SXL-8500 Series:
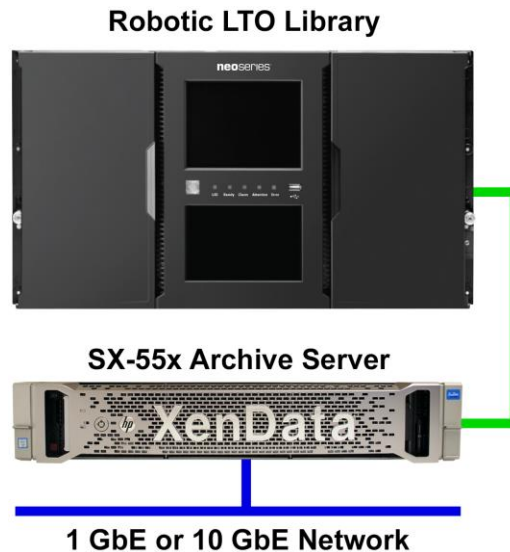## LTO Digital Video Archives

Scalable LTO-7 Archive System 420 TB to 3.3 PB

managed by XenData6 Server software

Robotic LTO Library

SX-55x Archive Server

1 GbE or 10 GbE Network

Functionality

Standard File-Folder Interface

Object Storage Interface

Writes to LTO in LTFS or TAR

CIFS/SMB and FTP Network Protocols

Unlimited Offline LTO capacity

Windows and Mac Compatibility

4.8 to 240 TB Archive/Restore RAID

From 2 to 10 LTO-7 drives

Automatic LTO Tape Replication

Optimized File Restores

Supports Partial File Restores

File and Folder Spanning

Repack of LTO Tape Cartridges

Supports Multiple LTO Groups

Tape Contents and File Search Reports

E-mail Alerts and On-Screen Notifications

Overview

The SXL-8500 Series of LTO archives combine ease of use and scalability. The base models include a 6U robotic library with two high performance LTO-7 drives and 70 LTO cartridge slots under management, providing 420 TB of near-line LTO capacity. By adding up to six 80 slot expansion modules, the capacity scales to 3,300 TB. Furthermore, the system can be configured with up to 10 LTO-7 drives. Each LTO-7 has a transfer rate for both archive and restore operations of 300 MBytes/s enabling increased performance as storage needs grow.

The SXL-8500 archives are powered by an SX-550 Series server, delivering high performance and a wide range of connectivity options, including 10 GbE Ethernet, connection to a fibre channel SAN, as well as local file transfers via USB 3.0.

It is ideal for growing applications that need modular video archives with capacities up to 3.3 PB of near-line storage.

Great Compatibility

Files are presented in a standard file/folder structure which is typically shared over the network. This means that the archive appears like disk. Files are transferred to and from the archive locally or using either the standard Windows network protocol (CIFS/SMB) or FTP file transfers. In addition, the system provides an object storage interface using an XML API.

These interface options mean that the system works with most applications used in video surveillance and creative video. Alternatively, video files may be archived and restored manually to a file-folder structure using Windows Explorer or FTP utilities.

The SXL-8500 Series is compatible with most of the applications commonly used in creative video including a wide range of media asset management systems. It delivers a highly reliable lower-cost and long-term tier of media storage which is complementary to video edit storage.

The systems also support XenData VS functionality optimized for video surveillance applications. This includes non-vaulted functionality which retains files on LTO for a defined retention period, after which the content is deleted and the LTO cartridges are automatically reformatted ready for re-use.

Easily Scalable to 3.3 PB

Archive Server

The SXL-8500 Series archive systems are available in three models:

Model	Server	Disk Cache	Characteristics
SXL-8501	One 8 core Xeon processor, 32 GB RAM	Internal 1.2 TB disks in RAID50; max capacity of 26.4TB	Good performance
SXL-8503	Two 8 core Xeon processors, 64 GB RAM	6TB SAS disks in external RAID enclosure; max capacity of 240TB	High performance; very high capacity disk cache.
SXL-8504	Two 8 core Xeon processors, 64 GB RAM	Internal 800 GB high SSDs in RAID5; max capacity of 19.2TB	Very high performance

All models run a Windows Server 2012 R2, Standard Edition operating system.

