



SXL-8600Q Series

LTO-8 Digital Video Archives

Managed by
**XenData Archive Series
Software**

*Scalable LTO-8 Archive System
840 TB to 6.6 PB*



Functionality

- ✓ 840 TB – 6.6 PB library capacity
- ✓ Manages Unlimited Offline LTO
- ✓ Highly Dependable LTO Technology
- ✓ Lowest Cost Data Storage per TB
- ✓ Standard File-Folder Interface
- ✓ CIFS/SMB and FTP Network Protocols
- ✓ 5.6 TB – 240 TB Disk Cache
- ✓ Writes to LTO in LTFS or TAR
- ✓ Replicates LTO Automatically
- ✓ End to End Verification
- ✓ Optimized File Restores
- ✓ Partial File Restore Support
- ✓ File and Folder Spanning
- ✓ Automatic LTO Generation Migration
- ✓ Supports Multiple LTO Groups
- ✓ E-mail Alerts and On-Screen Notifications
- ✓ Backed by Excellent Customer Support

Overview

The SXL-8600Q Series of LTO archives combine ease of use and scalability. Starting at 840 TB of near-line LTO capacity, the system is easily expanded to 6.6 PB by adding library expansion modules.

The SXL-8600Q Series is powered by a high performance XenData SX-560 Series Archive Server which means files are archived to and restored from LTO just as files are transferred to and from a standard disk volume. The SX-560 Series server manages an expandable Qualstar LTO library and connects to a 1 GbE or 10 GbE network. It may also be connected to a SAN via fibre channel.

The LTO archive system runs automatically, driven by administrator defined policies. It can automatically create duplicate LTO cartridges which may be exported from the tape library and retained in an offsite location, providing strong data protection for your digital assets.

Highly Expandable

The LTO library in the base system is a 6RU Qualstar Q80 rack mount unit. It has 80 physical slots of which 10 are mail slots that are used to import and export LTO cartridges. When using LTO-8 cartridges, the remaining 70 slots provide 840 TB of near-line capacity.

The library may be further expanded by addition of up to six 6RU expansion modules that each provide an additional 80 physical slots. Each module adds 960 TB when using 12 TB LTO-8 cartridges. When the maximum number of modules are added, the library takes 42RU of rack space and provides a 6.6 PB capacity.

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, an XML driven API is available which allows third party applications to move files to and from the archive and provide a tight integration. These interface options mean that the system works with most applications. Alternatively, files may be archived and restored manually to a file-folder structure using Windows Explorer or FTP utilities.

Easily Scalable to 6.6 PB

Archive Server



The SXL-8600 Series archive systems are available with three different servers:

Model	Server	Disk Cache	Characteristics
SXL-8602	Two 8 core Xeon processors, 64 GB RAM	60-100 TB usable - RAID50	High performance Large disk cache
SXL-8603	Two 8 core Xeon processors, 64 GB RAM	120-240 TB usable – RAID 50	High performance Very large disk cache
SXL-8604	Two 8 core Xeon processors, 64 GB RAM	5.6 – 8.8 TB usable – SSDs in RAID5	Very high performance

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

Highly Modular LTO Library

The base SXL-860x models have an expandable 6U robotic library with 70 LTO cartridge slots and ten mail slots, 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 960 TB of capacity when using LTO-8 cartridges.

Number of Expansion Modules	Number of Slots	Near-line LTO Capacity
0	70	840 TB
1	150	1,800 TB
2	230	2,760 TB
3	310	3,720 TB
4	390	4,680 TB
5	470	5,640 TB
6	550	6,600 TB

The SXL-860x base models include two LTO-8 drives.



The SXL-8600Q Series library with 6 expansion modules

Key Functionality and Benefits

Standard File Interface

The digital archive accepts all file types – from an MXF to a WORD document - 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 or network share. **Benefit:** works with most applications natively.

Disk Cache

The disk cache delivers high performance in a system that combines the access times of disk with all the dependability and cost-effectiveness of tape.

XML Interface

In addition to the file system interface, an XML driven API is available. 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 move files to and from the archive and provides a tight integration with the application.

Standard Network Protocols

The solution is optimized for CIFS/SMB and FTP file transfers. Furthermore, it supports connectivity to a SAN. **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 disk 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.

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.

