



# IBM TS4500 Tape Library Data Sheet

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## Highlights

- Store up to 1.05 EB 3:1 compressed per library with IBM 3592 cartridges
- Store up to 1.04 EB 2.5:1 compressed per library with IBM LTO 9 cartridges
- Strengthen security and compliance with encryption and WORM media
- Simplify user access to data stored on tape via IBM Spectrum Archive
- Provide a flexible upgrade path to expand tape storage as needs grow
- Reduce storage footprint and simplify cabling with 5U or 10U top rack space
- Optimize connectivity with FC, Ethernet and SAS interface attachments
- Cyber resilient technology with physical air gap
- Proactively monitor archived data with policy-based media verification

## A next-generation cloud storage solution that delivers high storage density and integrated management

Big data offers vast opportunities for business insight, but you need the right technology to help you manage and use that data. IBM cloud solutions can help you harness the power of big data while reducing costs and enabling a secure environment.

TS4500 answers those business needs by incorporating the latest generation of industry-leading LTO and IBM enterprise-class technology that will help organizations handle the growing data demands of modern tape use cases like big data, cloud, media and entertainment, ultra high-definition editing, digital video surveillance, Internet of Things (IoT), active file archiving and, of course, backup.

The next-generation IBM TS4500 Tape Library is designed to help midsized and large enterprises meet cloud storage challenges, including data volume growth, rising storage footprint costs, data migration efforts and the increased complexity of IT training and management as staff resources shrink.

TS4500 delivers the density that today's data growth requires—along with the efficiency and manageability to grow with business needs while preserving your existing investments in IBM tape library products. You can achieve both a low per-terabyte cost and high density, with up to 13 PB of data in a single 10 square-foot library using LTO Ultrium 9 cartridges or 11 PB with 3592 cartridges.

TS4500 provides advanced capabilities for integrated tape drive and media management, delivered within a single-

pane-of-glass management console. The TS4500 graphical user interface (GUI) is based on the unified interface used in other IBM storage solutions. It includes key features to help guide storage administrators in completing critical tasks. For example, you can monitor a tape library via persistent, at-a-glance library utilization and health status indicators.

IBM TS4500 features such as automatic control-path and data-path failover, tape-drive encryption, dual robotic accessors and WORM media support improved management and help to reduce risk in the cloud.



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*IBM TS4500 Tape Library*

In addition, IBM TS4500 now supports IBM z15, the latest generation of IBM Z servers, through virtual tape attachment. Mainframe administrators can trust TS4500 to help reduce floorspace costs and increase overall capacity.

### **Automates solutions for cloud environments**

TS4500 is a tape drive integration leader, with features including a persistent worldwide name, multipath architecture, drive/media exception reporting, remote drive/media management and host-based path failover. TS4500 L25, D25 and S25 frames support IBM TS1160, TS1155, TS1150, and TS1140 tape drives, while TS4500 L55, D55 and S55 frames support LTO Ultrium 9, 8, 7, 6 and 5 tape drives. LTO Ultrium tape drives and TS1160, TS1155, TS1150 and TS1140 tape drives can be mixed within the TS4500 library, frame by frame. The L-frame and D-frame models help boost efficiency with improved hot-swappable drive packaging. All of the frames include high-density (HD) slot technology that can greatly increase a library's total capacity.

TS4500 frame models can be placed in any active position, so the library can grow from both the right and the left side of the first L frame for floorspace flexibility. A dual-accessor option can help increase mount performance and overall system reliability and availability. Accessors can be serviced at the ends of the library, eliminating the need for a dedicated service bay frame.

A top-rack offering can also provide optional 5U or 10U of rack space on top of the library for Fibre Channel switches, tape data movers or IBM Spectrum Archive nodes.



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*IBM TS4500 Tape Library with 5U top rack*

## **Introducing Open Recommended Access Order (oRAO) to LTO 9 technology**

A key challenge when proposing an infrastructure based on tape technology is to battle the disk drive performance. While accessing disk files seems instant from a user's point of view, access time to tape files is significantly higher, raising to several minutes for a series of files. If large volumes are being traded, this issue becomes a serious performance bottleneck and optimizations are queried in order to balance the numbers. The new LTO 9 tape drive installed on the TS4500 library is designed to optimize tape performance with the introduction of Open Recommended Access Order (oRAO). The new IBM LTO 9 Tape full height drives obtain up to 73% faster data retrieval access<sup>1</sup> to your LTO Ultrium 9 tape cartridges while reducing wasted movement of the tape media and tape robotics, reduction of tape drive and media wear without an extra cost to the existing library.

## **Delivers capacity on demand**

The TS4500 library frame provides a more flexible upgrade path for users who want to expand their tape storage as their needs grow. Capacity on demand configurations for TS4500 L-frame models include an entry-level configuration, an intermediate configuration and a base-capacity configuration. All models also support HD capacity on demand configurations.



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*Inside IBM TS4500 Tape Library*

## **Optimized connectivity for drive optimization**

IBM TS4500 supports the latest TS1160 tape drive which provides reliable and cost-efficient connectivity with two different drive versions to help optimize drive utilization and reduce infrastructure requirement. TS1160 can be shared on a storage area network through the existing Fibre Channel 16 Gb interface, or Ethernet 10 Gb option designed for hyperscale and RHEL environment. If speed is the need, a 25 Gb version can be supported via RPQ. The TS1160 expanded attachment support, adding to the portfolio a new SAS 12 Gb interface that brings more versatility to businesses to help simplify storage management and system performance.

The IBM TS4500 tape library, also supports LTO tape technology. The IBM TS1080 Model F8C has an 8 Gbps Fibre Channel dual-ported interface for connection to a wide spectrum of open system servers.