Highly Modular LTO Library

The base SXL-850x models have an expandable 6U robotic library with 70 LTO cartridge slots and ten mailslots, all of which are licensed for use. The system supports up to 6 expansion modules. Each 6U expansion module adds 80 licensed slots which provides an additional 480 TB of capacity when using LTO-7 cartridges.

Number of Expansion Modules	Number of Slots	Near-line LTO Capacity
0	70	420 TB
1	150	900 TB
2	230	1,380 TB
3	310	1,860 TB
4	390	2,340 TB
5	470	2,820 TB
6	550	3,300 TB

The SXL-850x base models include two LTO-7 drives.

The SXL-8500 Series library
with 6 expansion modules

Functionality

Key Functionality and Benefits

Standard File Interface – The digital archive accepts all file types and presents them in a single Windows file/folder structure. Files are written to and retrieved from the archive as though from a standard disk-based volume. **Benefit:** works with most applications natively.

Object Storage Interface – In addition to the file system interface, an XML interface is provided. The XML instructions include the ability to pull assets from and push assets to a specified location, the option to batch and prioritize jobs and obtain job status. **Benefit:** easily allows third party applications to directly control and monitor the archive system.

Standard Network Protocols – The solution is optimized for CIFS/SMB and FTP file transfers. **Benefit:** works with the most common network protocols used in media and entertainment.

Manages Near-line Disk, Near-line & Offline Tape – The administrator defines policies for RAID caching that can be tailored for different file types and folders. **Benefit:** frequently accessed files may be retained on disk.

Supported Tape Formats – LTFS and TAR. **Benefit:** avoids proprietary formats and vendor lock-in.

LTO Cartridge Replication – The software automatically generates replica LTO cartridges that may be exported from the library for off-site retention. **Benefit:** provides strong data protection.

End to End Verification – A read head that follows the write head is used to verify the data just written. **Benefit:** provides an automated check-sum operation for all data written to LTO.

Self-Describing LTO Cartridges – Each LTO cartridge contains all the file system metadata necessary to recover all the files stored on it. **Benefit:** LTO cartridges easily transferred between archive systems.

Supports LTO Cartridge Spanning – The Administrator defined policies can be set to allow or prevent files being spanned across multiple LTO cartridges. Additionally, the transfers of multiple files and folders will be automatically spanned across multiple cartridges. **Benefit:** archive operations are not limited by the capacity of individual LTO cartridges unlike most basic LTFS systems.

Dynamic Expansion of LTO Cartridge Groups – The system will dynamically expand LTO cartridge groups to meet capacity demands. **Benefit:** system runs automatically without need for administrator intervention.

Optimized Restores – The system restores a queue of files in the shortest possible time. The restore requests are processed in an order that minimizes unnecessary tape movement. **Benefit:** greatly decreases total restore time when restoring multiple small files.

File Version Control – The software provides comprehensive file version control. **Benefit:** deleted files and old file versions may be restored from LTO (unless the files have been purged using a repack operation).

Partial File Restore – With very large files there is often a need to read only a portion of the file. For example, this frequently occurs with multi-gigabyte video files when a short clip is requested. The XenData object storage interface is available with partial file restore (PFR) based on timecodes. In addition, the XenData file system interface supports PFR based on byte offset which when combined with applications such as a Dalet media asset management system provide a timecode based PFR solution. **Benefit:** reduces time to restore short clips.

Repack of LTO Cartridges – This copies only current files, excluding deleted files and old versions of files, to new LTO cartridges. **Benefit:** permits recovery of capacity from rewritable LTO cartridges.

Metadata Backup and Restore – A file system metadata backup and restore utility is provided. **Benefit:** rapid system restore in case of rebuild after RAID failure.

Alert Module – A software module is included which provides e-mail and on-screen alerts. These are tailored to the needs of archive system operators, system administrators and IT support personnel. **Benefit:** ideal for cartridge management and instant notification of any problems.

Cartridge Contents and Search Reports – The files contained on any cartridge, including offline cartridges, can be listed in a report. Additionally, search reports list all the files and their LTO cartridge barcode locations that match a user-defined search term. The reports may be exported to Excel for further analysis. **Benefit:** useful archive management tool.

