



Quantum

LTFS

Linear Tape File System

**Setting Your Videos and Data Free
Now and for the Future!**



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LTO Showcase Agenda

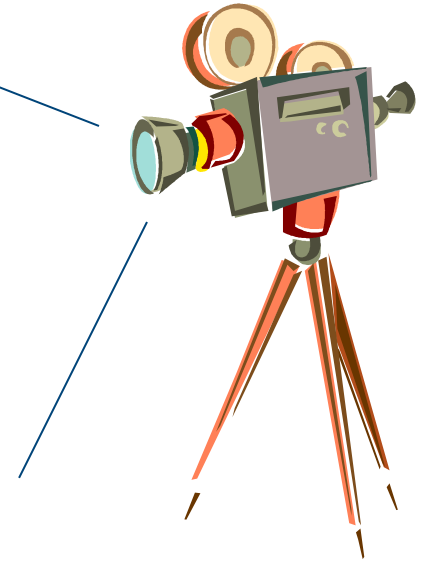
Conference Room: S224

- Tuesday 4/17 from 4PM to 6PM
 - LTO Program - LTFS Overview
 - HP
 - IBM
 - Quantum
 - 1 Beyond
 - Arkivum
 - Cache-A
 - Q&A
- Wednesday 4/18 from 1PM to 3PM
 - LTO Program - LTFS Overview
 - Crossroads
 - FOR-A
 - Panasonic
 - SGL
 - Storage DNA
 - XenData
 - Q&A

LTFS
Linear Tape File System

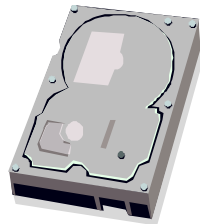
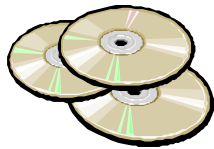
Agenda

- What is LTFS?
- How does it work?
- What are the cost comparisons?
- What are the benefits?
- What LTFS Supported Offerings are Available?
- LTO User Stories
- What the experts are saying
- How do I start using LTFS?



What is the Linear Tape File System?

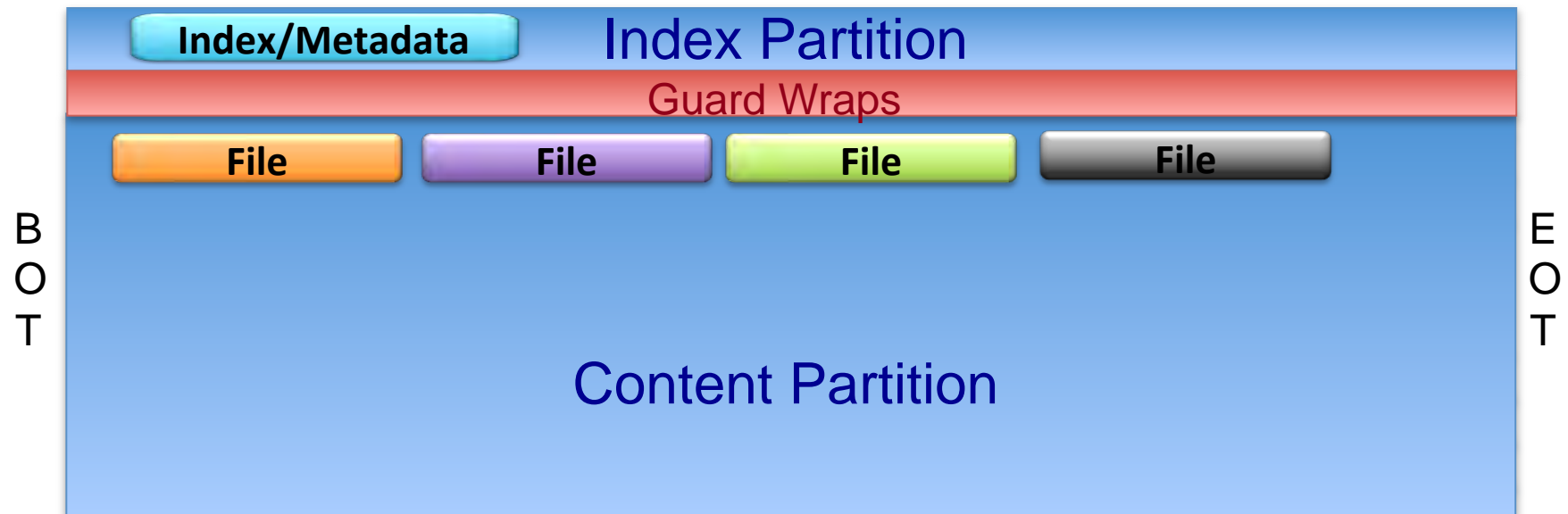
- A open software specification that allows simple and new ways of accessing data on tape
(LTFS spec doc available at: www.ultrium.com/ltfs)
- Self-describing tape format to address data archive requirements
- Implemented on dual-partition LTO-5 tape
 - First partition holds the tape index / metadata
 - Second partition holds the content
- It presents a tape as an extension of the operating system: appears as another drive letter, icon or folder like a disk or memory stick



