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Highlights

- Support highly-scalable, automated data retention on tape using Linear Tape-Open (LTO) Ultrium and IBM 3592 tape drive families

- Deliver extreme scalability and capacity, growing from one to 16 frames per library and from one to 15 libraries per library complex

- Provide up to 900 PB of automated, low-cost storage under a single library image, improving floor space utilization and reducing storage cost per TB with IBM 3592 JC Enterprise Advanced Data Cartridges

- Enable data security and regulatory compliance via support for tape drive encryption and write-once-read-many (WORM) cartridges

IBM System Storage TS3500 Tape Library

A highly scalable, automated tape solution addresses data protection and long-term retention

The IBM® System Storage® TS3500 Tape Library is designed to provide a highly-scalable, automated tape library for mainframe and open systems backup and archive that can scale from midsize to large enterprise environments.

Automates solutions for open and mainframe environments

The TS3500 Tape Library continues to lead the industry in tape drive integration with features such as persistent worldwide name, multipath architecture, drive/media exception reporting, remote drive/media management and host-based path failover. The L23 and D23 frames support the IBM System Storage TS1140, TS1130, TS1120 or IBM 3592 J1A tape drives. The L53 and D53 frames support LTO Ultrium 6 tape drives as well as previous-generation LTO Ultrium tape drives. L-frame models support improved cartridge handling, hot-swappable drive packaging and the option of an additional 16-slot I/O station. The TS3500 model D23 and D53 frames can be attached to existing model L22 or D52 frames. Mixed media is supported by combining LTO Ultrium tape drives and the TS1140, TS1130, TS1120 or 3592 J1A tape drives within the TS3500 library, frame by frame.

The TS3500 Tape Library supports IBM System z® when used with the IBM 3953 Tape System, the IBM Virtualization Engine TS7740 or the IBM System Storage Tape Controller for System z with its embedded library manager. These systems enable System z hosts to access the TS3500 Tape Library cartridge inventory and allow connection to TS1140, TS1130, TS1120 and IBM 3592 Model J1A tape drives. The TS3500 Tape Library can support up to four 3953 tape systems, up to eight Virtualization Engine TS7740 subsystems per physical library and up to 16 System Storage tape controllers for System z per logical library.

The System Storage Tape Controller for System z offers IBM FICON® attachments of TS1140 tape drives in a TS3500 Tape Library or rack, and reduces hardware and infrastructure requirements by sharing tape drives with FICON hosts. It can also add tape drives nondisruptively, which helps enhance configuration flexibility and availability.

Offers high-capacity, high-density, low-cost storage

Storage requirements are exploding in organizations, with the exponential growth of email, documents, images, video and application data. Data retention and protection policies further increase these demands, while at the same time, available floor space in data centers is diminishing. To help manage these conflicting issues, the TS3500 Tape Library supports storage-only library frames with patented, high-density slots that can significantly increase a library's total capacity. These frames contain multiple tiers of cartridge slots, yet have the same physical footprint as L and D frames. S24 frames can store up to 1,000 3592 cartridges with 12 PB of compressed data, and S54 frames support up to 1,320 LTO cartridges with 8.25 PB of compressed data, all in just 10 square feet. A TS3500 Tape Library configured with high-density frames can store up to 125 PB of compressed data with LTO cartridges, or up to 180 PB of compressed data with 3592 cartridges.

The TS3500 supports the IBM System Storage Tape Library Connector (shuttle connector), which allows single or multiple interconnection of library strings to form a library complex of up to 15 libraries with a total capacity of 900 PB of data and up to 2,880 tape drives for storing and managing vast amounts of information in an automated fashion.

Ensures high availability and capacity on demand

The TS3500 Tape Library can be ordered with a dual-accessor model option to help increase mount performance and overall system reliability and availability. The TS3500 Model HA1 enables two robotic accessors to operate simultaneously in configurations from two to 16 frames.

The TS3500 Tape Library entry-base frame provides a more flexible upgrade path for users who want to expand their tape storage as their needs grow. Capacity-on-demand (CoD) con-figurations for TS3500 Tape Library L-frame models include an "entry-level" configuration, an "intermediate" configuration and a "full-capacity" configuration. S-frame models also allow two CoD configurations.