Industry Standard File Security – The file server runs Windows Server 2012 R2 and integrates fully with the Microsoft Windows security model based on Active Directory. **Benefit:** easy integration into an existing Windows environment.

Policy Driven File Management

Three Storage Levels

The system administrator defines policies that determine where files are physically stored on the digital archive. These policies support hierarchical storage management (HSM) and automatic tape cartridge replication. The Archive Server supports three main levels of storage hierarchy:

Online with one instance of a file on RAID and, in addition, there will typically be one or more instances on LTO. In this case the file will be retrieved from disk when accessed over the network.

Near-line with at least one instance of a file on an LTO cartridge within the library and no instance on RAID. When a near-line file is accessed over the network, the system automatically transfers the file from LTO to disk cache. As soon as the file transfer to disk commences, the file transfer over the network also starts.

Offline with no instance on RAID and one or more instances of a file on LTO cartridges, all of which have been exported from the tape library.

Data protection is achieved by automatically generating multiple instances of a file. The archive system can automatically produce copies of LTO cartridges which may be exported from the tape library and retained off-site.

Tailored Policies

The SXL-6500 Series archives may have many different policies, tailored to the needs of the different file types and folder contents that are being archived. A typical XenData file management policy is illustrated in the diagram opposite. On writing a file, it is first written to RAID. As soon as the file has been successfully written to disk, it is put into a queue to be written to a primary LTO cartridge. After completion of this operation, there are two instances of the file – one on RAID and one on LTO. LTO cartridge replication is optional and may be set to occur at the same time as the primary is written or may be scheduled.

The administrator can configure the system such that after a file has been securely written to LTO, the instance stored on RAID will be flushed (deleted and replaced by a sparse file, often called a stub file) to release the disk space that was occupied by the file. Files are available to users even if they have been flushed from disk and are only stored on LTO. Flushing from disk does not affect the location of a file within the file system or make it inaccessible in any other way; the only impact of flushing is to increase the time taken to read the file because it first has to be accessed on LTO. After a file has been flushed from disk, its off-line attribute bit is set and the file is still available from LTO within the library. The Microsoft off-line bit changes network timeout periods to allow retrieval of the file from storage types with long access times.
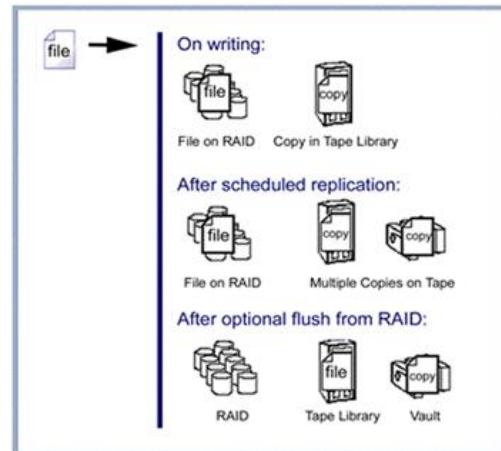
On reading from LTO, a file is automatically restored to disk as it is simultaneously transferred over the network. This use of caching for restores ensures that the LTO tape drives provide fast transfers even if the network connection becomes slow.

Offline File Management

The archive system manages an unlimited number of LTO cartridges that have been taken entirely offline. This means that the capacity of the archive effectively becomes infinite. It also means that operator intervention is required to move LTO cartridges from the shelf to the library when there is a need to restore an offline file.

When a file is taken offline by exporting all the LTO cartridges that contain that file, it continues to be shown in the archive file/folder structure. However, this is not the complete file; it is a sparse file which has the same attributes as the complete file, such as reported size, modification date, etc. When an offline file is accessed by a program, a message is returned immediately that identifies that the file is not available. Also the XenData software puts a message in the Windows Event Log and optionally sends an e-mail and/or on-screen message that identifies which LTO cartridges contain the requested file. This notification allows the correct cartridge to be easily identified and then imported back into the LTO library. The file will then be automatically restored when the read request is retried.
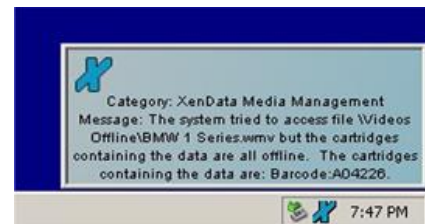
Intelligent Cartridge Management

Importing and Exporting Cartridges

LTO cartridges may be bulk loaded and unloaded using the tape magazines or alternatively the mailslot may be used to import or export up to three cartridges at a time. The mailslot allows import and export of cartridges without taking the robotic library offline.

