TECH BRIEF

ATTO
The Power Behind the Storage

Using Thunderbolt™ and LTFS with LTO™ Tape to Enhance Media Workflows

Thunderbolt™ technology offers high throughput (40 Gbps) to peripheral devices, but even more importantly, brings versatility to traditionally limited mobile computers. It is also changing how media professionals think about external storage by opening up many new use cases: a single Thunderbolt cable can provide connectivity to 40Gb Ethernet, 32Gb Fibre Channel and 12Gb SAS.

Content is everything in media and entertainment (M&E), and Thunderbolt provides the high-performance connectivity needed to transfer content data to SAS or Fibre Channel storage systems. It also provides the means to quickly distribute content via Ethernet networks. With Thunderbolt, the broadcast and film industries have more flexibility to manage their creative assets. But now, with the adoption of 4K and higher formats, traditional storage options are too expensive to accommodate the growing amount of data. A challenge also exists in being able to cost-effectively protect content.

Thunderbolt provides a solution to these obstacles when combined with linear tape-open (LTO™) tape. Prior to Thunderbolt, moving large volumes of data in the media sector involved portable disks — there was no easy way to move content from a mobile computer to tape, which is less expensive. Now, connecting a Thunderbolt-to-SAS adapter outfitted with an LTO SAS tape drive provides a simple and affordable means to store, archive and transport large amounts of content.

LTO-8 SAS Tape Technology

- Performance: Up to 750MB/s compressed transfer rate
- Capacity: Up to 30TB compressed capacity
- Security/Ease of Use: AES 256-bit data encryption security, WORM functionality, and partitioning capability
- Compatibility: One generation of backward read and write capability simplifies data migration projects and protects a company's investments
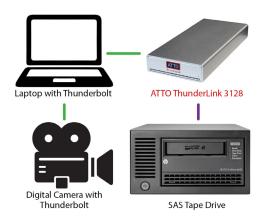- Larger capacity eases tape management since there are fewer tapes with which to deal

Laptop with Thunderbolt   ATTO ThunderLink 3128   SAS Tape   SAS/SATA or JBOD Storage

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TECH BRIEF

The value of tape has increased to media professionals since the introduction of Linear Tape File System (LTFS). LTFS is a format that allows data to be written to tape so that it can be read anywhere with open source LTFS software. It also indexes the tape and makes it searchable so that files can be retrieved much faster. Users can browse contents and drag and drop files from a desktop or folder directly to and from tape just as with a hard drive or thumb drive. And tapes can be shared with any Mac® or Windows® users who have LTFS installed on their system, regardless of what kind of LTO drive they own.

LTO cartridges allow for at least two media partitions: one to hold content, and the second to hold that content's index. These can be independently accessed to provide faster data retrieval and improved management, with the ability to recall data down to the frame level. This fits naturally with DPX formats in that applications can control the relative placement of data on tapes to facilitate efficient recall. But the real value of tape is that it provides a near infinite capacity since cartridges can be replaced as they fill up. Tape also has a low cost per gigabyte, making it a good alternative to disk-based storage.

Since LTFS is free and well-supported, multiple users at multiple locations can easily share the same data, regardless of what hardware and operating system they're using. Another driving factor in M&E is that the increasing visual resolution and complexity of media (HD, 4K, 3D, etc.) creates larger and more numerous files that must be managed. Storing hours of high-resolution media live on disk quickly becomes cost prohibitive — a challenge that LTO tape with LTFS addresses.

Laptop with Thunderbolt   ATTO ThunderLink 3128

Digital Camera with Thunderbolt   SAS Tape Drive

Thunderbolt & Camera Media

LTFS Benefits

- Ease of use: LTFS used for increased mobility, not just archiving
- Make multiple copies concurrently in different transcoded formats
- Fully integrated file-based workflow that can handle and move mixed formats seamlessly
- LTO tapes can be used across multiple platforms and in various parts of the workflow. LTO can replace pro-video tape archives, and is less expensive to operate than disk-based storage

There are limitations to tape in that it's linear and, while file data is stored across the whole tape, the file directory is stored at the beginning. This forces the tape drive to constantly rewind and fast forward as you interact with it. You can actively use files stored on tape, but you may want to instead consider it as an archive and transport medium and simply copy files from tape back to disk for editing. LTFS also doesn't support tape spanning, which is the ability to automatically write a large archive across multiple tapes. Ultimately, this means having to put a little more effort into managing your archives.