LTO Tape Joins the Ranks of Easy to Use Portability

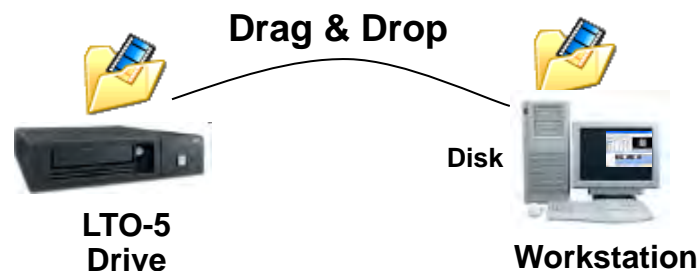
LTFS: How does it work?

- LTFS utilizes media partitioning (new to LTO Gen 5)
- Tape is logically divided “lengthwise” into two partitions
 - **Index partition:** File system info, index, metadata (37.5 GB)
 - **Content partition:** Contains the files / content bodies (1425 GB)
- When mounting the tape, the Index is copied to the workstation/server memory for fast access and updates
- Periodically the index is backed up to the content partition



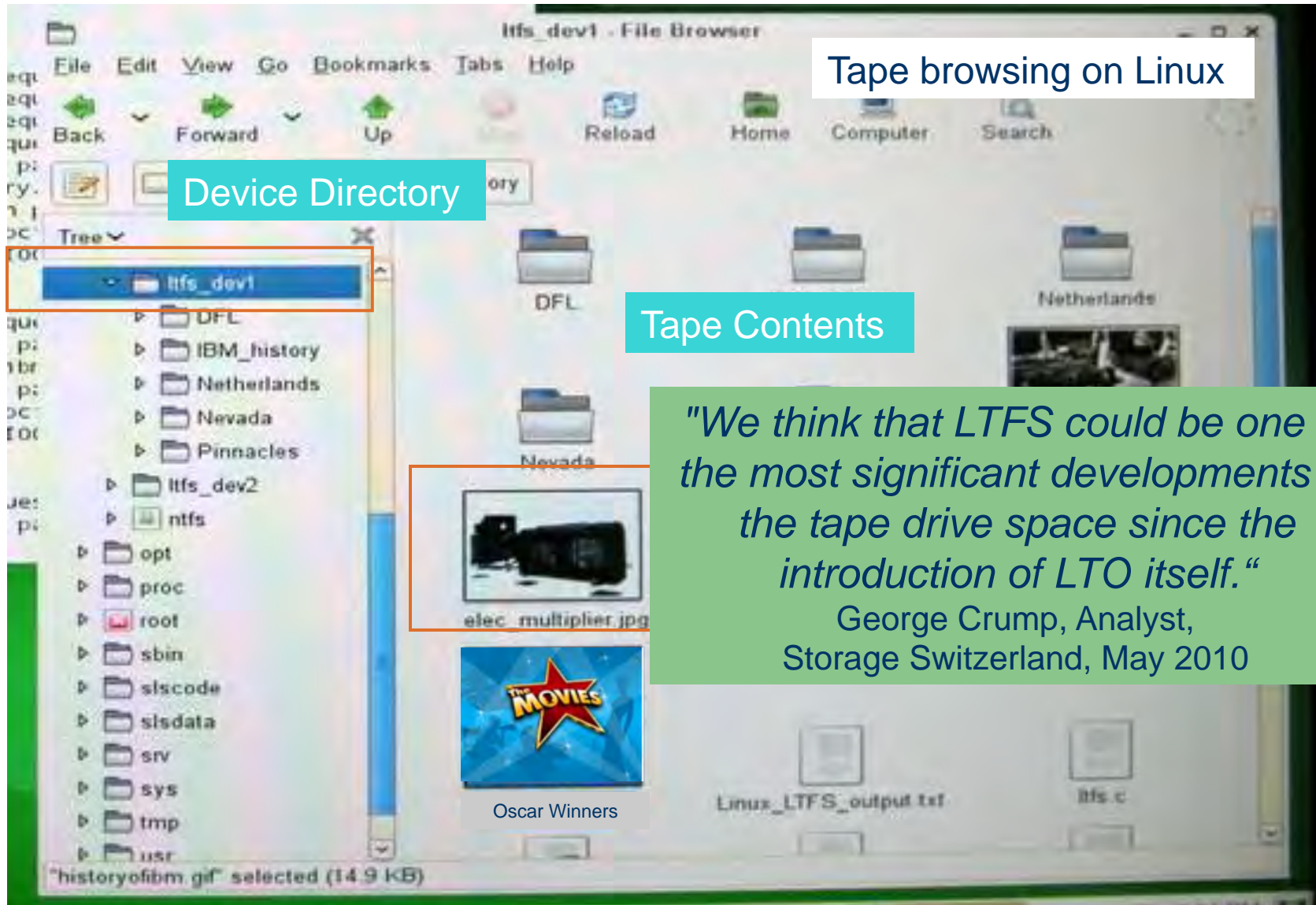
How it works: LTFS – Drag and Drop

- File access on an LTO-5 is similar to hard disk, CD/DVD disc or USB media
- Access with OS browser (e.g. Windows Explorer) and drag & drop to/from the tape
- Can use workstation applications: File Open, Write, Read, Append, Delete and Close from workstation applications
- Use directory tree structures: the tape can be used in a random access fashion...
- ...The Tape is still a sequential device
 - Requires media to be moved to the correct position
 - On average can take 40 to 60 seconds to reach beginning of file
 - After location of the file, provides a transfer rate of up to 140MB/s (280MB/s 2:1 compressed)

