTO-CM is designed to hold information about that specific cartridge, the media in the cartridge, and the data on the media. The storage capacity of the Generation 6 LTO-CM is 16320 bytes, double capacity of Generation 5 and 4 LTO-CM 8160 bytes. Communication between the drive and the LTO-CM is via a low-level radio frequency field transmitted by the drive to the cartridge.
- **Statistical Analysis and Reporting System (SARS):** The Ultrium 6 Tape Drive uses SARS to help isolate failures between media and hardware. SARS uses the cartridge performance history saved in the CM module and the drive performance history kept in the drive flash EEPROM to help determine the most likely cause of failure. SARS is designed to cause the drive to request a cleaner tape, to mark the media as degraded, and to indicate that the hardware has degraded.
- **Highly integrated electronics using IBM-engineered copper technology:** This technology is designed to reduce the total number of components in the drive, help lower chip temperatures, and reduce power requirements, helping to provide for a more reliable drive. The sixth-generation drive electronics are designed to provide error correction of soft errors in the memory arrays in data and control paths.

Multi-Path support

The Multi-Path architecture of the TS3310 Tape Library supports sharing of the library robotics. This is accomplished by partitioning the library into multiple logical libraries, and providing each logical library its own separate and distinct drives, storage slots, and control paths. You can partition the library into as many logical libraries as there are drives in the library. Each logical library must contain at least one drive.

Note: This type of partitioning is designed to allow heterogeneous applications to share the library robotics independent of each other. Cartridges under library control are not shared between logical libraries, nor allowed to be moved between logical libraries. An example of heterogeneous sharing is a Microsoft Windows application using the drive and storage slots of one logical library while a UNIX application uses the drive and slots of another logical library.

Path failover

The TS3310 Tape Library may use the optional path failover feature to help enhance availability. This optional feature is designed to provide automatic control path failover to a preconfigured redundant control path in the event of a loss of a host adapter or control path drive, without aborting the current job in progress. Support is provided under selected operating systems when the IBM tape device driver is used. Path Failover not supported by IBM System i® or IBM i.

Data path failover and load balancing supports native Fibre Channel Ultrium 4, 5, and 6 Tape Drives in the TS3310 Tape Library using the IBM tape device driver for IBM System p®, Linux, Solaris, and Windows. Data path failover is designed to provide a failover mechanism in the IBM device driver to enable configuration of multiple redundant paths in a SAN environment. In the event of a path or component failure, the failover mechanism is designed to automatically provide error recovery to retry the current operation using an alternate, preconfigured path without aborting the current job in progress. This helps allow flexibility in SAN configuration, availability, and management.

When accessing a tape drive device that has been configured with alternate pathing across multiple host ports, the IBM device driver is designed to automatically select a path through the host bus adapter (HBA) that has the fewest open tape devices, and assign that path to the application. This autonomic self-optimizing capability is called load balancing. Dynamic load balancing support is designed to optimize resources for devices that have physical connections to multiple HBAs in the same machine. The device driver is designed to dynamically track the usage on each HBA as applications open and close devices, and balance the number of applications using each HBA in the machine. This may help optimize HBA resources and improve overall performance. Further, data path failover is designed to provide autonomic self-healing capabilities similar to control path failover, and is designed to failover to an alternate data path in the event of a failure in the primary host-side path. Data path failover and load balancing for Ultrium Tape Drives requires the optional path failover feature.

Capacity on Demand

The Capacity Expansion feature (#1640), ordered against the TS3310 Model L5B base library, allows a user to enable the unused storage slots within an expansion library via a firmware license key.

I/O station features

The I/O station can be defined as I/O slots or data storage, and the definition affects the number of cartridges available for data storage. Refer to the table below for the various combinations and resulting data capacities.