Includes advanced features

The TS3500 Tape Library is designed with a number of advanced features to deliver cutting-edge performance and long-term value. Highlights include:

- Flexible library capacity with up to 192 drives in up to 16 TS3500 Tape Library frames, and up to 15 libraries interconnected in a library complex
- Architecture designed to allow simultaneous attachment of servers and applications to logical library partitions
- Remote management with a web-based interface for library control and configuration
- Simple Network Management Protocol query and trap functionality
- Automatic control path and data path failover to support improved continuity and disaster recovery
- Redundant control paths, grippers, power supplies and AC feeds for enhanced availability

The available Advanced Library Management System feature supports dynamic storage management, enabling users to dynamically create and change logical libraries and configure any drive into any logical library. Based on capacity require-ments, the Advanced Library Management System can be implemented as an entry, intermediate or full CoD level in the TS3500 Tape Library.

Provides encryption and WORM cartridge support

To keep information confidential if backup tapes are lost or stolen, the TS3500 Tape Library supports TS1140, TS1130 and TS1120 tape drive encryption. It also supports LTO Ultrium 6 and 5 tape drive encryption. These tape drives include data encryption capabilities within the drives, helping to avoid the need for host-based data encryption—and the resulting drain on host performance—or the use of specialized encryption appliances.

The IBM Tivoli® Key Lifecycle Manager component for Java platforms can help generate and manage encryption keys for TS1140, TS1130, TS1120, and LTO Ultrium 6 and 5 tape drives across the enterprise. This feature uses standard key repositories and supports three different encryption key-management methods: application-managed, system-managed or library-managed. The LTO Ultrium generation 6, 5 and 4 tape drives can also support WORM LTO media.

Features next-generation tape-drive support

TS1140 tape drives support IBM 3592 JC and JY advanced, standard and WORM cartridges that feature four times more capacity than the previous generation—up to 4 TB native or 12 TB compressed—with more than 50 percent faster data transfer rates at 250 MB per second (MBps) native, TS1140 tape drives also support the IBM 3592 JK economy cartridge with a capacity of up to 500 gigabytes (GB). TS1140 tape drives can read and write IBM 3592 JB and JX cartridges with improved performance.

LTO Ultrium 6 2.5 TB cartridges (standard and WORM) and LTO Ultrium 6 tape drives are supported and designed to provide 67 percent more tape cartridge capacity and greater than 12.5 percent improvement in tape drive performance over

the fifth-generation LTO Ultrium drives. They can also support media partitioning and the IBM Linear Tape File System™ to help improve data management on tape media. The sixth-generation LTO Ultrium is designed to support up to 160 Mbps native data transfer rates. LTO Ultrium 6 tape drives can read and write LTO Ultrium 5 cartridges and read LTO Ultrium 4 cartridges at original capacities with improved performance.

The TS1140 and LTO Ultrium 6 tape drives and cartridges (standard or WORM) can reside in the same TS3500 Tape Library string with previous generations of 3592 or LTO Ultrium tape drives and cartridges to help protect existing investments.

Integrates powerful software support

Further enhance the power of the TS3500 Tape Library by integrating it with industry-leading storage management solutions, such as IBM Tivoli Storage Manager and a wide array of other storage software.

Centralizes management of tape resources

IBM offers a wide range of management software options for the TS3500 Tape Library. The following table lists a subset of the software options for the TS3500 Tape Library. Some options are downloadable files available at ibm.com, and some are more complete options that users must request.

Management software options

IBM System Storage TS3500 command line interface (CLI)	• Simple and concise for tape users wanting to write their own scripts to manage tape libraries and to quickly move from concept to production • Enables users to interact with the operating system by typing commands to perform specific tasks
IBM Tape System Reporter	• Enables operators and administrators of the TS3500 Tape Library to monitor and report on storage devices in an enterprise environment • Enables users to monitor multiple TS3500 libraries using the Java-based server application • Enables users to generate custom reports for multiple TS3500 tape cartridges, tape drives and tape libraries with the optional Microsoft Windows-based client
IBM Tivoli Key Lifecycle Manager	• Enhances data security while dramatically reducing the number of encryption keys to be managed • Simplifies encryption key management with an intuitive user interface for configuration and management • Helps minimize the risk of loss or breach of sensitive information
Crossroads ReadVerify Appliance*	• Provides dynamic, multi-variable, user-managed reporting for understanding complex system interactions and projecting future budget and system needs • Helps maximize the performance and utilization of tape drives and media in the TS3500 by providing system monitoring, policy-based alerting and reporting • Automates the verification of media quality in idle tape cartridges, while creating an audit to supplement any regulatory compliance for archiving enabled by the ArchiveVerify features
IBM Tape System Library Manager	• Enables clients with large tape environments, spanning multiple TS3500 Tape Libraries, to manage them as a single system made up of one or more pools of drives and cartridges • Enables Tivoli Storage Manager support for the TS3500 shuttle complex • Can significantly simplify the creation and management of Tivoli Storage Manager tape drive paths to the TS3500 in storage area networks • Provides investment protection of tape drives and cartridges for customers using applications designed for the IBM 3494 Tape Library