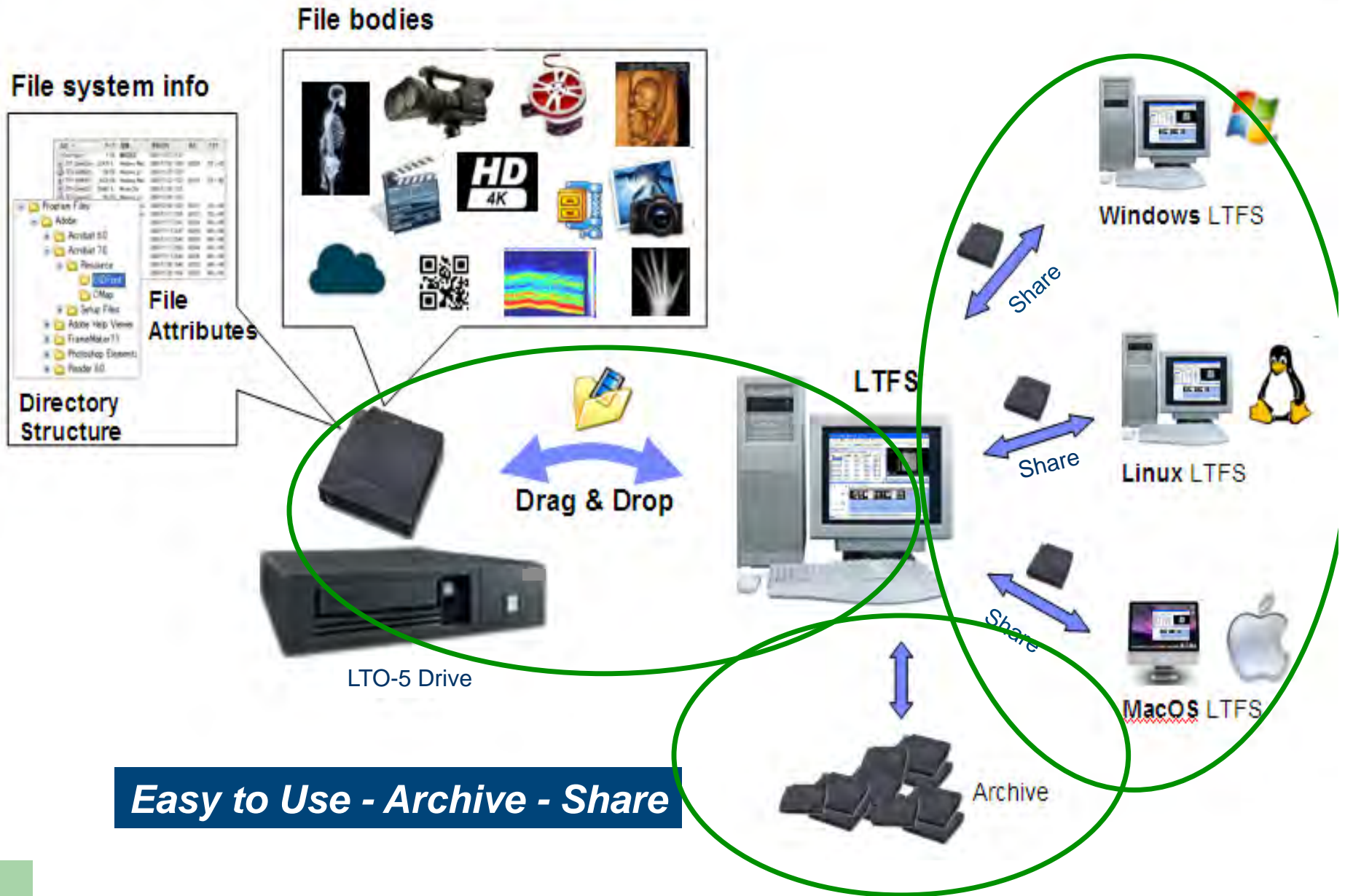


How it Works: LTFS in Action with File Browser

Files can be accessed on tape directly from any application



LTFS – Easily Exchange, Archive and Share Files



LTO Tape Can Help Reduce Storage Costs

LTO-5 Tape vs. Video Media

Format	GB	Cost per unit ¹	\$ / GB	LTO Tape Advantage
LTFS/LTO 5 tape	1425 ²	\$52.50	\$0.04	NA
G-Tech G-Drive	3072	\$297.00	\$0.10	3 X
HDCAM SR tape	698	\$217.00	\$0.31	8 X
XDCAM disc	50	\$67.50	\$1.35	37 X
P2 SSD card	64	\$828.00	\$12.94	350 X

