

IBM Storage Tape: Leading the Future of Data Storage

The Expanding Data Universe

The data universe is rapidly expanding — in 2023 alone, an estimated **129 zettabytes** of data were created, consumed, and stored worldwide.

This massive growth opens up new opportunities for business insights and innovation.

Currently, **36% of organizations** regard big data as essential to their operations, which has led **28% of them** to maintain archives exceeding **4 petabytes**.

However, storing such large volumes comes with significant costs — making a **sustainable data retention strategy** critical for every organization's future.



Data Governance and Operational Balance

Organizations are challenged to maintain **data privacy and security** while ensuring accessibility to meet SLAs and manage escalating IT expenses.

Physical tape remains a truly **offline medium**—data stored on tape is inaccessible without being mounted on a drive, creating a genuine **air gap** between networked systems and mission-critical data.

Tape technology supports both **physical and logical WORM** (Write Once, Read Many) capabilities that comply with long-term regulatory retention standards.

Backup architectures are increasingly returning to the **traditional 3-2-1-1 model**, where tape provides the most **cost-effective** medium for secondary and tertiary backup copies—both on-premises and off-premises, online or fully offline.

By storing secondary and tertiary copies on tape, organizations can preserve **fast recovery** on flash systems while ensuring **immutable and economical** long-term backups.

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Rethinking Tape in Modern Infrastructure

Tape is often underestimated by those who have not experienced its modern advantages. For strategic business continuity and defense, long-term **multi-copy, secure, compliant storage** is indispensable.

IT teams aiming to **control costs** and **protect against cyber threats** benefit from tape's **optimized economies of scale** and **unmatched total cost of ownership (TCO)**—freeing budget to reinvest in growth.

Tape technology not only meets **sustainability goals** by reducing energy use and e-waste but also delivers **eco-friendly, scalable** storage at a fraction of HDD's operational and capital costs. Modern tape systems integrate seamlessly with **unstructured data solutions**, making them easy to use and cost-efficient.

The Role of Tape in Data Management Strategy

Only a small portion of enterprise data is accessed after 30 days—yet it is often stored across aging infrastructures. Over **65% of enterprise data** originates from **System Z** environments, requiring stringent continuity through backup and HSM systems.

Whether for compliance, audit readiness, or legal obligations (such as **HIPAA**), businesses must retain data securely and retrieve it quickly when needed.

Thus, the challenge is twofold: **efficient storage** and **continuous access control**.

Organizations must answer:

“How can I store massive amounts of data as cost-effectively and accurately as possible—and retrieve it whenever and wherever I need it?”

Once this is addressed, deeper questions emerge:

- How can enterprise data be unified and leveraged as a strategic asset?
- How can automated data environments—such as System Z—be orchestrated for optimal control?

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IBM Tape Leadership and Innovation

Adding value to data is only half the equation—**retaining it in a resilient environment** completes it.

IBM has led the tape storage market for nearly **two decades**, with consistent innovation in **LTFS** and cutting-edge **tape research**.

IBM's demonstrated **580 TB prototype** and current **50 TB cartridge capacity** represent the highest in the industry, along with **46.4 PB** of density in just **0.76 m²** of space.

IT and I/O leaders face explosive data growth, stricter SLAs, and rising cloud costs. Cloud storage, while flexible, introduces concerns around **privacy, governance, availability, and unpredictable expenses**.

IBM emphasizes that **data location** is key—cost predictability and compliance depend on where and how data is stored.

Tape provides a **secure, cost-controlled** solution for long-term data, immune to bandwidth or egress fee volatility.

Cost, Durability, and Sustainability Advantages

Tape offers **58% lower media acquisition costs** and stores more than **2.4 zettabytes** of global data (as of 2022).

It boasts **16x higher demonstrated capacity** than HDDs and grows at nearly **4 TB per year** in average unit capacity.

Modern tape achieves a **bit error rate of 9.7E-21**, equivalent to **12 nines of durability**—far exceeding HDD reliability (6 nines).

For perspective, writing data to LTO-9 cartridges would create a tape length circling the Earth **1.42 times**.

Environmental and Economic Impact

Comparing IBM **Diamondback Tape System** with traditional HDD solutions shows:

- **96% reduction** in total carbon footprint (from extraction to recycling)
- **97% lower annual energy consumption**
- **50% less floor space** required

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When considering sustainability and longevity, **tape offers up to 82% lower total cost of ownership (TCO)** than cloud storage.

IBM's **TCO calculator tools** can assist in modeling scenarios for any data strategy.



IBM's Comprehensive Tape Portfolio

IBM provides an unmatched range of **adaptive tape solutions**—from **portable single-drive systems** for digital media workflows to **Exabyte-scale automated libraries** for enterprise environments.

- **TS4500 Enterprise Automation:** Up to 128 drives, 184 TB/hour throughput, and nearly 877 PB capacity.
- **IBM Diamondback:** Ultra-high-density design with 46.4 PB capacity in 0.76 m² and 20.1 TB/hour throughput.
- **TS4300 Modular Library:** Expandable up to 11.5 PB native storage.
- **TS2290 / 7226 / TS2900:** Compact desktop and rackable options for entry and mid-range deployments.

- **LTO family (LTO-7, 8, 9, 10):** Adaptive and cost-efficient for organizations of any size.
- **Enterprise family (TS1150, TS1160, TS1170):** The only mainframe-compatible, feature-rich tape systems in the industry.



With **two complementary formats—LTO and Enterprise**—IBM ensures “the right data, in the right place, at the right time.”

Tape remains the **cornerstone of sustainable, secure, and scalable data retention** for the hybrid cloud era.