

IBM System Storage TS1040 Tape Drive provides an Ultrium 4 Tape Drive for the TS3500 Tape Library

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At a glance

The IBM System Storage TS1040 is an IBM LTO Ultrium 4 Tape Drive that combines IBM tape reliability and performance at open systems prices. The new Ultrium 4 Tape Drive:

- Increases maximum data transfer rate, providing to up to 120 MB/sec native as compared to LTO Ultrium 3
- Provides up to 800 GB native physical capacity per cartridge (1,600 GB with 2:1 compression) with Ultrium 4 800 GB cartridge
- Includes a 4-Gbps Fibre Channel interface attachment
- Supports encryption capabilities designed to work with the IBM Encryption Key Manager Component
- · Adheres to LTO specifications
- Mounts in TS3500 Tape Library Model L53 or D53, and in 3584 Tape Library Model L52, L32, D52, or D32

For ordering, contact:

Your IBM representative, an IBM Business Partner, or the Americas Call Centers at

800-IBM-CALL Reference: YE001

Overview

The **IBM System Storage™ TS1040** (machine type 3588, Model F4A) is designed to be installed in an **IBM System Storage TS3500 Tape Library** (machine type 3584) to offer high capacity and performance for the midrange open systems environment. This model incorporates the new Linear Tape-Open (LTO) IBM Ultrium 4 Tape Drive, with enhanced maximum tape drive throughput over the IBM LTO generation 3 Tape Drive (Ultrium 3). It has a native data transfer of up to 120 MB/sec. In addition, with the use of the IBM LTO Ultrium 800 GB Data Cartridge, the TS1040 doubles the maximum tape cartridge capacity providing up to 800 GB native physical capacity (1,600 GB with 2:1 compression), as compared to the IBM Ultrium 3 Tape Drives and cartridges. IBM Ultrium 4 Tape Drives can read and write LTO Ultrium 3 Data Cartridges and read LTO Ultrium 2 Data Cartridges. The TS1040 has a 4-Gbps Fibre Channel interface for connection to a wide spectrum of open system servers.

The IBM System Storage TS1040 LTO Ultrium 4 Tape Drive supports data encryption on the base drive with Ultrium 4 media meeting LTO consortium specifications and Application Managed Encryption. System Managed and Library Managed Encryption and associated IBM Encryption Key Manager access are available as a chargeable licensed key (feature 1604 — Transparent LTO Encryption) under the TS3500 Tape Library L-frames.

Support for the TS1040 encryption function requires a minimum level of microcode firmware that is your responsibility to load, configure, and maintain on the TS3500 Tape Library.

The TS1040 Tape Drive's encryption capability and its subsystem integration support help provide you with a flexible tape data encryption solution that supports encryption and key management across a variety of environments, supporting a single point of control for all encryption keys, and most importantly can help customers protect tape data in a cost effective way.

The TS1040 can be installed in new or installed TS3500 Tape Library Models L53 and D53, and also in 3584 Tape Library Models L52 L32, D52, and D32.

In summary, IBM Ultrium 4 enhancements that help improve performance and reliability include:

- Native data transfer rate up to 120 MB/sec
- Ultrium 4 tape cartridge native physical capacity of 800 GB
- 4-Gbps Fibre Channel drive attachment
- A larger 256 MB internal buffer
- LTO Ultrium 4 encryption support
- 8 KB cartridge memory with Ultrium 4 media
- Better integrated electronics using IBM-engineered copper technology

Key prerequisites

Appropriate levels of host and drive software are required to attach the TS1040 to selected IBM System i^{TM} , IBM System p^{TM} , IBM System x^{TM} , or IBM System z^{TM} , and Hewlett Packard (HP), Sun, UNIX®, LinuxTM, and WindowsTM servers. Refer to the Technical information section for details.

Planned availability dates

- April 27, 2007: For the tape drive and its two feature numbers
- July 6, 2007: Encryption Key Manager for LTO on HP, Sun Solaris, and Microsoft™ Windows

Description

The IBM TS1040 is an IBM Linear Tape-Open (LTO) Ultrium 4 Tape Drive designed for the heavy demands of backup tape storage. The TS1040 is designed to mount in a TS3500 Tape Library and has a 4-Gbps Fibre Channel interface for attachment to IBM System p, IBM System i, IBM System z, or IBM System x products, and HP-UX, Sun, UNIX, Linux, or Windows servers.

The TS1040 incorporates fourth-generation IBM LTO Ultrium technology. It offers the following significant improvements over the Ultrium 3 Tape Drive:

 Increased performance — Maximum tape drive throughput native data rate performance is up to 120 MB/sec. Data tracks are written 16 at a time. IBM Ultrium 4 Tape Drives can read and write LTO Ultrium 3 Data Cartridges at Ultrium 3 capacities and rates, and read LTO Ultrium 2 Data Cartridges at Ultrium 2 capacities with improved rates.