Source: MTMP March 2012

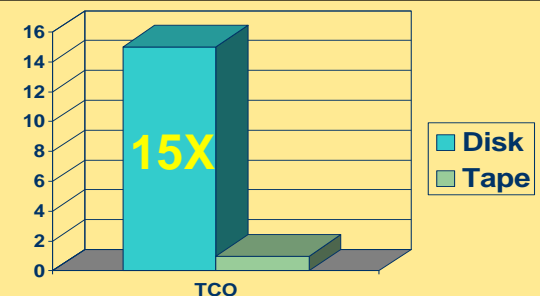
1. Cost per unit based on market prices as of February, 2012

2. Capacity of an LTFS formatted LTO 5 tape data partition

TCO: SATA Disk System vs. LTO-5 Tape Library System¹

- 12 Year TCO Archiving Study
- Back-end storage costs: hardware, maintenance, floor space and energy
- Disk storage is **15 times** Tape TCO

•The cost of energy alone for the average disk-based solution exceeds the entire TCO for the average tape-based solution



¹Clipper Notes report "In Search of the Long-Term Archiving Solution - Tape Delivers Significant TCO Advantage over Disk", The Clipper Group, Dec.23, 2010. This was a general TCO study and did not specifically focus on LTFS or video storage.

LTFS: What are the potential benefits?

"I am shocked!
This is exactly
what we need!"



"Now I can offer an
LTO-5 archiving
service to my movie
clients."



"LTO-5 technology
gives tape-less
work-flow....with
tape!"



• Easy to use

- View contents in OS browser directory tree
- Simple "Drag & Drop" movement of data

• Improved archive storage

- "Memory stick like" self describing file system
- Tape can tell you what's on it now and in the future
- Up to 30 year shelf life

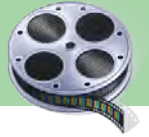
• Increased data mobility-portability

- Compatibility across OS environments
- No backup/archive software needed to view content
- A single storage media standard
- File, HW, SW and camera agnostic

• Reduced costs and energy consumption

- LTO tape is less expensive than other storage formats
- Tape is "green" ...a cartridge draws no power!

Some Independent LTFS Supported Developments



- **1Beyond**: high performance video production and post production, tapeless workflow and storage systems (<http://www.1beyond.com/>)
- **Arkivum**: assured archiving, 100% guaranteed safe data storage service (<http://arkivum.com/>)
- **Cache-A**: archive appliances serving the digital video industry (<http://cache-a.com/about.php>)
- **Crossroads**: online, file-based archive, combining disk storage with LTFS tape storage for a fast, cost effective, long-term data archive (www.crossroads.com)
- **Digital Media Logix**: LTFS enabled solutions for M&E, Video Surveillance, Archive Management (<http://digitalmedialogix.com/>)
- **FOR-A**: innovative products and advanced video and audio technology (<http://www.for-a.com/>)

And more...LTFS Supported Developments



- **Panasonic**: this product can easily archive P2 content and preview P2 content from LTO tape directly like video tape (www.panasonic.com)
- **SGL**: content archive and storage management solutions to the media and entertainment (<http://www.sglbroadcast.com/>)
- **Storage DNA**: Intelligent LTO-5/LTFS archiving for file-based workflows, application archiving (Avid, Final Cut etc.) and continuous backup (<http://storagedna.com>)
- **Thought Equity**: large scale archive management and “smart content” metadata tools (www.thoughtequity.com)
- **TOLIS Group Inc**: Bru Backup Software-Producers Edition version 2.3.0 provides native LTFS support for OS X users (<http://knowledgebase.tolisgroup.com/?View=entry&EntryID=260>)
- **XenData**: LTO video archives for the media industry scaling to multiple petabyte enterprise solutions (www.xendata.com)

FotoKem Uses LTFS for Reality TV Post Production

- **FotoKem background**

- 700+ employees; HQ in Burbank, California USA
- Film lab & post production facility