Library configuration	Available storage slots	Available I/O slots	Total available slots
L5B	35	6	41
L5B + E9U without Capacity on Demand (COD) Feature	76,70* or 64*	6,12* or 18*	82
L5B + E9U w/1 COD Feature	127,121*, or 115*	6,12*, or 18*	133
L5B + E9U + E9U w/1 COD Feature	168*,162*,156*, 150*, or 144*	6,12*,18*,24*, or 30*	174
L5B + E9U + E9U w/2 COD Features	219,213*,207*, 201*, or 195*	6,12*,18*,24*, or 30*	225
L5B + E9U + E9U + E9U w/2 COD Features	258*,252*,246*, 240*,234*,228*, or 222*	6,12*,18*,24*, 30*,36*, or 42*	264
L5B + E9U + E9U + E9U w/3 COD Features	311,305*,299*,293*, 287*,281*, or 275*	6,12*,18*,24*, 30*,36*, or 42*	317
L5B + E9U + E9U + E9U + E9U w/3 COD Features	350,344*,338*,332*, 326*,320*,314*,308*, or 302*	6,12*,18*,24*, 30*,36*,42*,48*, or 54*	356
L5B + E9U + E9U + E9U	403*,397*,391*,385*,	6,12*,18*,24*,	409

+ E9U w/4 COD Features 379*,373*,367*,361*, 30*,36*,42*,48*,
or 355* or 54*

Note: The E9U I/O station contains 12 slots, which can be configured as either I/O or storage slots. If the E9U I/O slots are configured as I/O, the L5B I/O slots can only be configured as storage slots.

Ethernet expansion blade

An additional enhancement for the TS3310 Tape Library reduces the time required to obtain logs and update drive firmware for LTO Ultrium 5 and newer tape drives. The web user interface enables transfer of drive logs and drive firmware at very high speeds over an internal Ethernet interface. For tape drives in the base module TS3310 Model L5B, library-to-drive Ethernet cables are required. For tape drives in each expansion module TS3310 Model E9U, an Ethernet Expansion Blade is required.

IBM TS3310 CLI

The IBM TS3310 CLI program can be used to access the TS3310 library from a CLI. This is in addition to the TS3310s web user interface. To get the CLI visit

[https://www-304.ibm.com/support/docview.wss?
mynp=OCSTCXRHW&mync=E&uid=ssg1S4000981&mys=s034](https://www-304.ibm.com/support/docview.wss?mynp=OCSTCXRHW&mync=E&uid=ssg1S4000981&mys=s034)

IBM Tape System Reporter (TSR)

IBM TSR enables administrators to gather usage statistics for multiple TS3500 and TS3310 libraries using a centralized Java-based server application. Administrators can then generate custom reports on the health and utilization of tape cartridges, tape drives, and tape libraries by querying the TSR database directly or using the optional Windows-based client.

Accessibility by people with disabilities

A US Section 508 Voluntary Product Accessibility Template (VPAT) containing details on accessibility compliance can be requested at

http://www.ibm.com/able/product_accessibility/index.html

Product positioning

As you compare competitive tape solutions, consider:

- Library scalability with the number of expansion module units with multiple drives and cartridge slots within a single vertical rack
- Capacity and performance requirements
- Data integrity, reliability, and availability
- Data security and encryption
- Data partitioning, formatting, and management like LTFS
- Storage usage and application requirements
- Affordability
- Loyalty to legacy or existing tape formats

The TS3310 Tape Library and outstanding software applications from IBM excel in addressing these requirements, creating functionally rich tape storage solution incorporating LTO Ultrium tape technology. You will gain the flexibility of automated tape library management with unattended save and restore operations.

TS3310 Tape Library models are an excellent choice for tape automation for selected IBM and other popular open systems. The TS3310 utilizes Multi-Path Architecture, designed to allow homogeneous or heterogeneous open systems servers to share the library robotics.

The TS3310 Tape Library offers excellent price and performance in small-to-medium business open systems environments where the tape automation requirements are satisfied by an expanding scalable modular design structure.

The TS3310 Tape Library is suitable for use in network-attached storage implementations, such as backups and mass storage archives where multi-terabyte capacities are required.

The TS3310 is part of a family of IBM System Storage LTO Ultrium tape products and can be the answer to growing storage requirements and shrinking backup and archive windows.

The TS3310 Tape Library delivers an excellent tape storage solution for customers with existing digital linear tape experience or requiring high-performance automated tape backup. The TS3310 Tape Library provides an excellent functional alternative to DLT/SDLT, 1/4 in, 4 mm, 8 mm/AIT, IBM Magstar® MP 3570, or older LTO generation tape drives. You can tailor the TS3310 library to match your system capacity and performance needs.

For capacity requirements greater than that provided by the TS3310 Tape Library, the IBM System Storage TS3500 Tape Library should be considered.