Note: Although the Ultrium 4 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 tape cartridge physical capacity is up to 800 GB
 native physical capacity (1,600 GB with 2:1 compression), with the use of the new IBM LTO
 Ultrium 800 GB Data Cartridge, double that of the Ultrium 3 Data Cartridge. This is achieved
 by increasing the linear density and the media length. The tape itself is an advanced metal
 particle tape developed to help provide durability and capacity.
- Ultrium 3 cartridge compatibility The Ultrium 4 Tape Drive can read and write Ultrium 3

cartridges.

 Encryption supported on Ultrium 4 Fibre Channel tape drives — The IBM System Storage TS1040 LTO Ultrium 4 Tape Drive supports data encryption on the base drive with Ultrium 4 media, meeting LTO consortium specifications and Application Managed Encryption. System Managed and Library Managed Encryption and associated IBM Encryption Key Manager access are available as a chargeable licensed key (feature 1604, Transparent LTO Encryption) under the TS3500 Tape Library L-frames.

Support for the TS1040 encryption function requires a minimum level of microcode firmware and is a customer's responsibility to load, configure, and maintain on the TS3500 Tape Library.

- Attachment options The TS1040 Tape Drive comes with 4 Gbps Fibre Channel attachment models, for connection to a wide spectrum of open system servers. They are supported on IBM System p, IBM System i, IBM System x, or IBM System z products, and Sun Solaris, HP-UX, Microsoft Windows 2003, Linux, and other open systems.
- WORM media support The IBM 3589 Ultrium 4 800 GB WORM Tape Cartridges are designed for applications such as archiving and data retention, as well as those applications requiring an audit trail. These cartridges work with the IBM LTO Ultrium 4 Tape Drive to help prevent the alteration or deletion of user data. IBM Ultrium 800 GB WORM Tape Cartridges can be ordered as unique 3589 models with the following features:
 - Pre-labeling, with the ability to specify a starting volume serial and color coding
 - Packaging in individual jewel cases or in bulk
 - Cartridge memory, built into every cartridge, which helps 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 particle tape with a 800 GB WORM native capacity in a single cartridge
- Larger internal data buffer There is a 256 MB internal data buffer in the Ultrium 4 Tape Drive.
- 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 fourth-generation drive electronics are designed to provide error correction of soft errors in the memory arrays in data and control paths.

Proven IBM LTO Ultrium features enhanced in the IBM LTO Ultrium 4 Tape Drive include:

- 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.
- Independent tape loader and 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 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 704 data tracks in Ultrium 4 and Ultrium 3 versus 512 data tracks in Ultrium 2. 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 IBM's patented Surface Control Guiding Mechanism is designed to guide the tape along the tape path in the Ultrium 4 Tape Drive. 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.
- Magneto Resistive (MR) head design Use of flat lap head technology in MR heads for Ultrium 4 helps minimize contact, debris accumulation, and wear on the tape as it moves over the read/write heads.

- Digital speed matching The Ultrium 4 Tape Drive is designed to perform dynamic speed matching (at one of six speeds: 30, 48, 66, 84, 103, or 120 MB/sec) 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 4 ranges from 30 to 120 MB/sec versus 30 to 80 MB/sec on Ultrium 3.
- Robust drive components optimized for automation environments To help enhance reliability and prolong the life of drives, uses some of the most robust components available, such as (1) all metal clutch, (2) steel ball bearings in loader, (3) robust leader block design, (4) single circuit card.
- Power management The Ultrium 4 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.
- Adaptive read equalization 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 has two advantages. First, it helps improve
 performance if a subsequent append overwrites somewhere after the first filemark. Second,
 write of multiple filemarks typically indicates a point where an append operation might occur
 after the first of these filemarks. 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 4 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's 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.
- 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 LTO-CM is 8 KB. Communication between the drive and the LTO-CM is via a low-level RF field transmitted by the drive to the cartridge.
- Statistical Analysis and Reporting System (SARS) The Ultrium 4 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.

With support for LTO Ultrium-format tape data cartridges, the TS1040 with the TS3500 Tape Library can be a cost-effective solution for backup, save-and-restore, and archiving functions.

Ultrium 800 GB Data Cartridge

The tape cartridge physical capacity of the IBM Ultrium 800 GB Data Cartridge has doubled over the IBM Ultrium 400 GB Data Cartridge to 800 GB native physical capacity (1,600 GB with 2:1 compression). IBM LTO Ultrium 4 Tape Drives can read and write Ultrium 3 data cartridges, and read only Ultrium 2 data cartridges. Ultrium 4 cartridges can be resident in the same TS3500 Tape Library with the Ultrium 3 and Ultrium 2 data cartridges. LTO Ultrium 800 GB data cartridges can be ordered using machine type 3589, LTO Ultrium tape cartridges.

