



Highlights

- Store up to 69.7 PB with 2.5:1 compression 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 expansion path to meet storage growth needs
- Reduce storage footprint and simplify cabling with 5U top rack space
- Optimize connectivity with FC, and SAS interface attachments
- Cyber resilient technology with physical air gap

IBM Diamondback Tape Library Data Sheet

A next-generation cloud storage solution that delivers ultra-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 scale storage solutions can help you harness the power of big data while reducing costs and enabling a secure environment.

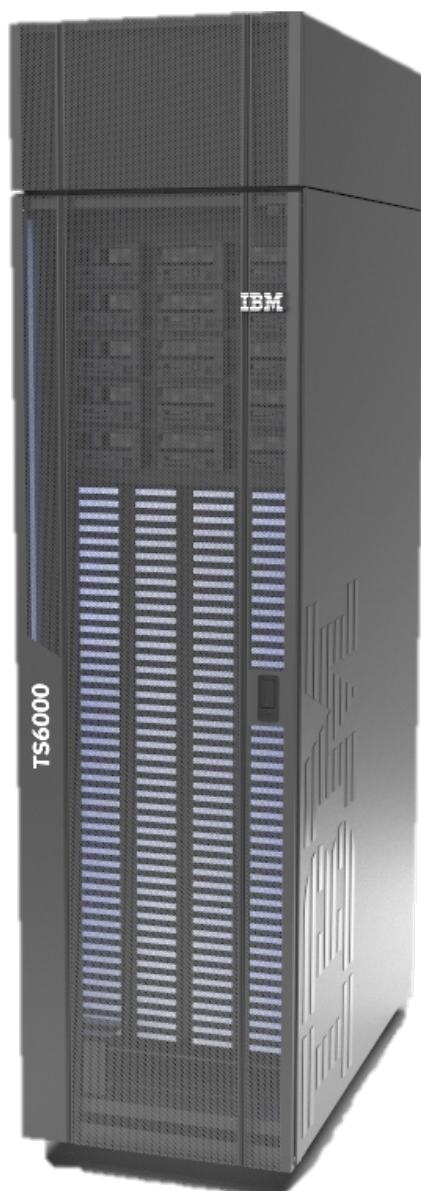
Diamondback answers those business needs by incorporating the latest generation of industry leading LTO, IBM enterprise class technology, and open compute project designs that help organizations handle the growing data demands of modern tape use cases like AI, big data, cloud, media and entertainment, active file archiving and, of course, deep data archiving.

The next-generation IBM Diamondback Tape Library is designed to help mid-sized 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.

TS6000 delivers the density that today's data growth requires—along with the efficiency and manageability to grow with business needs while improving the supportability of data infrastructure. You can achieve both a low per-terabyte cost and high density, with up to 27.9 PB¹ of native data in a single 8 square-foot library using LTO Ultrium 9 cartridges.

Diamondback provides advanced capabilities for integrated tape drive and media management, delivered within a single-pane-of-glass management console. The Diamondback graphical user interface (GUI) is based on the unified interface used in other leading IBM storage solutions. It includes key features to help guide storage administrators in completing critical tasks. The Diamondback also supports management via REST API commands over SCSI.

IBM Diamondback with features such as automatic data-path failover, tape-drive encryption, dual robotic accessor grippers and WORM media support improve management and help to reduce risk in operations.



IBM Diamondback Tape Library

In addition, IBM Diamondback supports standardized reporting, reporting via the server interface as a “3584”. Independent software vendor administrators can integrate Diamondback without automation recognition modifications to existing software. This standardized reporting reduces the time and cost of infrastructure modernization projects.

Automates solutions for cloud environments

Diamondback 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. Diamondback frames support LTO Ultrium 9 tape drives. Diamondback models help boost

efficiency with improved serviceability, hot-swappable drive packaging, tool-less design, and captured fasteners. All libraries utilize Ultra-density (UD) slot technology that greatly increase a single library frame's total capacity.

Diamondback frame models deploy as OCP influenced rack designs, enabling reduced floor space per library frame. A customer serviceable, high-performance robot with dual-grippers increase mount performance and overall system reliability and availability. Robots are serviced from the front of the library, eliminating the need for dedicated service bay frames and side access to the library.

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



IBM TS6000 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, up to several minutes for a series of files. If large volumes are being accessed, this issue can become a serious performance bottleneck and optimizations are required in order to balance the numbers. The new LTO 9 tape drive installed on the Diamondback 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 access² 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 Diamondback 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 Diamondback models include a half capacity configuration and a full capacity configuration.



Inside IBM Diamondback Tape Library

Optimized serviceability reduces time to repair

IBM Diamondback supports the latest innovations in serviceability enhancements. All service actions are performed from the front or back of the frame, enabling the frames to be placed next to each other without side service clearance. The tool-less design of components in the library reduces most service actions to less than 2 minutes in duration, while the captured screw design reduces the likelihood of fasteners being lost during service.

The improved serviceability reduces the resources required to support tape infrastructure in the data center, optimizing the storage resource time to focus on data availability without specialized training.

Diamondback is also available with full IBM service through the IBM Service Expert Care Basic and IBM Service Expert Care Premium services. IBM Service Expert Care is recommended to provide optimal system availability and reduce down-time of drives and libraries.