LTO Cartridge Replication

The software automatically generates replica LTO cartridges that may be exported from the library for off-site retention. If a cartridge fails for any reason, a replacement is easily recreated.

End to End Verification

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

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. The XenData XML interface is available with partial file restore (PFR) based on timecodes. In addition, the XenData file system interface supports PFR based on byte offset.

Easy Migration from One Generation of LTO to Another

Repack function allows seamless migration from one LTO generation to another.

Metadata Backup and Restore

A file system metadata backup and restore utility is provided. **Benefit:** rapid system restore in case of rebuild after disk 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 appliance runs Windows Server 2012 R2 Standard Edition 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. 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.

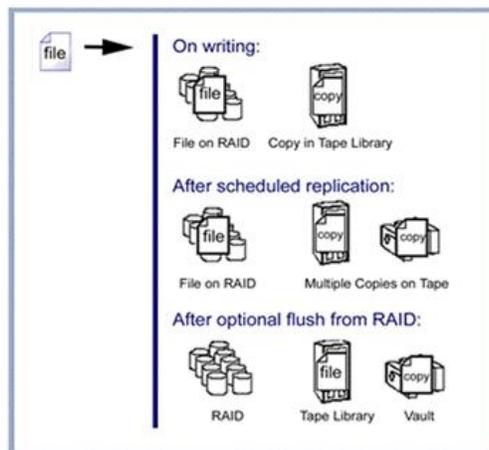
Offline with no instance on RAID and one or more instances of a file on LTO cartridges, all of which have been exported from the tape library.

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-8600 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 to occur later.

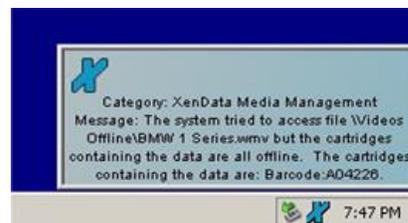
The administrator can configure the system such that after a file has been securely written to LTO, the instance stored on RAID will be flushed (deleted and replaced by a sparse file, often called a stub file) to release the disk space that was occupied by the file. Files are available to users even 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.



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 mail slot may be used to import or export up to ten cartridges at a time. The mail slot 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-8600 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

Compatible with LTO-8 and LTO-7 Cartridges

The archive system is compatible with LTO-8 and LTO-7 cartridges, and provides capacities per cartridge from 6 TB to 12 TB:

12 TB – write/read compatible with LTO-8 rewritable cartridges that have a native capacity of 12 TB.

9 TB – write/read compatible with LTO-7 rewritable cartridges which have been formatted using the LTO-8 SXL-8600 system or another LTO-8 drive to provide 9 TB of native capacity.

6 TB – write/read compatible with LTO-7 rewritable cartridges which have been formatted using an LTO-7 or LTO-8 drive to provide 6 TB of native capacity.

Quoted capacities are without compression. When using compressible files, the capacities typically increase by X 2.5 per cartridge.

In addition, the system is write/read compatible with WORM LTO-7 cartridges.

Note: 1 TB equals 1 x 10E12 bytes.

Writes using LTFS and TAR Formats

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.

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 10 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:

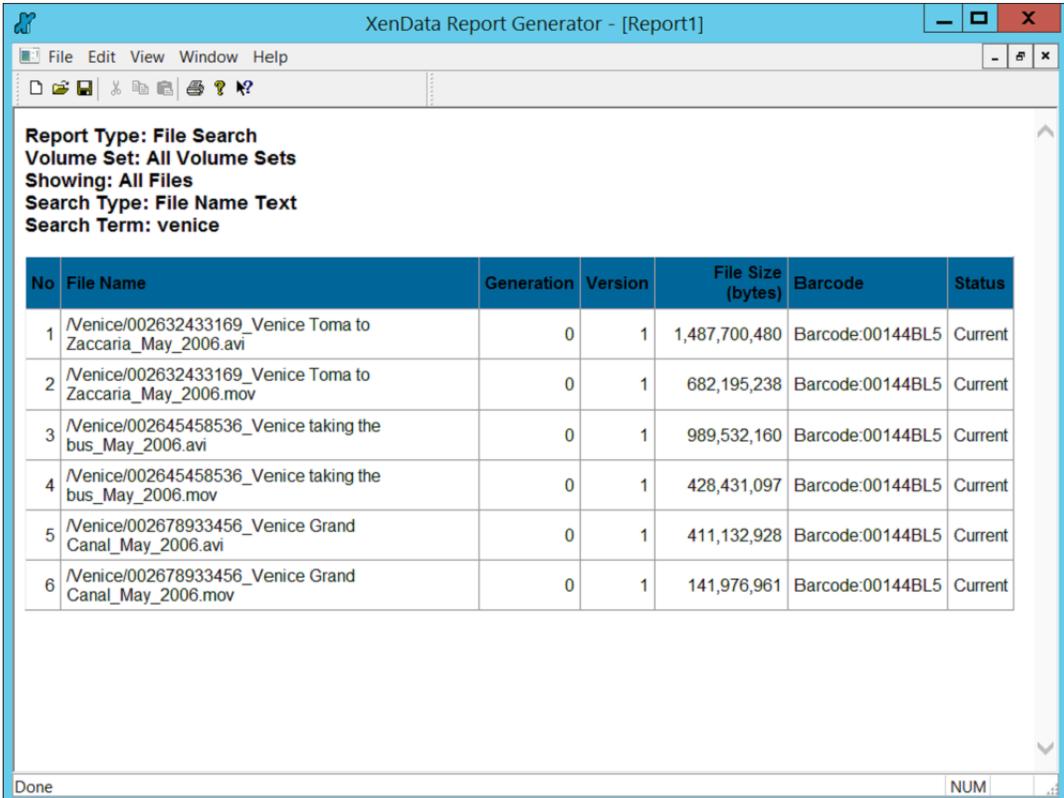
XenData History Explorer, a plug-in to Windows Explorer, provides a file system view of the archive which identifies the physical locations of all instances of all files including old versions of files and deleted files. It identifies the barcodes of all cartridges that contain a particular file.

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.

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

These utilities are particularly useful when files are moved offline.



The screenshot shows the XenData Report Generator interface. The report title is "XenData Report Generator - [Report1]". The report type is "File Search", the volume set is "All Volume Sets", and the search term is "venice". The report displays a table with 6 rows of search results. Each row includes a file number, file name, generation, version, file size in bytes, barcode, and status.

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

Base Model Library	
LTO library type:	Qualstar Q80
LTO drive type:	IBM LTO-8 half-height
Drive interface:	8 Gb/s FC
Transfer rate - writing and reading:	300 MBytes/s native per drive
Total slots – including mailslots:	80
Licensed Near-Line LTO Capacity:	840 TB
Mail slots – as shipped:	10
Mail slots - 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
Mail slots:	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-8602	SXL-8603	SXL-8604
Server Model:	SX-562	SX-563	SX-564
External RAID:	None	Requires addition of XenData 44 bay external RAID	None
Base RAID cache configuration:	Eight 10TB SAS disks in RAID 50	Twenty-four 6TB SAS disks in RAID 60	Eight 800 GB SSDs in RAID 5
Base RAID cache capacity:	60 TB	120 TB	5.6 TB
Max RAID cache capacity:	100 TB	240 TB	8.8 TB
Max number of supported LTO drives	10	10	10

Software	
Operating System:	Windows Server 2012 R2, Standard Edition
Archive Management Software:	XenData Archive Series, LTO Edition and Cloud File Gateway Extension
XML Interface Software:	XenData Workflow API
Notification Software:	XenData Alert Module
Processors, RAM and Boot Volume	
Processors:	Two Xeon 8 cores
RAM:	64 GB
Boot volume RAID:	Mirrored 300 GB 10K SAS disks
Library Connections	
Ports:	One 8 Gb/s FC port per LTO drive
Network Connections & Protocols	
Base Model Network Ports:	Four 1 GbE ports
Optional Additional Network Ports:	Two 10 GbE ports
Network Protocols:	CIFS/SMB and FTP
USB Connections	
Rear:	Two USB 3.0
Power Requirements	
Number of Power Supplies:	Two
Voltage:	100 – 240 V
Frequency:	50 – 60 Hz
Peak Power Requirements (each):	800 Watts
Dimensions & Weight	
19 Inch Rack Form Factor:	2U
Width:	17.54 inches (445 mm)
Depth:	28.75 inches (730 mm)
Weight:	51.5 lbs (23.4 Kg) maximum
Rack Rails:	Included

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