IBM System Storage TS3500 Tape Library at a glance

Characteristics	
Frame definition	**L23**—Base frame for TS1140, TS1130, TS1120 or 3592 **D23**—Drive-capable and storage expansion frame for TS1140, TS1130, TS1120 or 3592 **S24**—Storage-only expansion frame for 3592 cartridges **L53**—Base frame for LTO **D53**—Drive-capable and storage expansion frame for LTO **S54**—Storage-only expansion frame for LTO cartridges **HA1**—High-availability service bay frame for use with the dual-accessor feature **SC1**—Library strings shuttle connector
Library shuttle connector	IBM System Storage Tape Library Connector Model SC1
Tape drive types	TS1140, TS1130, TS1120 or 3592 tape drives or LTO Ultrium 6, 5, 4, 3, 2 or 1 tape drives
Number of frames per library	One base frame, up to 15 expansion frames (TS3500 Model HA1 installation provides one of the two additional frames required as service bays in a dual-accessor library)
Number of libraries per complex	Up to 15 libraries
Number of drives	Up to 12 per frame Up to 192 per library string Up to 2,700 per library complex
Number of tape cartridges	**L23**—up to 260 **D23**—up to 400 **S24**—up to 1,000 Total supported per library: >15,000 Total supported per complex: >225,000 **L53**—up to 287 **D53**—up to 440 **S54**—up to 1,320 Total supported per library: >20,000 Total supported per complex: >300,000
Number of I/O slots	Up to 224 per library (16 I/O slots standard) Up to 3,360 per complex
Number of logical libraries	Maximum of 192 per library (up to number of drives installed) Maximum of 2,700 per complex
Number of 3953 systems	Maximum of four per TS3500 subsystem
Number of TS7700 virtualization engines	Maximum of eight per TS3500 subsystem
Number of tape controllers for System z	Maximum of 16 per TS3500 logical library
Capacity**	LTO Ultrium 6 cartridges: up to 50 PB per library (up to 125 PB with 2.5:1 compression), up to 1.875 EB per complex when compressed 3592 advanced cartridges: up to 60 PB per library (180 PB with 3:1 compression), up to 2.7 EB per complex when compressed
Media type	**L23/D23/S24**—IBM 3592 JA/JJ/JB/JC and JW/JR/JX/JY WORM cartridges **L53/D53/S54**—LTO Ultrium 6, 5, 4, 3, 2, 1 cartridges

IBM System Storage TS3500 Tape Library at a glance

Dimensions (all frames)	1,800 mm H × 782 mm W × 1,212 mm D (70.9 in. × 30.8 in. × 47.7 in.)
Maximum weight	**L23**—490 kg (1,079 lb); **D23**—451 kg (994 lb), **S24**—526 kg (1,160 lb) **L53**—481 kg (1,061 lb); **D53**—440 kg (970 lb), **S54**—563 kg (1,240 lb)
Warranty	One year limited warranty, on-site service, same day 24×7, service upgrades available
Operating environment	
Temperature	16°C – 32°C (61°F – 90°F)
Relative humidity	20% – 80% (noncondensing)
Wet bulb maximum	23.0°C (73.4°F)
Electrical power	8.0 A at 200 – 240 V ac; 1.6 kVA
Attachment and systems support	Can attach to IBM Power Systems™; IBM System p®, IBM System i® and IBM System x® servers; and non-IBM servers and workstations. (Attachment to System z can be made via the 3953 Tape System, the Virtualization Engine TS7740 or the System Storage Tape Controller for System z)
Operating systems support	Device driver support is available for: IBM system platforms • System z—SUSE Linux Enterprise Server, Red Hat Enterprise Linux • System p—IBM AIX®, SUSE Linux Enterprise Server, Red Hat Enterprise Linux • System i—IBM i, IBM i5/OS® • System x—Microsoft, SUSE Linux Enterprise Server, Red Hat Enterprise Linux, Solaris • Other vendor platforms • Oracle—select SUN Servers/Fibre Channel host bus adapters, Solaris • Hewlett Packard—select HP Servers/Fibre Channel host bus adapters, HP-UX • Microsoft—Windows Server 2008 • Linux—Red Hat Enterprise Linux, SUSE Linux Enterprise Server