For capacity requirements with an entry-level automation need, the IBM System Storage TS3200 Tape Library should be considered with its one to four IBM LTO Ultrium Tape Drives and 48-cartridge capacity, or the IBM System Storage TS3100 Tape Library with its one to two IBM LTO Ultrium Tape Drives and 24-cartridge capacity.

For a single drive solution, the IBM System Storage TS2900 Tape Autoloader, or TS2260, or TS2360 External Tape Drives should be considered.

For high duty-cycle and start/stop intensive tape applications, with mission-critical data protection and high-capacity requirements, consider the IBM System Storage TS1130 or TS1140 Tape Drive with the IBM System Storage TS3500 Tape Library.

Statement of general direction

IBM intends to introduce tape cartridge media meeting the LTO Generation 6 media specifications.

IBM's statements regarding its plans, directions, and intent are subject to change or withdrawal without notice at IBM's sole discretion. Information regarding potential future products is intended to outline our general product direction and it should not be relied on in making a purchasing decision. The information mentioned regarding potential future products is not a commitment, promise, or legal obligation to deliver any material, code, or functionality. Information about potential future products may not be incorporated into any contract. The development, release, and timing of any future features or functionality described for our products remains at our sole discretion.

Reference information

For IBM statement on compliance with European Union Directive on Restriction of the use of certain Hazardous Substances in Electrical and Electronic Equipment (2002/95/EC) ("RoHS"), visit:

<http://www.ibm.com/ibm/environment/products/rohs.shtml>

Product number

Description	Machine type	Model	Feature
Ethernet Expansion Blade	3576	E9U	3470
Two Lib-to-Drv Ethernet Cables	3576	L5B	6001
Ultrium 6 Fibre Tape Drive	3576	E9U	8342
Ultrium 6 Fibre Tape Drive	3576	L5B	8342

All geographies except EMEA use the combined machine type/model number as the ordering number

Business Partner information

If you are a Direct Reseller - System Reseller acquiring products from IBM , you may link directly to Business Partner information for this announcement. A PartnerWorld® ID and password are required (use IBM ID).

<https://www.ibm.com/partnerworld/mem/sla.jsp?num=112-163>

Education support

IBM Global Services, IT Education Services, supports many IBM offerings Visit

<http://www.ibm.com/training/us>

Questions? Contact 800-IBM-TEACH (426-8322)

Publications

The following publications are shipped with the products. Additional copies will be available by December 2012.

Title	Order number
IBM System Storage TS3310 Tape Library Setup and Operator Guide	GA32-0477
IBM System Storage TS3310 Tape Library Maintenance Information for IBM Service Personnel	GA32-0478
IBM System Storage TS3310 Tape Library Hardware Installation Quick Reference	GA32-0592
IBM Tape Device Drivers Installation and User's Guide	GC27-2130

The IBM Systems Information Center provides you with a single information center where you can access product documentation for IBM systems hardware, operating systems, and server software. Through a consistent framework, you can efficiently find information and personalize your access. The IBM Systems Information Center is at

<http://publib14.boulder.ibm.com/infocenter/systems>

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Technical information

Specified operating environment

Physical specifications

3576-L5B:

- Width: 443.2 mm (17.45 in)
- Depth: 801.4 mm (31.55 in)
- Height: 219.7 mm (8.65 in)
- Weight: 38.6 kg (85 lb) maximum configuration (two drives, two power supplies)

3576-L5B plus E9U:

- Width: 443.2 mm (17.45 in)
- Depth: 801.4 mm (31.55 in)
- Height: 620.8 mm (24.44 in)
- Weight: 88.5 kg (195 lb) maximum configuration (six drives, four power supplies)

To assure installability and serviceability in non-IBM industry-standard racks, review the installation planning information for any product-specific installation requirements.

Operating environment

Models L5B and E9U

- Temperature: 10° to 38° C (50° to 100° F)
- Relative humidity: 20% to 80%
- Wet bulb (caloric value): 26° C, 79° F
- Electrical power: 0.2 kVA
- Capacity of exhaust: 54 cfm for 5U, 148 cfm for 9U
- Caloric Value: 0.68 kBTU/hr
- Sound Power Level (LwAd): 6.2 Bels idle, 6.7 Bels operating
- Leakage current: 0.75 mA at 212 Vac per power supply

Hardware requirements

The TS3310 Tape Library can be attached to a selected wide spectrum of IBM System Servers and open system servers that support those interface specifications. A current list of supported open system configurations is available from the following website

<http://www-03.ibm.com/systems/support/storage/config/ssic>

The TS3310 Model L5B initially comes with the capability to access up to 35 cartridge slots. Each Model E9U has approximately half of its storage slots enabled by default. The capability to access the remaining cartridge slots of an attached Model E9U requires the addition of the Capacity Expansion feature (#1640).

