



Highlights

- Deploy IBM® Linear Tape-Open (LTO) Ultrium Generation 8 drives to help lower storage costs and double the storage density compared with LTO Ultrium 7 drives
 - Enable 20 percent faster data access over LTO Ultrium 7 with new LTO Ultrium 8 technologies
 - Gain support for AME and AES-256 standard encryption, data partitioning, security key management and much more while maintaining compatibility with LTO Ultrium 7
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The eighth generation of success

Innovations from IBM position tape storage as the right solution for many modern enterprises

Far from being in decline, tape today provides data storage solutions to enterprises large and small in a wide range of industries around the planet. In fact, tape:

- Is used by the majority of the world's large organizations¹
- Ships more capacity than external disk²
- Is significantly less expensive than disk storage²
- Is orders-of-magnitude more reliable than disk¹
- Can be used in production IT environments to lower costs through new software-defined storage (SDS) and flash-based architectures

IT industry analyst Enterprise Strategy Group (ESG) states: “Nothing is more cost-effective, reliable, or energy-efficient for long-term data retention than a tape in a library slot or on a shelf, and it continues to play a key role for organizations across the globe.”³

IBM has never lost sight of the value and the promise of tape-based storage. IBM has an ongoing commitment to the resilient technology, and the ever-expanding storage solutions it continues to provide has recently been reaffirmed with the release of new Linear Tape-Open (LTO) Ultrium 8 technologies and offerings. Because they increase tape's ability to provide cost-effective, practical storage solutions for 21st century business requirements and data center data growth challenges, the new LTO Ultrium 8 drives and supporting libraries are already being described as next-generation tape technology for next-generation use cases.



Eighth generation of innovation

IBM is the leading tape storage vendor on the planet, with twice the market share of any other vendor.⁴ This success is the result of a more than six decades-long commitment to the technology, and the adoption and execution of a product strategy based on innovation, continual improvement, constant communication with customers and business partners and a focus on component quality.

IBM LTO Ultrium tape technology is designed for the heavy demands posed by the storage of less active data in modern use cases such as the Internet of Things (IoT), big-data analytics, media and entertainment, genomics, video streaming and digital archiving. This proven tape technology has been enhanced in new LTO Ultrium 8 tape drives to provide increased capacity, performance and reliability compared to LTO Ultrium 7.

LTO Ultrium 8 tape drive enhancements include:

- Native data transfer rates of up to 360 Mbps on the full-height version and 300 Mbps on the half-height version
- Cartridge capacity up to 30TB with routine 2.5:1 compression ratio
- 6 Gbps SAS or 8 Gbps Fibre Channel attachment
- 1 GB internal buffer in both full-height and half-height drives
- Tape drive AME and AES-256 standard encryption support
- Support for data partitioning, data encryption, key management and IBM Linear Tape File System™ (LTFS) format in IBM Spectrum Archive™
- Full read/write compatibility with LTO Ultrium 7 media

This high-capacity generation of IBM tape storage products is designed to deliver outstanding performance, capacity and reliability, combining the advantages of linear multi-channel, bi-directional formats with enhancements in servo technology, data compression, track layout and error correction. The new 12 TB IBM cartridges help lower costs by enabling storage of twice the capacity in the same footprint and increase performance and productivity by allowing 20 percent faster data access. LTO Ultrium 8 drives support write-once-read-many (WORM) cartridges, and they feature new tunnel magnetoresistance head technology.



Half-height LTO Ultrium 8 tape drive.

The LTO Ultrium format is a powerful, scalable, adaptable open-tape format developed and continuously enhanced by IBM and the other members of the [LTO Program](#). The current LTO Ultrium roadmap has tape technology mapped out through 12 generations. This provides confidence to consumers and organizations in the storage market that tape will continue to be the most cost-effective storage medium for many years.

With IBM Spectrum Archive, accessing data stored on an IBM tape cartridge—instead of on disk—is transparent. IBM Spectrum Scale™ keeps a pointer to the data on tape and, if requested, retrieves the data without user or operator intervention. By leveraging the capabilities of IBM Spectrum Scale, IBM Spectrum Archive enables high performance and reliable access across the storage infrastructure. In turn, IBM Spectrum Archive enables IBM Spectrum Scale installations to add extensive capacity with lower costs for media, floor space and power. And, with policy-based migration, archive capacity can be expanded without impacting data availability.

Ready for the next generation of use cases



Full-height LTO Ultrium 8 tape drive.

Tape storage solutions have always enjoyed strong deployment rates in traditional business and data center use cases such as backup and long-term archiving. For example, recent ESG research shows that nearly half of surveyed organizations rely on tape as some part of their primary backup ecosystem.³ In addition to its data integrity and cost benefits, tape also offers the advantage of portability, which allows for an “air gap” between data and online hackers, providing a uniquely effective safeguard against cyberattacks.