IBM System Storage 3953 Tape System at a glance

Characteristics	
Frame	3953 Model F05 + feature code 5505—base frame for the 3953 Tape System, consisting of the mechanical frame, power and cabling infrastructure to support the library manager(s) and a single TS1120 tape controller (up to five additional F05s can be configured as expansion frames, each capable of supporting up to three TS1120 tape controllers)
Library manager	3953 Model L05—single library manager; maximum of two (redundancy only) per 3953 tape system
Number of frames	Six total—one base frame and up to five expansion frames
IBM System Storage TS3000 System Console	One per 3953 tape system
TS7700 Virtualization Engine support	Maximum of two TS7700s per 3953 tape system, maximum of eight per TS3500 Tape Library
TS1120 Tape Controller support	Maximum of 14 with two TS7700s, up to 16 with 0 TS7700s

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IBM System Storage 3953 Tape System at a glance

System Storage TS3000 System Console capability	Yes, required
Dimensions (all frames)	1,804 mm H × 1,102 mm W × 644 mm D (71 in. × 43.4 in. × 25.4 in.)
Weight	3953 Model F05—282 kg (620.4 lb)
Warranty	One-year limited warranty, on-site service, same day 24×7, service upgrades available
Operating environment	
Temperature	16°C – 32°C (61°F – 90°F)
Relative humidity	20% – 80% (noncondensing)
Wet bulb maximum	23.0°C (73.4°F)
Electrical power	8.0 A at 200 – 240 V ac; 1.5 kVA
Attachment and systems support	The 3953 Tape System enables the TS1140, TS1130, TS1120 and 3592 J1A tape drives within the TS3500 Tape Library to attach to System z hosts or the TS7700 Virtualization Engine
Operating systems support	IBM z/OS®

IBM Tape System Library Manager at a glance

Hardware requirements		
Tape systems	IBM System Storage TS3500 Tape Library	
Tape drives	IBM System Storage TS1140 Tape Drive IBM System Storage TS1130 Tape Drive LTO Ultrium 6 LTO Ultrium 5 LTO Ultrium 4 LTO Ultrium 3	
Server	Any IBM System x, IBM System p or Intel server	
Host bus adapter	Dependent on the server and operating system selected	
Operating systems support (server)	AIX 6.1, 7.1 Red Hat Enterprise Linux 5.x, 6.x SUSE Linux Enterprise Server 11	
Operating systems support (client)	AIX 6.1, 7.1 Red Hat Enterprise Linux 5.x, 6.x SUSE Linux Enterprise Server 11 Windows Server 2008 Solaris 10 for SPAC processor HP-UX 11i v3	
Hard disk drive requirements	File system	Size
	/opt	5 GB
	/home/db2inst1	20 GB
	/tmp	7 GB

Why IBM?

The performance and availability of your storage environment can either enhance or hamper your business processes. That's where IBM comes in. As a market leader in the storage industry, IBM can help you handle the challenges, whether you are a small to midsize company or a large enterprise.

Innovative technology, open standards, excellent performance, and a broad portfolio of proven storage software, hardware and solutions offerings are just a few of the reasons you should consider storage solutions from IBM, including the IBM System Storage TS3500 Tape Library.

For more information

To learn more about the IBM System Storage TS3500 Tape Library, please contact your IBM representative or IBM Business Partner, or visit: **ibm.com**/systems/storage/tape/ts3500

Additionally, IBM Global Financing can help you acquire the IT solutions that your business needs in the most cost-effective and strategic way possible. We'll partner with credit-qualified clients to customize an IT financing solution to suit your business goals, enable effective cash management, and improve your total cost of ownership. IBM Global Financing is your smartest choice to fund critical IT investments and propel your business forward. For more information, visit: **ibm.com**/financing

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