These cartridges have been designed to provide several enhancements over previous tape technologies. They are designed to work with tape drives that have increased tape speeds and high-density data recording. The case is specially designed for use in automated libraries and is designed for repeated, unattended handling.

Product positioning

As you compare competitive tape solutions, consider:

- Capacity and performance requirements
- Data integrity and encryption, reliability, and availability
- · Storage usage and application requirements
- Affordability
- Loyalty to legacy or existing tape formats

The TS1040 and software applications are designed to address these requirements and constitute a functionally rich tape storage solution incorporating LTO Ultrium 4 Tape Drive technology.

The TS1040 is an excellent choice if you use tape drives that require larger-capacity or higher-performance tape backup. The TS1040 Tape Drive can be the answer to growing storage requirements and shrinking backup windows.

The TS3500 Tape Library and IBM software applications excel in addressing these requirements and can constitute a functionally rich tape storage solution incorporating LTO Ultrium and 3592 tape technology. You also gain flexibility of automated tape library management and unattended save/restore operations.

The TS3500 Tape Library models are a smart choice for tape automation for IBM System i, IBM System p, IBM System x, IBM System z products, or Linux, and other popular open systems. The TS3500 utilizes the patented Multi-Path Architecture, designed to allow homogeneous or heterogeneous open systems applications to share the library robotics, with Advanced Library Management System (ALMS) for storage slot pooling and flexible drive assignment. Additional TS3500 features include capacity on demand entry library frames, LTO and 3592 drive technology choices and integration, dual active accessors, and 16-frame expansion.

The TS3500 Tape Library Base Frame Model L53 or L52 offers 64 to 287 slots for LTO Ultrium tape cartridge media and up to 12 IBM LTO Ultrium Fibre Channel Tape Drives. It is designed to provide excellent price and performance in the open systems environments.

The TS3500 Tape Library Base Frame Model L23 or L22 offers 58 to 260 slots for 3592 tape cartridge media and up to 12 IBM TS1120 or 3592 Tape Drives. The TS1120 or 3592 Tape Drives are designed to provide high capacity, performance, and reliability in open systems environments with tape drive flexibility to accommodate capacity as well as fast access where these requirements are needed.

Up to 15 3584 or TS3500 Tape Library Expansion Frame Models D22, D23, D32, D52, or D53 can be added to either the Model L22, L23, L32, L52, or L53. The Model D23 or D22 provides up to 400 cartridge slots for 3592 media, and can contain up to 12 TS1120 or 3592 Tape Drives. The Model D32, D52, or D53 provide up to 440 slots for Ultrium media, and can contain up to 12 Ultrium Tape Drives. When a Model HA1 is attached, the last Model D22, D23, D52, or D53 in the TS3500 Tape Library functions as a Service Bay B for the second accessor.

The TS3500, part of a family of IBM System Storage LTO Ultrium tape products, can be the answer to growing storage requirements and shrinking backup windows.

If you have existing digital linear tape experience or require high-performance automated tape backup, the TS3500 Tape Library constitutes an excellent tape storage solution. The IBM LTO Ultrium Tape Drives in the TS3500 Tape Library provide an excellent functional alternative to DLT/SDLT, 1/4-inch, 4mm, 8mm, or IBM Magstar® MP 3570 tape drives.

Depending on capacity requirements, a wide spectrum of tape libraries are available from the IBM Ultrium Tape family of products, based on your storage usage and requirements. Tape automation products to choose from include the IBM System Storage TS3310, TS3200, or TS3100 Tape Libraries.

For high-cycle and start/stop intensive tape applications, with mission-critical data protection and high-capacity requirements, consider the IBM System Storage TS1120 or 3592 Tape Drive with the IBM System Storage TS3400 or TS3500 Tape Library.

Reference information

Refer to:

• IBM System Storage TS3500 Tape Libraries Supporting LT04 and 4X I/O Hardware

Announcement 107-215, dated April 24, 2007.

- The IBM System Storage TS3500 Tape Library, Hardware Announcement 106-340, dated May 9, 2006.
- The IBM System Storage TS1120 Tape Drive Model E05, Hardware Announcement 105-413, dated October 11, 2005.
- The 3584 Model HA1, Hardware Announcement 105-061, dated February 15, 2005.
- The 3588 Model F3A, Hardware Announcement 105-063, dated February 15, 2005.
- The 3584 Models D22, D52, L22, and L52, Hardware Announcement 104-135, dated April 27, 2004.

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

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).