## **Advanced features**

TS4500 is designed with advanced features to deliver cutting-edge performance and long-term value. For example, the Advanced Library Management System (ALMS) feature supports dynamic storage management, enabling you to create and change logical libraries and configure any drive into any logical library. TS4500 also offers automatic control-path and data-path failover to help improve business continuity and disaster recovery, and policy-based automatic media verification can help minimize data risk.



## Centralized tape management

IBM offers a wide range of management software options for TS4500. The management software options include:

- **IBM Spectrum Archive**—Allows users and applications to directly access files and directories stored on tape
- **IBM TS4500 command-line interface (CLI)**—Provides access to TS4500 library management commands
- **IBM Tape System Library Manager**—Allows multi-library environments to be managed as a single system
- **IBM Security Key Lifecycle Manager**—Simplifies encryption key management with an intuitive user interface

## Cyber resilient technology with physical air gap

The term “air gap” refers to physical or virtual isolation of systems or networks to avoid widespread corruption of data due to malware infection, system failures, or human error. The basic concept around an air gap is to bring secondary storage systems online periodically to incorporate the latest changes and then take them back offline. The “offline by design” nature of tape offers a true physical air gap and provides one of the most secure protections to confront cybercrime.

<sup>1</sup>Based on IBM internal testing of like User Data Sets, not all users will see these levels of performance improvements as optimization varies according to the number of segments retrieved. Source: *Tsuyoshi Miyamura and Osamu Matsumiya*, IBM LTO 9 Tape Drive RAO Performance Position Paper, May 2021.

**TABLE 1. IBM TS4500 Tape Library with IBM 1100 tape technology**

	Base Frame	Drive-capable and Storage expansion frame	Storage-only expansion frame	Total Support per library
Frame Definition	L25	L25	L25	
Input/output (I/O) slots	32 slots	32 slots optional		
Tape Drive types	TS1160, TS1155, TS1150, and TS1140			
Tape Cartridges type	3592 cartridges			
Compression Rate	3:1 compression			
Number of frames per library	One base frame	One base frame, up to 17 expansion frames with maximum of 7 Dx5 frames		18 frames
Number of drives	Up to 12	Up to 16 per frame		Up to 128 per library
Number of tape cartridges	Up to 660 (up to 550 in frame 1)	Up to 740 (up to 590 in frame 1)	Up to 1,000 (up to 798 in frame 1)	Up to 17,550
Capacity* with 3592 advanced cartridges	FRAME 1: Up to 11 PB native / up to 33 PB compressed ANY FRAME: Up to 13 PB native / up to 39 PB compressed	Up to 351 PB native / 1.05 EB compressed per library		
Operating systems support	<a href="#">See the IBM System Storage Interoperation Center</a>			

**TABLE 3. Physical characteristics of Top Rack frame models**

Physical Characteristics	<b>3584 Model TR2</b>	<b>3584 Model TR1</b>
EIA Space	5U	10U
Height	266.6 mm (10.5 in)	520 mm (20.44 in)
Width without covers <sup>†</sup>	725 mm (28.5 in)	725 mm (28.5 in)
Width with covers	782 mm (30.8 in)	782 mm (30.8 in)
Depth (including front and rear doors)	1212 mm (47.72 in)	1212 mm (47.72 in)
Weight of Top Rack Empty <sup>‡, §</sup>	17.5 kg (38.5 lb)	24.5 kg (54 lb)
Weight of Top Rack with 2 Side-Panels, Front and Rear Doors	32.4 kg (71.5 lb)	

**TABLE 2. IBM TS4500 Tape Library with IBM LTO tape technology**

	Base Frame	Drive-capable and Storage expansion frame	Storage-only expansion	Total Supported per library
Frame Definition	L55	D55	S55	
Input/output (I/O) slots	36 slots	36 slots optional		
Tape Drive types	LTO Ultrium 9, 8, 7, and 6 tape drives			
Tape Cartridges type	LTO Ultrium 9, 8, and 7			
Compression Rate	2.5:1 compression			
Number of frames per library	One base frame	One base frame, up to 17 expansion frames with maximum of 7 Dx5 frames		18 frames
Number of drives	Up to 12 in frame 1	Up to 12 on frame 1 / Up to 16 per frame		Up to 128 per library
Number of tape cartridges	Up to 882 (up to 730 in frame 1)	Up to 970 (up to 774 in frame 1)	Up to 1,320 (up to 1,054 in frame 1)	Up to 23,170
Capacity* with LTO 9 cartridges	FRAME 1: Up to 13 PB native / up to 32 PB compressed. ANY FRAME: Up to 15 PB native / up to 39 PB compressed.	Up to 417 PB native / up to 1.04 EB compressed per library		
Capacity* with LTO 8 cartridges	FRAME 1: Up to 8 PB native / up to 21 PB compressed	Up to 278 PB native / up to 695 PB compressed per library		
	ANY FRAME: Up to 10 PB native / up to 26 PB compressed			
Operating systems support	<a href="#">See the IBM System Storage Interoperation Center</a>			

\* Capacity depends on drives installed, number and type of cartridges used, and compression ratio achieved. Listed capacity is physical. Usable capacity may be less.

^ Supported by TSS only, solutions no-longer available in the market

† Frame width only. Extra inter-frame spacing of 30 mm (1.2 in.) is required.

‡ A TR1 top rack can optionally be installed on any TS4500 frame. Side panels and PDUs are also optional. Each side panel adds 6.8 kg (15 lb). Each PDU adds 4.5 kg (10 lb).

§ A TR2 top rack can optionally be installed on any TS4500 frame. Side panels, PDUs, Front Doors, and Rear Doors are also optional. Each side panel adds 3.6 kg (8 lb). Each PDU adds 4.1 kg (9 lb). Each door adds 3.2 kg (7 lb).