More Effective Use of Camera Media

Most digital cameras encode images directly to a solid state device (SSD) or removable disk. This media can be quite expensive. Fast drag-and-drop transfers of content to tape via LTFS using mobile computers with Thunderbolt allows for efficient reuse of media, reducing the number of SSDs or disks that must be purchased.

Post Production

Post-production is where all of a project's ingredients come together: camera content, digital effects, graphics and sound. These elements are repeatedly edited, enhanced, assembled and reviewed. Ideally, this collection of medium to high bit rate content would reside in a common storage pool that multiple creative professionals from various companies could access from different geographic locations. But the reality is that making content available in this way is expensive and a logistical challenge. In most cases, very large files end up moved over networks that aren't equipped to handle them

effectively, or on removable hard drives over the "sneaker net." Thunderbolt and LTO tape provides an affordable alternative for exchanging content files, which can be loaded to disk for editing and then moved back to tape to free up expensive online storage capacity for new work. ATTO Thunderbolt adapters provide connectivity to most types of primary storage devices, meaning that the cost and benefit for each technology can be effectively maximized.

TRANSPORT

Network-based solutions can be used for many distribution needs, but given the large size of media files, significant network bandwidth is required. This increases both complexity and expense. When combined with the ease of use provided by LTFS, LTO tape's density and cost effectiveness make it a very effective transport medium. Large amounts of data can be transferred to tape via Thunderbolt and moved more quickly and economically than over the network/Internet — a compelling prospect for media houses that produce terabytes of data on a daily basis. The encryption features of LTO tape also help to secure data that's in transit.

TRANSCODING

Thunderbolt technology also adds value by simplifying the transcoding process. You can seamlessly ingest, transcode and store to multiple sources concurrently by attaching cameras, primary storage and near-line storage directly to a workstation, which saves an enormous amount of time and money. Consider Adobe® Prelude, for example. By transcoding to multiple formats as you ingest clips, this "ingest and transcode" application helps to deal with the enormous amounts of file-based video footage common to modern-day productions. You simply set up a primary destination folder and format, add more destinations and their corresponding formats, and then click Ingest. Adobe Prelude transfers, transcodes and verifies the media and it can copy files to various locations simultaneously. This is particularly useful when your project's media comes from several camera sources that don't match. Having the ability to transfer transcoded files to more than one location also helps for securing and backing up original footage, and for simple handoffs for editing.

BACKUP

Losing a full day's worth of production is very costly. That's why backup of daily footage to LTO tape is a common requirement. LTFS facilitates backup by enabling small, portable independent systems to easily write daily content to tape. Archiving with a Thunderbolt tape solution also satisfies the mandate imposed by insurance companies on many motion picture productions to maintain multiple copies of content.

Technologies improve and change over time. Operating systems, file systems and data formats change. As the years pass, the likelihood of retrieving files on disk or other traditional mechanisms decreases. With LTFS, however, you can load a current LTFS driver and read the tape content regardless of the original source system, operating system or version. And due to the way LTFS is laid out, you can copy the contents to a computer, examine the XML index and identify which blocks of data and associated metadata belong to which file. LTFS is also supported by a variety of Media Asset Management (MAM) applications, which allow for the simple tracking of media across multiple tapes.

Thunderbolt technology simplifies workflows for media professionals by bringing high-end workstation capabilities to mobile computers. And it's not just about simplicity; there's also a basic economic equation: Hard disk drives (HDDs) are too expensive, use too much power, produce too much heat and take up too much space to be a viable storage medium for the large amount of data generated during a typical media production. By providing a mobile solution for media professionals to transport and exchange content data, ATTO Thunderbolt adapters combined with LTO tape and LTFS provide an example of the cost and convenience benefits that Thunderbolt technology offers.