BP Attachment for Announcement Letter 107-203

https://www.ibm.com/partnerworld/mem/sla.jsp?num=107-203

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Publications

Information on the TS1040 Tape Drive Model F4A is contained in the following TS3500 Tape Library publications. Additional copies are available. To order, contact your IBM representative.

Title	Order number
IBM System Storage(TM) TS3500 Tape Library Introduction and Planning Guide	GA32-0559
IBM System Storage TS3500 Tape Library Operator Guide	GA32-0560
IBM System Storage TS3500 Tape Library SCSI Reference Guide	GA32-0561
IBM Tape Device Driver Installation and User's Guide (English)	GC27-2130

The device driver publication listed above and the publication IBM Tape Device Driver Programming Reference(English) (GA32-0566) are also available at

ftp://ftp.software.ibm.com/storage/devdrvr/Doc/

The IBM Publications Center Portal

http://www.ibm.com/shop/publications/order

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For more information, refer to

http://www.ibm.com/servers/eserver/xseries/services.html

Specified operating environment

Physical specifications

- Width: 186 mm (7.3 in)
- Depth: 455 mm (17.9 in)
- Height: 89 mm (3.5 in)
- Weight: 5.07 kg (11.2 lb)

Operating environment

- Temperature: 16° to 38° C (60° to 100° F)
- Relative humidity: 20 to 80 percent
- Wet bulb: 26° C (78.8° F) maximum
- Voltage: 5 V dc and 12 V dc
- Electrical power: 5.0 amps at 5 V dc and 2.0 amps at 12 V dc
- Heat output: 49 watts (0.17 kBTU/hour)
- · Capacity of exhaust: 0.34 cubic meter/min (12 CFM)
- Maximum sound power levels: 6.2 bels idle, 6.3 bels operating

Hardware requirements: The TS1040 is designed for installation in the TS3500 Tape Library Model L53, D53, L52, D52, L32, or D32. Up to 12 TS1040s can be installed in one of these frames (for a total of up to 192 Ultrium Tape Drives in a 16-frame library). The TS1040s can be installed and intermixed within the same frame with other Ultrium 2 or 3 Tape Drives.

The TS1040 Model F4A has a 4-Gbps Fibre Channel interface that may attach in either Fabric topology or Arbitrated Loop topology. An LTO Fibre Drive Mounting Kit feature (#1504 or #1514) is required on a TS3500 Tape Library frame to install a TS1040. The TS1040 must be ordered separately, and is designed for customer setup in the TS3500 Tape Library. When ordered with a new TS3500 (coming from the plant), one of the following feature numbers should be specified:

- #9682 (3588 F4A Plant Install) should be specified on the TS1040, and the TS3500 Tape Library frame into which it will be installed, if it is going to be shipped with the TS3500 Tape Library frame.
- #9679 (Field Merge 3588 in 3584) should be specified on the TS1040 if it is going to be shipped for installation into an already installed TS3500 Tape Library frame.

The TS1040 Tape Drive Model F4A is designed for customer setup. However, if the customer desires assistance with the installation, the following feature can be ordered on the TS3500 frame (one feature for each drive that is needed):

• 1678 — 3588 Drive Field Install Assist

Customer-owned TS1040 or 3588 Tape Drives, or TS1040 or 3588 Tape Drives, removed from a TS3500 library frame, can be installed in another TS3500 frame. A LTO Fibre Drive Mounting Kit feature (#1514) is required for installing a TS1040 or 3588 Tape Drive in a drive slot in a TS3500 Tape Library Model L53 or D53 frame. A LTO Fibre Drive Mounting Kit feature (#1504) is required for installing a TS1040 or 3588 Tape Drive in a 3584 Model L32, D32, L52, or D52 frame.

Labeled or bulk quantities of LTO Ultrium cartridges can be ordered using machine type 3589 or purchased through distributors. Refer to the Supplies section for additional information.

Note: The TS3500 requires that cartridges have appropriate bar code labels.

A TS1040 in the TS3500 Tape Library can be attached to IBM System i[™], IBM System p[™], IBM System x[™], or IBM System z[™] products, and Hewlett Packard, Sun, UNIX®, Linux[™], and Windows[™] servers that support Fibre Channel interfaces.

A current list of supported open system configurations for the TS1040 Tape Drive Model F4A is available from the following Web site

http://www.ibm.com/storage/tape

Select the model, then "Interoperability Matrix", and view the "Supported Servers and Operating Systems" for the product.

Cables: Cables are required to attach tape drives in the TS3500 Tape Library to each server connection (up to the number of tape drive attachments installed). One or more of the following Fibre Channel cables should be specified on the TS3500 frame.