Each model comes with one power supply, and an additional power supply can be added with Additional Power Supply feature (#1900).

In the Model L5B plus Model E9U configuration, if a second power supply is added to one model, it is recommended that it be added to both models. If ordered as an MES, feature #1900 will come with a power cord based on the original order. If the Additional Power Supply feature #1900 is ordered, then two power cords will be supplied based on the power cord feature ordered.

Path failover

This optional feature is designed to provide automatic control path failover and data path failover for tape drives in the TS3310 Tape Library. Path Failover not supported by IBM System i or IBM i. The data path failover is designed to provide a failover mechanism for configuring multiple redundant paths in selected SAN environments. This capability is ordered with the Path Failover feature (#1682).

Ethernet expansion blade

An additional enhancement for the TS3310 Tape Library reduces the time required to obtain logs and update drive firmware for LTO Ultrium 5 and newer tape drives. The web user interface enables transfer of drive logs and drive firmware at very high speeds over an internal Ethernet interface. For tape drives in the base module TS3310 Model L5B, library-to-drive Ethernet cables are required. For tape drives in the expansion module TS3310 Model E9U, an Ethernet Expansion Blade is required.

Ultrium 6 Tape Drives

At least one IBM LTO Ultrium 6 Tape Drive can be ordered with each TS3310 Tape Library. The TS3310 L5B can have one or two tape drives, and the TS3310 E9U can have up to four additional tape drives. A Fibre Channel Ultrium 6 tape drive can be ordered with feature #8342 (LTO Ultrium 6 Fibre Tape Drive - 8 Gbps) to install one IBM LTO Ultrium 6 Tape Drive with a dual-port 8 Gbps Fibre Channel attachment interface.

Using the 1-Cleaning Cartridge feature (#8002), additional cleaning cartridges for the tape drives can be ordered with a new TS3310 Tape Library.

Cables and interposers

A Fibre Channel cable is required to attach the TS3310 Tape Library to the server HBA with the Ultrium 6 Tape Drive. Customers are responsible for selecting and ordering the correct cables and interposers to match the IBM LTO Ultrium 6 Fibre Channel interface and the server or network controller Fibre Channel interface.

Fibre Channel cables: A Fibre Channel cable is required to attach a TS3310 Tape Library with the LTO Ultrium 6 Fibre Tape Drive (8Gb) feature (#8342) to host Fibre Channel adapters, Fibre Channel switches, or other Fibre Channel components. At least one Fibre Channel cable is recommended to be specified on the initial plant order for feature #8342. The IBM LTO Ultrium 6 Fibre Tape Drive comes with an LC Duplex connector. Features available for Fibre Channel cables, and their respective lengths, are as follows:

- #6013 - 13 meters LC-LC Fibre Channel Cable
- #6025 - 25 meters LC-LC Fibre Channel Cable

An interposer may be required to connect a fibre cable with LC Duplex connectors to another SC Duplex connector. Feature #5096 - Interposer SC-LC Fibre is available.

Refer to the *Specify or Special Features* section of the Sales Manual for a detailed description of the above features.

Software requirements

For a current list of host software versions and release levels that support the TS3310, refer to the following website

- <http://www-03.ibm.com/systems/support/storage/config/ssic>

Tivoli Storage Manager and other compatible software offerings provide storage and tape management software for the 3576 or TS3310 family of products. Supporting software and applications must be obtained separately from IBM, IBM Business Partners, or independent software vendors (ISVs). A list of compatible software is available from your IBM representative or visit

<http://www-03.ibm.com/systems/storage/tape/library.html#compatibility>

Select "Compatibility Information", then "Independent Software Vendor Matrix (ISV) for LTO and 3592 Tape Drive" to view supported operating systems.

IBM continues to work together with the ISVs to support the TS3310 Tape Library. Individual application vendors should be contacted for specific information and availability dates.