Intelligent Barcode Management

The LTO library includes a barcode reader which automatically scans all LTO cartridges and makes the barcode information available to the Archive Server. Barcodes are the ideal way to keep track of LTO cartridges in an archive: the barcode is readable by human operators and machine readable by the barcode reader in the library.

The XenData system automatically writes the barcode information to an in-cartridge memory chip within each LTO cartridge. This allows the barcode to be available even when the cartridge has been exported from the library and is being used within a stand-alone LTO drive which does not have a barcode reader.

One of the key features of a SXL-8500 system is LTO cartridge replication. The system can be configured to automatically create replica cartridges for data protection purposes. This capability is typically used to create replica cartridge pairs and after a pair of cartridges becomes full, one of the duplicate cartridges is exported from the library and stored in a secure offsite location. The XenData system will automatically pair A-B barcode sequences to tape replicas, making for easy management of the replica cartridges.

LTO Cartridge Compatibility

LTFS and TAR

The archive system supports both LTFS (Linear Tape File System) and TAR (Tape ARchive) cartridge file system formats. These formats define how data is written to the tape: LTFS and TAR use different data structures for the file data and file system metadata that are written to tape. When configuring a group of LTO cartridges, the administrator selects either TAR or LTFS as the cartridge file system format. In either case, the file restored from the system is identical to the original archived file. For example, if an MXF file is written to the archive, the same MXF will be restored.

The choice of cartridge file system format is important when transferring cartridges from one system to another. The LTFS format was developed by IBM and announced in 2010. Since then, it has been widely adopted, making it an exchange standard which allows cartridges to be moved between systems created by different vendors.

LTO-7 and LTO-6

The archive system is compatible with the following LTO cartridges:

LTO-7 – 6 TB rewritable cartridges which may be written in either LTFS or TAR
LTO-6 – 2.5 TB rewritable cartridges which may be written in either LTFS or TAR

In addition, the system is write/read compatible with WORM LTO-7 and LTO-6 cartridges and will read LTO-5 cartridges written in LTFS or on a XenData system using the TAR format.

Archive System Management

Automatic Operation

The archive system is designed for maximum reliability and requires minimal operator intervention. The server is based on highly reliable HP DL380 Gen 9 hardware.

If automatic LTO cartridge replication is used, the system should be checked from time to time and full replica cartridges should be exported from the robotic library for location offsite.

If there is a problem with the system, email alerts and on-screen notifications will be issued. All messages are logged in the Windows Event Log.

Keeping Track of File Location

The system includes four utilities to keep track of the relationship between files in the file system and their physical storage locations:

XenData History Explorer, a plug-in to Windows Explorer, provides a file system view of the archive which identifies the physical locations of all instances of all files including old versions of files and deleted files. It identifies the barcodes of all cartridges that contain a particular file.

XenData Volume View, a plug-in to Windows Explorer, allows the user to browse the file and folder structure stored on any LTO cartridge.

XenData Tape Cartridge Contents Reports which list the contents of any cartridge and allows export of the report to an Excel spreadsheet. This is illustrated opposite.

XenData File Search Reports which list all files that meet user-specified criteria and identify the barcodes of the cartridges that contain those files. The results of this report may also be exported to Excel.

These utilities are particularly useful when files are moved offline.