Fibre Channel cables: A Fibre Channel cable is required to attach a TS1040 in the TS3500 Tape Library via the standard Fibre Channel patch panel in the TS3500 Tape Library Model L23 or L53 to host Fibre Channel adapters, the IBM 2109 SAN Fibre Switch, or other Fibre Channel components. The cable can be customer supplied, or ordered with the TS3500 Tape Library in the lengths shown. The attaching Fibre Channel cable must be a 50.0/125 micrometer short wavelength fiber-optic cable for distances up to 500 meters. These tape drives come with LC Duplex connectors. One 2.0 meter LC-LC Fibre Channel drive-to-patch panel cable is included with each Fibre Mounting Kit (#1504 or #1514).

Features available for Fibre Channel cables, and their respective lengths, are available on the TS3500 frame, with the following feature numbers:

- 6005 5 m LC-LC Fibre Channel Cable
- 6013 13 m LC-LC Fibre Channel Cable
- 6025 25 m LC-LC Fibre Channel Cable
- 6061 61 m LC-LC Fibre Channel Cable

An interposer is available to connect a tape drive or server LC Duplex adapter to a SC Duplex cable by ordering the Interposer SC-LC Fibre feature (#5096).

Refer to the **Special Features** section of the TS3500 or 3584 Tape Library Sales Manual for detailed descriptions of these features.

Software requirements: The TS1040 in the TS3500 Tape Library is supported on the following operating systems at the minimum levels indicated:

- OS/400® V5R3, or later
- i5/OS[™] V5R3, or later
- AIX 5L[™] V5.1, V5.2, V5.3
- Sun Solaris 8, 9, or 10
- Microsoft[™] Windows 2003 (build 3790, or later)
- 64-bit HP-UX 11iv1 and 11iv2
- Linux distributions: Red Hat Enterprise Linux Version 4, Novell SUSE Linux Enterprise Server 9 (SLES 9), SUSE Linux Enterprise Server 10 (SLES10), and Asianux 2.0

For a current list of host software versions and release levels that support the TS3500 or 3584, refer to the following Web site

http://www.ibm.com/storage/tape

An update of the open systems device drivers can be obtained, via anonymous FTP, from

ftp.software.ibm.com

Look under the directory storage/devdrvr.

Further information can be found in the IBM Tape Device Driver Installation and User's Guide (GC27-2130), also available at the above FTP site.

Tivoli® Storage Manager and other compatible software offerings provide storage and tape management software for the TS3500 or 3584. Supporting software and applications must be obtained separately from IBM, IBM Business Partners, or ISVs. A list of compatible software is available from your IBM representative or at

http://www.ibm.com/storage/tape

Select the model, then "Product Details," and "Independent Software Vendor (ISV) matrix" for the product.

IBM continues to work together with ISVs to support the TS3500 Tape Library. Individual application vendors should be contacted for specific information and availability dates. Consult with ISV providers for their support of mixed drive types and media types in the same logical library.

TS1040 Tape Drive and encryption

Support for the TS1040 Tape Drive in the TS3500 Tape Library is provided in i5/OS, AIX®, HP-UX, Linux, Sun Solaris, and Microsoft Windows 2003 operating system environments. The installation of a TS1040 Model F4A Tape Drive with encryption may require code updates for System p, System i, System x, and System z and supported open systems device drivers or storage management software. Per the Solutions Assurance Product Review (SAPR) Guide, the account team or Business Partner should confirm that the customer checks the appropriate PSP buckets for System z environments or the equivalent support levels required for their particular software environment prior to the installation of the TS1040 Tape Drive. A Solutions Assurance call is required, at a minimum, for the installation of the first new TS1040 Tape Drive in an account.

An update of the open systems device drivers can be obtained via anonymous FTP from

ftp.software.ibm.com

Look under the directory storage/devdrvr.

Further information can be found in the IBM Tape Device Driver Installation and User's Guide (GC27-2130), also available at the above FTP site.

For details on supported software versions and release levels for the TS1040 Tape Drive, as well as hardware support information, refer to the following Web site

http://www.ibm.com/storage/tape

Three modes of encryption management are supported:

- System Managed (available for AIX and Sun Solaris only)
- Library Managed (available for AIX, i5/OS, Linux, Linux on System z FCP-connected tape drives, HP, Sun Solaris, and Windows)
- Application Manager (IBM Tivoli Storage Manager only)

IBM System i

System i supports Library Managed Encryption in conjunction with the TS3500 tape library. System i support of Library Managed Encryption for the TS3500 requires:

- i5/OS V5.3, or later
- An Encryption Key Manager component available to the TS3500 Tape Library
- A TS3500 Tape Library

The Encryption Key Manager is supported on i5/OS V5.3, or later. If the Encryption Key Manager component is run on i5/OS, then the following program product is required:

IBM Developer Kit for Java[™] — Java Developer Kit 5.0 (5722-JV1)

i5/OS Library Managed Encryption support is planned for June 8, 2007.