- **Business Need**

- Must have reliable long term archive from XDCam disks
- TAR tapes not self describing
- Need ease of use, reliable technology, low cost



www.fotokem.com

- **Solution - Benefits**

- LTO-5 tape library and LTFS; Open standard; Cross O/S platform compatibility
- Self describing tapes: Can easily determine tape contents with browser
- Offers long term reliable archive, easy to use, cost effective
- Can store 100 XDCAM disks on 1 LTO-5 tape
 - Saves considerable space
 - Allows reuse of XDCAM disks
 - Can make 2 LTO tape copies inexpensively (keep one copy onsite)

BAMM.TV Archives Music Videos to LTO-5 Tape and LTFS



“LTO-5 technology is very reliable. Over the last year we’ve used over 60 tapes and have had zero failures!”

Jamie Morganstern, Director of Operations

▪ **Company Profile: BAMM.TV**

- San Francisco based
- Produces and distributes video for independent musicians
- 12 video / audio editors
- In house production and post-production

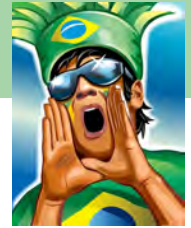
▪ **Business Need:**

- Large storage need (HD, Hoard all footage)
- SAN storage is expensive
- Removable HDs are fragile (~8% failure rate), limited shelf-life, expensive and take up excessive space
- On site and off-site copies are needed
- Video/data is BAMM’s livelihood and must be protected!

▪ **Solution Results: LTO-5 Technology with LTFS**

- Effectively backed up 80TB of uncompressed video and finished projects
- Slashed storage costs from ~ \$0.20/GB to ~\$0.05/GB
- Built an archive and restore workflow with fast recovery
- Scalable archive solution with a 30-50YR life
- LTFS standard format for easy sharing
- Assured data is protected with reliable off-line and off-site protection

What the experts are saying!



- **Hot Storage for 2012! LTFS: "...opening up new new possibilities for incorporating tape into workflows and making archive easier"** Storage Magazine
- **LTO5 with its own File System: An Enabling Technology for Archive, Backup, Simple DR - even the Cloud**
By Eric Slack, Senior Analyst, [Storage Switzerland](#)
- **LTO-5 and LTFS: Shaking the Pillars of Heaven**
By Mark Ferelli, [Computer Technology Review](#)
- **LTFS: Crazy like a fox "The more I thought about this idea the more I liked it... (LTFS is) also excellent for long term storage (i.e. archiving)."**
By W. Curtis Preston, [BackupCentral.com](#)
- **"The file system allows users to drag and drop files to and from tape the way they do with disk."**
By Andrew Burton, Site Editor, [SearchDataBackup.com](#)
- **What is LTFS? ...could be one of the most significant developments** in the tape drive space since the introduction of LTO itself.
By George Crump, Storage Switzerland
- **LTO-5 with LTFS Gives Tape a New Lease on Life**
By Jerome M. Wendt

How do I get started using LTFS?

For stand alone drives it's free!

1- Get an LTO-5 tape drive and LTO-5 cartridge.



2- Download and install LTFS software from your drive vendor's weblink.

3- Format and mount an LTO-5 cartridge using LTFS

4- Start using files on tape from your browser directory tree.

Now you can drag and drop files to and from your LTO-5 tape!

Addresses the needs of industries with rich media such as:

- Media and Entertainment
- Digital Surveillance
- Medical Imaging
- Legal files / documents
- Architectural drawings
- Cloud applications and more!



Come see us at NAB 2012

- **Booth# SL-11809 (South Hall)**
 - Live LTFS Demos
 - Mini-theatre LTFS presentations
- **Two LTFS Showcase sessions:**
 - Presentations by Vendors with LTFS supported offerings split over two days:
 - Tues, April 17, 4-6pm
 - Wed, April 18, 1-3pm

thank
you!



Learn about LTO technology at: www.trustlto.com

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