XenData Report Generator - [Report1]

Report Type: File Search
Volume Set: All Volume Sets
Showing: All Files
Search Type: File Name Text
Search Term: venice

No	File Name	Generation	Version	File Size (bytes)	Barcode	Status
1	/Venice/002632433169_Venice Toma to Zaccaria_May_2006.avi	0	1	1,487,700,480	Barcode:00144BL5	Current
2	/Venice/002632433169_Venice Toma to Zaccaria_May_2006.mov	0	1	682,195,238	Barcode:00144BL5	Current
3	/Venice/002645458536_Venice taking the bus_May_2006.avi	0	1	989,532,160	Barcode:00144BL5	Current
4	/Venice/002645458536_Venice taking the bus_May_2006.mov	0	1	428,431,097	Barcode:00144BL5	Current
5	/Venice/002678933456_Venice Grand Canal_May_2006.avi	0	1	411,132,928	Barcode:00144BL5	Current
6	/Venice/002678933456_Venice Grand Canal_May_2006.mov	0	1	141,976,961	Barcode:00144BL5	Current

Specifications

Robotic Library

LTO Drives	
LTO drive type:	IBM LTO-7 half-height
Drive interface:	6 Gb/s SAS
Transfer rate - writing and reading:	300 MBytes/s native per drive
Base Model Library	
Total slots – including mailslots:	80
Licensed Near-Line LTO Capacity:	420 TB
Mailslots – as shipped:	10
Mailslots - maximum	10
Number of LTO drives included:	2
Maximum number of drives:	6
Barcode Reader:	Included
Configuration interfaces:	Touchscreen front panel and web interface
Interface to Medium Changer:	ADI
Mean Swaps Between Failures:	>2 million robot load/unload cycles
Power Requirements	
Number of Power Supplies:	2
Voltage:	100 – 240 V
Frequency:	50 – 60 Hz
Power (peak):	350 W
Dimensions	
19 Inch Rack Form Factor:	6U
Width:	18.7 inches (475 mm)
Depth:	35.1 inches (892 mm)
Weight (including 2 LTO drives):	90 lbs (41 Kg)
Rack rails:	Included
Expansion Modules	
Total slots:	80 slots
Mailslots:	None
Number of LTO drives included:	0
Maximum number of drives/module:	6 (Note: total number of drives is subject to limits of the applicable server)
Power Requirements	
Number of Power Supplies:	2
Voltage:	100 – 240 V
Frequency:	50 – 60 Hz
Power (peak):	350 W
Dimensions	
19 Inch Rack Form Factor:	6U
Width:	18.94 inches (481 mm)
Depth:	36.42 inches (925 mm)
Weight:	70 lbs (32 Kg)
Rack Rails:	Included

Archive Server

Archive model:	SXL-8501	SXL-8503	SXL-8504
Server Model:	SX-551	SX-553	SX-554
External RAID:	None	XenData 44 bay	None
Processors:	One Xeon 8 core processor	Two Xeon 8 core processors	Two Xeon 8 core processors
RAM:	32 GB	64 GB	64 GB
Boot volume RAID:	Mirrored 300 GB SAS disks	Mirrored 300 GB SAS disks	Mirrored 300 GB SAS disks
RAID Controller Cache:	2 GB	4 GB	2 GB
Base RAID cache configuration:	Six 1.2 TB SAS disks in RAID 50	Twenty-four 6TB SAS disks in RAID 60	Eight 800 GB SSDs in RAID 5
Base RAID cache capacity:	4.8 TB	120 TB	5.6 TB
Max RAID cache capacity:	26.4 TB	240 TB	19.2 TB
Max number of supported LTO drives	4	8	10

Library connections:	One 6 Gb/s SAS port per LTO drive
Software	
Operating System:	Windows Server 2012 R2, Standard Edition
Archive Management Software:	XenData6 Server
Object Storage Interface Software:	XenData Workflow API
Notification Software:	XenData Alert Module
Network Connections	
Base Model:	Four 1 GbE ports
Option:	Two 10 GbE ports
USB Connections	
Rear:	2 USB 3.0
Front:	1 USB 3.0
Network Protocols:	CIFS/SMB and FTP
Power Requirements	
Number of Power Supplies:	2
Voltage:	100 – 240 V
Frequency:	50 – 60 Hz
Peak Power Requirements (each):	800 Watts
Dimensions	
19 Inch Rack Form Factor:	2U
Width:	17.54 inches (445 mm)
Depth:	26.75 inches (680 mm)
Weight:	51.5 lbs (23.4 Kg) maximum
Rack Rails:	Included

Additional Information

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