IBM System p

System p supports System Managed Encryption and Library Managed Encryption in conjunction

with the TS3500 tape library, and Application Managed Encryption with Tivoli Storage Manager.

AIX 5.2, or later is required for Application Managed, System Managed, and Library Managed Encryption.

System Managed Encryption with AIX requires:

- An Encryption Key Manager component available to the AIX system.
- The ATAPE device drivers must be installed, updated, and utilized. It may be downloaded from the following Web site

AIX System Managed Encryption support is planned for June 8, 2007.

Library Managed Encryption with AIX requires:

- An Encryption Key Manager component available to the TS3500
- A TS3500 Tape Library

AIX Library Managed Encryption support is planned for June 8, 2007.

If the Encryption Key Manager is run on a System p server with AIX:

- AIX 5.2, or later is required.
- One of the following two IBM Java SDKs should be updated to included the latest version of the Encryption Key Manager:
 - Java SDK 5 (31 and 64 bit)
 - Java SDK 1.4.2 (31 and 64 bit)

Updates to the AIX Java SDK may be obtained at the following Web site

http://www.ibm.com/developerworks/java/jdk/aix/index.html

Linux on System z

Library Managed Encryption is available for System z servers connected to the TS3500 via FCP, running one of the following Linux on System z distributions:

- Novell SUSE Linux Enterprise Server 9 (SLES 9)
- Novell SUSE Linux Enterprise Server 10 (SLES 10)
- Red Hat Enterprise Linux (RHEL 4)

Library Managed Encryption with Linux on System z requires:

- An Encryption Key Manager component available to the TS3500 Tape Library
- A TS3500 Tape Library

If the Encryption Key Manager is run on a Linux on System z partition, then one of the following Java 2 SDKs should be installed and updated:

- Java 2 Standard Edition SDK 5
- Java 2 Standard Edition SDK 1.4.2

Updates to the Linux Java SDK may be obtained at

http://www-128.ibm.com/developerw orks/java/jdk/linux/download.html

Library Managed Encryption support of the TS1040 Tape Drive attached via FCP to a Linux on System z partition is planned to be available June 8, 2007.

HP-UX systems

HP-UX supports Library Managed Encryption with the TS3500 Tape Library.

Library Managed Encryption with HP-UX requires:

- HP-UX 11iv1 and 11iv2
- An Encryption Key Manager component available to the TS3500 Tape Library
- A TS3500 Tape Library

Library Managed Encryption of HP servers is planned for June 8, 2007.

To run the Encryption Key Manager on HP-UX, the IBM TotalStorage® Productivity Center — Limited Edition (TPC-LE), licensed program product 5608-VC6, is required and is planned for July 6, 2007.

Sun Solaris systems

Sun Solaris supports Application Managed, System Managed, and Library Managed Encryption with the TS3500 Tape Library.

System Managed Encryption with Solaris requires:

- An Encryption Key Manager component available to the Solaris system.
- The IBM Solaris device drivers be installed, updated, and utilized. The drivers may be downloaded site

Solaris System Managed Encryption support is planned for June 8, 2007.

Library Managed Encryption with Sun Solaris requires:

- Sun Solaris 8, 9, and 10
- An Encryption Key Manager component available to the TS3500 Tape Library
- A TS3500 Tape Library

Library Managed Encryption of Sun servers is planned for June 8, 2007.

To run the Encryption Key Manager on Sun Solaris, the IBM TotalStorage Productivity Center — Limited Edition (TPC-LE), licensed program product 5608-VC6, is required and is planned for July 6, 2007.

Linux

System x and other Intel®-based or AMD Opteron-based Linux servers and System p servers support Application Managed and Library Managed Encryption on the TS3500. Library Managed Encryption requires:

- Red Hat Enterprise Linux 4 (REHL 4)
- Novell SUSE Linux Enterprise Server 9 (SLES 9)
- Novell SUSE Linux Enterprise Server 10 (SLES 10) Asianux 2.0
- An Encryption Key Manager component available to the TS3500 Tape Library
- A TS3500 Tape Library

If the Encryption Key Manager component is run on Linux, then one of the following two Java 2 SDKs should be installed and updated:

- Java 2 Standard Edition SDK 5
- Java 2 Standard Edition SDK 1.4.2

Updates to the Linux Java SDK may be obtained at

http://www.ibm.com/developerwor ks/java/jdk/linux/download.html

Library Managed Encryption is planned for June 8, 2007.

Windows systems

Application Managed and Library Managed Encryption is supported on Windows with the TS3500 Tape Library. Library Managed Encryption requires:

- Windows 2003
- An Encryption Key Manager component available to the TS3500 Tape Library
- A TS3500 Tape library

Library Managed Encryption of Windows servers is planned for June 8, 2007.