Note: All new IBM tape device drivers will be posted to the web through the Fix Central download portal. IBM maintains the latest levels of System Storage tape drive and library device drivers and documentation on the Internet. Utilize the Fix Central download portal by accessing the following website

<http://www.ibm.com/support/fixcentral>

There are a few pull down menus to navigate to the correct download as follows:

1. In the first pull down menu labeled "Product Group", select " System Storage ".
2. In the next pull down menu that appears which is labeled "Product Family", select "Tape Systems".
3. With the next pull down menu, "Product Type", select "Tape drivers and software".
4. This will bring up the "Product" menu, which provides selections for "Platform drivers, Tools, or Software".

5. Under "Platform drivers", in order to download your driver, select the correct operating system.
6. Two more pull down menus will appear with information. Click "Continue".
7. The next screen can be used to narrow the search, however just click "Continue" to view what is available.

The IBM Tape Device Drivers Installation and User's Guide can be found at the following website

<http://www-01.ibm.com/support/docview.wss?rs=577&uid=ssg1S7002972>

Compatibility

The IBM Ultrium 6 Tape Drives can read and write LTO 6 or 5 Data Cartridges, and can read LTO Ultrium 4 Data Cartridges. The LTO Generation 6 media specification 2.5 TB native data cartridges can only be used on the new IBM LTO Ultrium 6 Tape Drives.

Limitations

Fibre Channel cable lengths are limited to 500 m (1,650 ft).

The TS3310 operating environment must not conflict with media operating and storage requirements. If media is stored in the TS3310 for more than ten hours, the media storage temperature must be met.

For LTO Ultrium 6 and 5, the IBM Tivoli Key Lifecycle Manager V1.0 or V2.0 is required for enabling System Managed and Library Managed Encryption.

For configurations of 23U and above, the TS3310 Tape Library and expansion modules must be installed in a rack. Rack doors are required for any library that has more than 14 drives installed.

Path Failover not supported by IBM System i or IBM i.

Planning information

Customer responsibilities

Physical planning is a customer responsibility. Detailed planning information is in the *IBM System Storage TS3310 Tape Library Setup and Operator Guide (GA32-0477)*. The TS3310 Tape Library is designated as a customer setup unit (CSU). It is the customer's responsibility to install the unit.

Customers are responsible for obtaining the appropriate Fibre Channel adapters, cables, and interposers (if required) for system attachment. Customers are also responsible for ordering media. For optimum performance, the customer must obtain the latest level of firmware prior to installing the unit. Customers can download the latest level of firmware from the LTO website

<http://www.ibm.com/servers/storage/tape/lto>

You are responsible for downloading or obtaining from IBM , and installing designated Machine Code (microcode, basic input/output system code (called "BIOS"), utility programs, device drivers, and diagnostics delivered with an IBM machine) and other software updates in a timely manner from an IBM Internet website or from other electronic media, and following the instructions that IBM provides. You may request IBM to install Machine Code changes; however, you may be charged for that service.

Cable orders

Cables are required to attach tape drives in the TS3310 Tape Library to each server connection (up to the number of tape drives installed).

An interposer may also be required for attachment to various server adapters. One or more of the following Fibre Channel cables should be specified on the TS3310.

Fibre Channel cables: A Fibre Channel cable is required to attach a TS3310 Tape Library with the Ultrium 6 Fibre Drive feature (#8342) to host Fibre Channel adapters, Fibre Channel switches, or other Fibre Channel components. At least one Fibre Channel cable should be specified on the initial plant order. The IBM LTO Ultrium 6 Fibre Tape Drive (#8342) comes with an LC Duplex connector.

Features available for Fibre Channel cables, and their respective lengths, are as follows:

- #6013 - 13 meters LC-LC Fibre Channel Cable
- #6025 - 25 meters LC-LC Fibre Channel Cable

An interposer may be required to connect a Fibre cable with LC Duplex connectors to another SC Duplex connector. Feature #5096 - Interposer SC-LC Fibre is available.

An additional enhancement for the TS3310 Tape Library reduces the time required to obtain logs and update drive firmware for LTO Ultrium 5 and newer tape drives. The web user interface enables the transfer of drive logs and drive firmware at very high speeds over an internal Ethernet interface. For tape drives in the base module TS3310 Model L5B, library-to-drive Ethernet cables are required. For tape drives in each expansion module TS3310 Model E9U, an Ethernet Expansion Blade is required.