Advanced features

Diamondback is designed with advanced features to deliver optimized time to data, reduced time to deploy and ease of serviceability. 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. Diamondback offers pre-installed media shipment reducing time to deploy a fully loaded library frame to under 30 minutes from the time the system enters the data center. Diamondback also offers 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 Diamondback. The management software options include:

- **IBM Spectrum Archive**—Allows users and applications to directly access files and directories stored on tape
- **IBM Diamondback REST interface**—Provides access to Diamondback library management commands
- **IBM Guardium 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 and enhanced Safeguarded tape process offers a true physical air gap and provides one of the most secure protections to confront cybercrime.

¹Capacity depends on drives installed, number and type of cartridges used, and compression ratio achieved. Listed capacity is physical. Usable capacity may be less.

²Based 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 Diamondback Ultra Density tape library

Tape Drives	IBM LTO-9 tape technology
Native data rate	400 MB/sec
Native capacity	18 TB
Cartridge types	IBM Ultrium 9, 8
Number of drives	Up to 14
Compression Rate	2.5:1 compression
Number of tape cartridges	Up to 1584 (up to 1548 recommended with swap cells, cleaner cartridges and diagnostic media)
Maximum Data Transfer (Native)	20.2 TB/hr
Maximum Capacity (2.5:1 compression)	69.6 PB (1548 cartridges)
Drive Interface	8 Gb/sec Multi-mode Fibre Channel 8 Gb/sec Single-mode Fibre Channel 12 Gb/sec SAS
Service Magazine	One magazine with 10 cartridge slots
Standard Features	Install from 1 to 14 tape drives Capacity on Demand Ultra-dense media storage slots Dual active media grippers Advanced Library Management System (ALMS) Intelligent media tiering Library partitioning** LDAP** Library Managed Encryption** Mixed generation media support Captured Screws on serviceable parts 100/1000 ethernet management connectivity
Management	Remote Graphical User Interface (GUI) SCSI and REST API (compatible with existing TS4500 APIs)
Operating systems support	See the IBM System Storage Interoperation Center RHEL®, Linux, Unix, AIX, HPUX, Windows®

** Not all standard features available at GA

TABLE 2. Physical characteristics

EIA Space	42U
Height	2025 mm (79.7 in)
Width with covers	600 mm (23.6 in)
Depth (including front and rear doors)	1225 mm (48.23 in)
Weight of frame Empty	413 kg (908 lb)
Max Weight	785 kg (1727 lb)

TABLE 3. Operational environmental characteristics

	Allowable ²	Recommended ³	Maximum rate of change
Dry-Bulb temperature	16 to 32° C (60 to 90° F)	16 to 25° C (60 to 77° F)	5° C/Hour (9° F/Hour)
Humidity Range, non-condensing	20% to 80% RH	20% to 50% RH	5% RH/Hour with no condensation
Maximum dew point temperature	22° C (72° F)		
Maximum Elevation	3050 m (10,000 feet)		

1. Product equipment is removed from the original shipping container and installed but not in use - for example, during repair, maintenance, or upgrade.
2. Derate maximum dry-bulb temperature 1° C/300 m above 900 m (1.8° F/1,000 feet above 3,000 feet).
3. Derate maximum recommended dry-bulb temperature 1° C/300 m above 1,800 m (1.8° F/1,000 feet above 6,000 feet).

TABLE 4. Power requirements

	Power Consumption (watts)			Cooling Requirements
	Off ¹	Idle	Max continuous (not peak)	Btu/hr max. continuous ²
Library without drives or PDU	11	95	130	442
Each LTO-9 drive ³	0	18	37	126
Each FC 1852 PDU (in top rack)	9	9	9	31
Each FC 1853 PDU (in frame)	17	17	17	58

1. "Off" refers to power consumed when the library is connected to an AC power source and the library on/off switch is set to off.
2. To calculate the total cooling required by the library in Btu/hr, multiply the total power in watts by 3.41. To convert Btu/hr to kBtu/hr, divide your result by 1000
3. Idle power is consumed when the drive has no tape cartridge loaded. Maximum continuous power is consumed when the drive is actively reading and writing to the tape. These power consumption values includes the power that is required for the cooling fan at normal speed. In ambient environments that are hotter than the recommended range, the cooling fan might speed up and draw more power.

TABLE 5. Warranty and Service options

Warranty term lengths	1-year, 3-year, 5-year
Warranty coverage	9x5 next business day, parts only, IBM On-site limited
Service Expert Care term length	1 to 5 years
Service Expert Care Basic coverage	9x5 next business day, IOR- IBM on-site repair, Support Line
Service Expert Care Premium coverage	24x7 same day, IOR- IBM on-site repair, Support Line, Predictive alerts, 30 min. response (sev1/2), Remote Code Load, Technical Account Manager (TAM)

TABLE 6. Physical characteristics of Top Rack

EIA Space	5U
Height	266.6 mm (10.5 in)
Width without covers [†]	542 mm (21.3 in)
Width with covers	600 mm (23.6 in)
Depth (including front and rear doors)	1225 mm (47.72 in)
Weight of Top Rack Empty [‡]	17.5 kg (38.5 lb)
Max Loaded Weight of Top Rack with 2 Side-Panels, Front and Rear Doors	94 kg (206 lb)

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

† Frame width only.

‡ A top rack can optionally be installed on any Diamondback 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)