To run the Encryption Key Manager component on Windows, the IBM TotalStorage Productivity Center — Limited Edition (TPC-LE), licensed program product 5608-VC6, is required and is planned for July 6, 2007.

Application software

Tivoli Storage Manager supports Application Managed encryption on May 4, 2007.

Compatibility: The TS1040 Tape Drives can read and write LTO Ultrium 3 or 4 Data Cartridges and can read LTO Ultrium 2 Data Cartridges. The LTO Ultrium 800 GB Data Cartridges can only be used on Ultrium 4 Tape Drives, such as the TS1040 Tape Drive or 3588 Tape Drives.

The LTO Ultrium 800 GB Data Cartridges are physically the same size as all previous LTO Ultrium Data Cartridges, and can, therefore, reside in the same 3584 library frames as those cartridges.

The TS1040 Tape Drive and LTO Ultrium 4 cartridges can be resident in the same TS3500 Tape Library with IBM LTO Ultrium 3 Tape Drives and cartridges, IBM LTO Ultrium 2 Tape Drives and cartridges, or with TS1120 or 3592 Tape Drives and cartridges.

Limitations

- Although the compression technology can increase the amount of data stored on the media, the actual degree of compression achieved is highly sensitive to the characteristics of the data being compressed.
- Fibre Channel cable lengths are limited to 500 meters (1,650 ft).
- Although multiple systems may be attached to a tape drive, the systems cannot use the drive simultaneously.

Planning information

Customer responsibilities: Physical planning is a customer responsibility. Detailed planning information is in the IBM System Storage TS3500 Tape Library Introduction and Planning Guide (GA32-0559). Current levels of the open systems device drivers should be obtained to ensure the TS1040 Tape Drive Model F4A is supported.

Customers are responsible for obtaining the appropriate adapters, cables, and interposers (if required) for system attachment. Customers are also responsible for ordering media.

Cable orders: Cables are required to attach the TS1040 Tape Drive Model F4A in the TS3500 Tape Library to each server connection (up to the number of tape drive attachments installed). Refer to Cables in the **Hardware requirements** section for a list of cables for the TS1040 Tape Drive.

Installability: Installation time for the TS1040 Tape Drive Model F4A is approximately 0.5 to 0.7 hours.

Direct customer support: Eligible customers can obtain installation and usage assistance through ASK Support using the search word 3584, 3588, TS3500, or TS1040.

Packaging

Product	Shipment group	Number of boxes
3588 Model F4A	3588 Tape Drive Model F4A	1

Supplies: For end users: IBM data media supplies, including labeled, initialized, bulk data media, or cleaning cartridges, can be purchased from IBM using machine type 3589. Refer to the 3589 Sales Manual.

For information about IBM branded media, such as additional IBM LTO Ultrium data or cleaning cartridges, call 888-IBM-MEDIA (426-6334) in the U.S. or Canada or refer to the following Web site

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

Security, auditability, and control

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

Terms and conditions

IBM Global Financing: No

Warranty period: One year. IBM options or features initially installed in an IBM system carry the same warranty period as the system. If installed after the initial system installation, they carry the balance of the system warranty.

Warranty service: If required, IBM provides repair or exchange service depending on the types of warranty service specified for the machine. IBM will attempt to resolve your problem over the telephone, or electronically via an IBM Web site. You must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend upon the time of your call and is subject to parts availability. If applicable to your product, parts considered customer replaceable units (CRUs) will be provided as part of the machine's standard warranty service.

Service levels are response-time objectives and are not guaranteed. The specified level of warranty service may not be available in all worldwide locations. Additional charges may apply outside IBM's normal service area. Contact your local IBM representative or your reseller for country- and location-specific information. This product is covered by the following types of service.

On-site Service

IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well lit, and suitable for the purpose.

24 hours per day, 7 days a week, same-day response, IBM On-site Repair

If your problem can be resolved with a CRU (for example, keyboard, mouse, speaker, memory, or hard disk drive), IBM may ship the CRU to you for you to install. CRU information and replacement instructions are shipped with your machine and are available from IBM at any time on your request.

Based upon availability, CRUs will be shipped for next-business-day delivery. IBM specifies in the materials shipped with a replacement CRU whether a defective CRU must be returned to IBM. When return is required (1) return instructions and a container are shipped with the replacement CRU, and (2) you may be charged for the replacement CRU if IBM does not receive the defective CRU within 30 days of your receipt of the replacement.

Non-IBM parts support

Warranty service

IBM is now shipping machines with selected non-IBM parts that contain an IBM field replaceable unit (FRU) part number label. These parts are to be serviced during the IBM machine warranty period. IBM is covering the service on these selected non-IBM parts as an accommodation to their customers, and normal warranty service procedures for the IBM machine apply.