But the extremely positive data economics and security of tape storage play well in less traditional use cases as well. Consider cloud data storage. As much as 80 percent or more of the data enterprises generate will never be accessed after 90 days.⁵ If you are providing flexible, pay-as-you-go cloud IT services to internal company customers, you’ll certainly deal with this fact. If you move inactive data to tape storage, costs will dive but system performance will not. If you are a provider of public cloud services, implementing tape storage at a cost of less

than USD.002 per GB per month⁶ will give you significant competitive advantage. Leveraging the benefits of IBM tape solutions, enterprises using IBM Cloud services have realized storage total cost of ownership (TCO) savings of up to 90 percent⁷ over conventional storage solutions, with substantial improvements in data analytics system performance.

And now, innovations in SDS technologies such as IBM Spectrum Scale and IBM Spectrum Archive, as well as ongoing advances in tape technology itself, are making tape more attractive than ever for addressing the storage requirements of a much broader and more modern range of use cases. Using tape as a dynamic component of data storage solutions instead of just a place to park archived and often forgotten information can offer many benefits, such as finding value hidden in data that would otherwise never be accessed again by running it through various engines of insight. Thanks to tape’s lower cost and now much higher performance, data that was once just a budget loss—except for the value of meeting governmental data retention and compliance requirements—suddenly transforms into a valuable asset providing insights into past and current trends, customer behaviors and greater operational efficiencies.

Media and entertainment

The media and entertainment (M&E) industry may offer the most compelling and revealing tape use case. This sector has evolved enormously over the past several decades. Far from the days of simple broadcast channels, the M&E sector now encompasses:

- *Entertainment*: Games, film production, music, sports and even theme parks
- *Media and cable networks*: Broadcast networks, pay TV, cable and satellite broadcast operators
- *Information providers and publishing*: Newspapers, books, magazines and publishing
- *New media and advertising*: Marketing communications, advertising and online services providers

The IT infrastructure needed to support 21st century M&E offerings such as streaming video and interactive advertising has evolved as rapidly as the industry itself. With an ever-growing demand for data storage, it has been vital for entertainment professionals to find an economical, reliable, durable and high-volume storage solution to preserve their content. And in many cases the answer has been LTO technology. Not only do tapes last for up to 30 years when properly stored, but LTO Ultrium 8 tape cartridges can each store 30 TB of compressed data. Additionally, with an increasing amount of video productions being shot in the 4K and 8K ultra-high definition (UHD) formats, the need for reliable digital storage continues to grow—the 8K UHD format requires 16 times more storage than standard 1080p HD resolution. Plus, LTF5 serves as an effective and robust way to record long block files such as video while also helping with on-the-fly video editing.

Earlier in the M&E evolution, IBM tape solutions were already winning awards and helping enterprises in this sector achieve substantial cost savings over traditional storage solutions and processes.⁸ A more recent M&E example is provided by Speicher M1 GmbH, based in Bremen, Germany. The company saw an opportunity to distinguish itself from competitors by offering a cloud-based service for full-lifecycle management of media assets. Speicher M1 implemented an IBM tape storage solution integrated with IBM Spectrum Scale and IBM Spectrum Archive SDS technologies.

The cloud-based platform provides a host of industry-specific features that enable efficient processing and collaboration among distributed teams, including advanced search and filter options that allow customers to easily navigate through extensive footage. Customers can access the service via an online portal, making it quick and easy for teams to manage, edit and market projects regardless of location. Thanks to IBM tape and complementary technologies, Speicher M1 has gained a cost-efficient media asset management and distribution platform that allows the company to offer its customers an integrated, high-performance solution at a significantly lower rate than competitors.

Flape

Until the advent of powerful, deeply integrated SDS solutions such as IBM Spectrum Scale and IBM Spectrum Archive, the practicality and benefits of deploying a flash and tape-only storage architecture were unclear. The theory behind such an approach to storage is simple—to simplify the overall storage architecture and lower costs, place active data on flash to accelerate storage performance and efficiency, and move less frequently used data to tape to lower overall storage costs. This new storage architecture has informally been named “flape.”

Combining tape, flash and SDS in an integrated, cost-effective, high performance storage solution might be a powerful choice for a number of industry use cases, such as M&E, where high-resolution editing requires high performance and massive capacity, healthcare, genomics research, retail, big-data analytics and even autonomous cars.