Refer to the *Specify or Special Features* section of the Sales Manual for a detailed description of the above features.

Installability

Installation time for the TS3310 Tape Library Model L5B, when rack-mounted, is approximately 8 to 10 hours, and is approximately 6 to 8 hours for non-rack-mounted models. Installation time for each tape drive installed in the TS3310 Tape Library is approximately one hour. Refer to the *IBM System Storage TS3310 Tape Library Setup and Operator Guide* (GA32-0477) for installation instructions.

Supplies

For users and remarketers

IBM TS3310 Tape Library supports the LTO Generation 6 media specification of a more than double compressed capacity of 6.25 TB with 2.5 to 1 compression (2.5 TB native capacity) compared to previous LTO 5 compressed capacity of 3.0 TB with 2:1 compression (1.5 TB native capacity) per tape cartridge. The IBM LTO Cleaning Cartridge, for use with IBM LTO Ultrium 6 tape drives, can be purchased through the dealers around the world.

IBM TS3310 Tape Library supplies can be ordered directly through AAS using machine type 3589.

IBM TS3310 Tape Library supplies can be also purchased through Priority Fulfillment Services and its distribution channel in North America, Latin America, and Asia Pacific. These TS3310 Tape Library supplies can be purchased through Forex Telegistics BV and its distribution channel in Europe, the Middle East, and Africa.

For information about Priority Fulfillment Services distribution channels, call 1-888-IBM Media in the US and Canada or visit

<http://www.ibm.com/storage/media>

Security, auditability, and control

This product uses the security and auditability features of host hardware, host software, and application software.

The customer is responsible for evaluation, selection, and implementation of security features, administrative procedures, and appropriate controls in application systems and communications facilities.

IBM Electronic Services

IBM has transformed its delivery of hardware and software support services to help you achieve higher system availability. Electronic Services is a Web-enabled solution that offers an exclusive, no-additional-charge enhancement to the service and support available for IBM servers. These services are designed to provide the opportunity for greater system availability with faster problem resolution and preemptive monitoring. Electronic Services comprises two separate, but complementary, elements: Electronic Services news page and Electronic Services Agent.

The Electronic Services news page is a single Internet entry point that replaces the multiple entry points traditionally used to access IBM Internet services and support. The news page enables you to gain easier access to IBM resources for assistance in resolving technical problems.

The Electronic Service Agent™ is no-additional-charge software that resides on your server. It monitors events and transmits system inventory information to IBM on a periodic, client-defined timetable. The Electronic Service Agent automatically reports hardware problems to IBM. Early knowledge about potential problems enables IBM to deliver proactive service that may result in higher system availability and performance. In addition, information collected through the Service Agent is made available to IBM service support representatives when they help answer your questions or diagnose problems. Installation and use of IBM Electronic Service Agent for problem reporting enables IBM to provide better support and service for your IBM server.

To learn how Electronic Services can work for you, visit

<http://www.ibm.com/support/electronic>

Terms and conditions

MES discount applicable

No

Field installable feature

Yes

Warranty period

One year

An IBM part or feature installed during the initial installation of an IBM machine is subject to a full warranty effective on the date of installation of the machine. An IBM part or feature that replaces a previously installed part or feature assumes the remainder of the warranty period for the replaced part or feature. An IBM part or feature added to a machine without replacing a previously installed part or feature is subject to a full warranty effective on its date of installation. Unless specified otherwise, the warranty period, type of warranty service, and service level of a part or feature are the same as those for the machine in which it is installed.

Customer setup

Yes

Machine code

No license terms apply

Pricing

Description	Machine type	Model	Feature number	Field install only	Plant install only
Ethernet Expansion Blade	3576	E9U	3470	N	N
Two Lib-to-Drv Ethernet Cables	3576	L5B	6001	N	N
Ultrium 6 Fibre Tape Drive	3576	L5B, E9U	8342	N	N

For current prices visit

<http://www-03.ibm.com/systems/>

You may also contact us at 1-888-Shop-IBM.

Pricing terms

Prices in the following PDF prices link are suggested list prices on day of announcement for the U.S. only. They are provided for your information only. Dealer prices may vary, and prices may also vary by country. IBM list price does not include tax or shipping and is subject to change without notice.

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