Warranty service upgrades and maintenance service options: Warranty service upgrades

During the warranty period, warranty service upgrades provide an enhanced level of on-site service for an additional charge. A warranty service upgrade must be purchased during the warranty period and is for a fixed term (duration). It is not refundable or transferable and may not be prorated. If required, IBM will provide the warranty service upgrade enhanced level of on-site service acquired by the customer. Service levels are response-time objectives and are not guaranteed.

IBM will attempt to resolve your problem over the telephone or electronically by access to an IBM Web site. You must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend upon the time of your call and is subject to parts availability.

On-site Service

IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well lit, and suitable for the purpose. The following service selections are available as warranty upgrades for your machine type:

• 24 hours per day, 7 days a week, 2-hour average response

CRUs may be provided as part of the machine's standard warranty CRU Service except that you may install a CRU yourself or request IBM installation, at no additional charge, under one of the On-site Service levels specified above. For additional information on the CRU service, refer to the warranty information.

Maintenance Services

If required, IBM provides repair or exchange service depending on the types of maintenance service specified for the machine. IBM will attempt to resolve your problem over the telephone or electronically, via an IBM Web site. You must follow the problem determination and resolution procedures that IBM specifies. Scheduling of service will depend upon the time of your call and is subject to parts availability. Service levels are response-time objectives and are not guaranteed. The specified level of maintenance service may not be available in all worldwide locations. Additional charges may apply outside IBM's normal service area. Contact your local IBM representative or your reseller for country- and location-specific information. The following service selections are available as maintenance options for your machine type.

On-site Service

IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well lit, and suitable for the purpose.

- 9 hours per day, Monday through Friday, excluding holidays, next-business-day response
- 9 hours per day, Monday through Friday, excluding holidays, 4-hour average response
- 24 hours per day, 7 days a week, 4-hour average response
- 24 hours per day, 7 days a week, 2-hour average response

CRUs

If your problem can be resolved with a CRU (for example, a keyboard, mouse, speaker, memory, or hard disk drive), and depending upon the maintenance service offerings in your geography, IBM will ship the CRU to you for you to install. CRU information and replacement instructions are shipped with your machine and are available from IBM upon your request.

Based upon availability, CRUs will be shipped for next-business-day delivery. IBM specifies, in the materials shipped with a replacement CRU, whether a defective CRU must be returned to IBM. When return is required (1) return instructions and a container is shipped with the replacement CRU and (2) you may be charged for the replacement CRU if IBM does not receive the defective CRU within 30 days of your receipt of the replacement.

CRUs may be provided as part of the machine's standard maintenance service except that you may install a CRU yourself or request IBM installation, at no additional charge, under any of the On-site Service levels specified above.

Non-IBM parts support

Under certain conditions, IBM repairs selected non-IBM parts, at no additional charge, for machines that are covered under warranty service upgrades or maintenance services.

IBM service provides hardware problem determination on non-IBM parts (for example, adapter cards, PCMCIA cards, disk drives, memory) installed within IBM machines covered under warranty service upgrades or Maintenance Services and provides the labor to replace the failing parts, at no additional charge.

If IBM has a Technical Service Agreement with the manufacturer of the failing part, or if the failing part is an accommodations part (a part with an IBM FRU label), IBM may also source and replace the failing part, at no additional charge. For all other non-IBM parts, customers are responsible for sourcing the parts. Installation labor is provided at no additional charge, if the machine is covered under a warranty service upgrade or a maintenance service.

Usage plan machine: No

IBM hourly service rate classification: Two. When a type of service involves the exchange of a machine part, the replacement may not be new, but will be in good working order.

Field-installable features: No

Model conversions: No

Machine installation: Customer setup. Customers are responsible for installation according to the instructions IBM provides with the machine.

Graduated program license charges apply: No. This product does not contain Licensed Internal Code or Licensed Machine Code.

Educational allowance: A reduced charge is available to qualified education customers. The educational allowance may not be added to any other discount or allowance.

Prices

Product charges

Description	Machi ne type	e Model	Feature number	Purchase pri ce	MMMC	Fi el d i nstal l onl y	Pl ant i nstal l onl y
TS1040 Ultrium 4 Tape Drive	3588	F4A		\$22, 800	\$196		
Field Merge 3588	;	F3A,	9679	NC	NC	Ν	Y
in 3584		F3B,					
		F4A					
3588 F4A Plant I	nstall	F4A	9682	NC	NC	Ν	Y

MMMC = Monthly minimum maintenance charge NC = No charge

For ServiceElect (ESA) maintenance service charges, contact IBM Global Services at 888-IBM-4343 (426-4343).

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