A proof of concept of flape architecture was recently performed in the Ennovar Institute laboratory at Wichita State University. Using IBM Spectrum Scale and IBM Spectrum Archive SDS components, IBM flash and tape storage systems, and analytics application workloads provided by the National Institute for Aviation Research (NIAR), the Ennovar team demonstrated the advantages of a flape architecture while achieving an average of more than three times faster analytics performance.⁷

Next-generation analytics, cognitive and cloud workloads are driving the need for storage speed, but at the same time, managing large amounts of unstructured data places significant pressure on storage infrastructure to provide high capacity at very low cost. Ennovar and IBM together created a software-defined infrastructure designed to address storage requirements for high performance and capacity at low cost. The Ennovar team leveraged IBM Spectrum Scale to manage the placement of data between flash and tape in a true flape architecture, and also a solution using disk for comparison. The flape architecture used IBM flash storage as a high-performance scratch space for analytics processing, while the comparison solution used a conventional spinning disk array for the scratch space. Both solutions moved inactive research data to low-cost IBM tape storage leveraging IBM Spectrum Archive.

The testing at Ennovar proved that flash and tape storage can effectively work together to provide storage solutions with excellent performance, high capacity and very competitive low costs. Application workloads and business use cases that require fast transactional processing of data that won't be modified afterward—such as Blockchain, the IoT, and many types of financial and banking applications—will be especially good candidates for flape solutions. In fact, almost any type of workload will benefit from this revolutionary new storage architecture. Soon, “flape” may be a word heard around the world.

Video surveillance

Analysts estimate that in 2013 nearly 33 percent of all the data in existence then was involved in video surveillance systems, and by 2020 when there may be more than 40 zettabytes in the digital universe, video surveillance will still account for 16 percent.⁹ These astonishing estimates underscore the magnitude of the video surveillance challenge for enterprises worldwide. The widespread adoption of network cameras in the video surveillance market has accelerated its convergence with the IT industry and ushered in a period of robust expansion. This has caused a surge in demand for enterprise storage solutions that are simultaneously open, flexible and cost-effective. The market for enterprise storage solutions in security is forecast to grow by a 14.8 percent compound annual growth rate between 2014 and 2020.¹⁰ IBM LTO tape solutions address these requirements very effectively.

Of course, tape has been the traditional solution for video surveillance data storage because it provides easily scalable, cost-effective, very high-volume capacity. But 21st century video surveillance has evolved—thanks to the rapidly accelerating capabilities of cognitive applications. Today, video data is regarded as a treasure trove of information that can be utilized—both in real-time and afterward—for the purposes of situational awareness, predictive analysis and forensic investigation. These types of video content analysis (VCA) require agile data retrieval and movement from storage to analytics engines and back.

VCA requirements bring the story around again to the much faster data access and simple file management and movement provided by the latest generations of IBM tape solutions and their deep integration with IBM flash and SDS technologies. One might imagine that video surveillance could become a major consumer of flape solutions, for example. Flash storage can provide the high performance “scratch space” where video streams arrive from edge sources for initial real-time analysis. Cognitive applications search for familiar faces, get-away cars or designated shapes of interest. And soon VCA will do much more—it will add an increasingly rich layer of metadata to the video stream files—who was recognized, the color of their clothing and the make of the vehicle they left in. This metadata will provide invaluable help with later analysis. And it will help increase the value of tape, because the data about the data can remain on fast storage, not just with the enormous video files themselves. Instead of manually searching for hours for a familiar face in miles of tape cartridges, a quick metadata search in flash-accelerated IBM Spectrum Scale-managed metadata files can identify the relevant video file. IBM Spectrum Archive can find and load the file in a few moments, and data can move from low-cost, highly reliable, easily accessible IBM tape back to analytics engines or monitor screens for reuse.

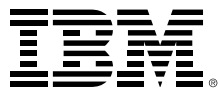
Next generation of success

This is the future of tape. LTO Ultrium 8 continues tape's innovation toward faster access, lower cost, greater security, longer life and more functionality. Complementary technologies such as IBM flash and SDS constantly increase their compatibility, integration and capabilities with tape. And even more industries, business use cases and leading enterprises find that tape isn't living in the past. It's innovating toward the future, just as the companies are.

For more information

To learn more about IBM Linear Tape Open (LTO) Ultrium Generation 8, contact your IBM representative or IBM Business Partner, or visit: ibm.com/storage/tape

Additionally, IBM Global Financing provides numerous payment options to help you acquire the technology you need to grow your business. We provide full lifecycle management of IT products and services, from acquisition to disposition. For more information, visit: ibm.com/financing



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Actual available storage capacity may be reported for both uncompressed and compressed data and will vary and may be less than stated.

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⁶ Cost of tape based on average street price of IBM nearline tape solution

⁷ "Tape goes high speed," *IBM Systems*, November 2016. <https://www-01.ibm.com/common/ssi/cgi-bin/ssialias?htmlfid=TSW03515USEN>

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