XenData Video Edition

Product Brief:

The Video Edition of XenData Archive Series software manages one or more automated data tape libraries on a single Windows 2003 server to create a cost effective digital video archive that is optimized for the requirements of the broadcast industry. It is a proven solution, used by more than 50 broadcasters worldwide

The solution is high performance, writing and reading at many times real time. Yet it is non-proprietary, presenting the digital archive as a standard Windows file system which allows it to be used by multiple applications. In addition, the video archive is highly scalable from terabytes to over a petabyte. For the most demanding requirements, the solution is upgradeable to the MX64 Edition of XenData Archive Series software which runs on multiple servers to provide the highest data transfer rates.

The solution is explained and a case study is provided which describes how it is used by a US TV station.

XenData

About XenData

XenData software creates digital video archives based on IT standards that scale from terabytes to petabytes. All XenData digital video archive solutions store video files to data tape such as LTO. A XenData system provides a standard file system interface for easy integration creating a universal digital archive that can be used by many automation, asset management system and post-production systems. It has proven compatibility with software from a broad range of companies including Apple, Blue Order, Cinegy, Crispin, Dalet, Fission Software, Gallery, NVerzion, Pharos, Pictron, Pro-Bel, TMD, Video Technics and vsn.

Further Information

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XenData Video Edition – Based on IT Standards

Digital video archiving in broadcast has conventionally involved complicated architectures, proprietary formats and proprietary interfaces. This has resulted in solutions which have been expensive to install and difficult to maintain.

In contrast, the Video Edition of XenData Archive Series software creates a digital archive on a Windows Server 2003 platform with a straightforward architecture and non-proprietary interfaces. The software is tightly integrated into the Windows server operating system which means it delivers high performance with a simple and elegant configuration.

The XenData archive has a standard file system interface appearing as a single Windows logical drive letter. The solution is optimized for use with the standard Windows network protocol (CIFS/SMB) or FTP file transfers. This non-proprietary approach to the interface means that the archive can be used simultaneously by multiple applications including those running on Windows and Mac. Furthermore, it does not tie the user to any particular asset management or automation solution.

In addition to its standard file system interface, the solution offers many other non-proprietary features:

- All file types can be archived on the system and partial file restore has been implemented in a way that is not specific to the file type.
- The system uses the open standard POSIX TAR format for recording to data tape.
- All informational, warning and error messages are logged in the standard Windows Event Log and may be sent as on-screen messages or e-mail alerts using the XenData Alert Module.

The system fully complies with the Microsoft security model based on Active Directory, which means that tedious special administration of file permissions is not necessary.

Data Tape Formats

The Video Edition supports a range of data tape formats including the market leading LTO format.

	LTO-3	LTO-4
Capacity per cartridge (Native capacity i.e. without compression)	400 GB	800 GB
Equivalent hours recording per cartridge at 25 Mbps	35.5 hours	71 hours
Equivalent hours recording per cartridge at 50 Mbps	17.7 hours	35.5 hours
Maximum Data Transfer Rate in Megabytes per second (without compression)	80 MB/s	120 MB/s
Typical Specified Media Archival Lifetime	30 years	30 years

The 800 GB capacity of an LTO-4 tape cartridge is equivalent to over 71 hours recorded at 25 Mbps or 35.5 hours at 50 Mbps.

Video Edition Archive Configuration

The archive consists of the following components:

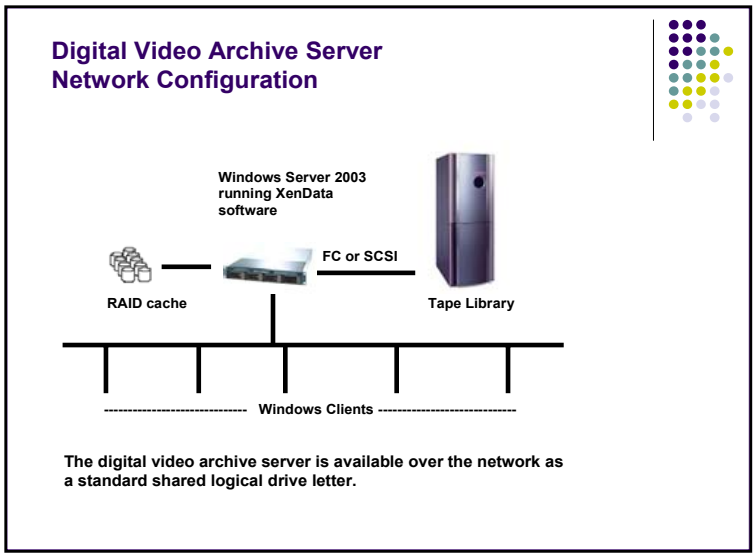
- one or more robotic data tape libraries
- a server with RAID cache running Windows Server 2003

The Video Edition supports a wide range of tape libraries from the leading suppliers including HP, IBM, Overland Storage, Qualstar, Quantum, Rorke Data, Sony, Spectra Logic and Sun Microsystems.

XenData software runs on the 2003 server and presents the digital tape library and RAID cache as a single Windows logical drive letter. The combined storage within the tape library and RAID effectively appear as a very large capacity magnetic disk.

A basic network configuration is shown opposite. The digital tape library is connected to the server via a SCSI or Fibre Channel interface. The RAID cache may be implemented any number of ways, for example as direct attached SAS or SATA disk arrays or from a SAN.

The Video Edition is optimised for transferring large files over the network via FTP or the standard Windows network protocol (CIFS/SMB). Other network protocols are supported, but FTP and CIFS/MB are recommended for high performance digital video applications.

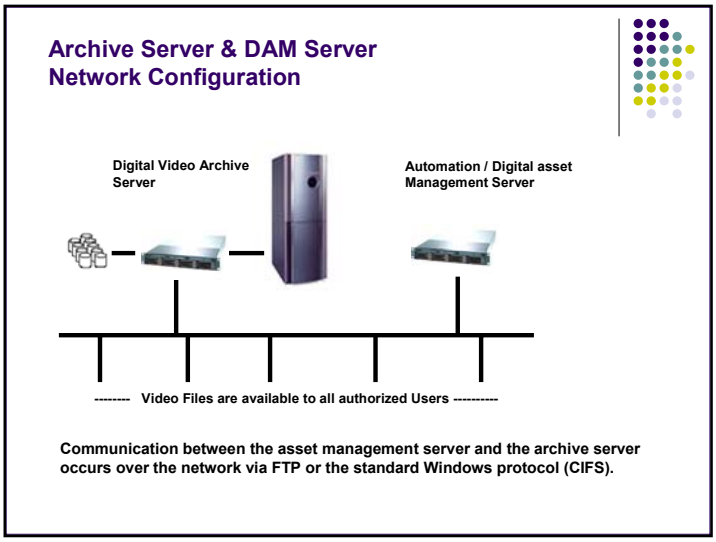


Combining Asset Management and the Digital Archive

Digital Asset Management (DAM) provides indexing of digital material and the ability to search and retrieve the assets of interest. The asset management system stores the indexed material as files which are held in one or more digital video archives.

XenData software creates a digital video archive, managing a digital tape library and RAID cache and presenting these physical storage devices as a standard Windows file system. Furthermore the software provides hierarchical storage management, data protection via tape cartridge replication, partial read capabilities and file security.

The DAM and digital video archive may each have a dedicated server, as illustrated in the configuration shown above. Alternatively, for smaller system, the DAM and archive may reside on the same server.



Seamless Integration with Windows and Mac OS X Clients

The increasing popularity of Apple's Final Cut product range has lead to many heterogeneous networks running both Windows and Mac OS X clients. OS X provides fast connectivity to XenData archives using the SMB protocol which means that a XenData archive will simultaneously work with both Mac and Windows clients.

XenData File Management Policies

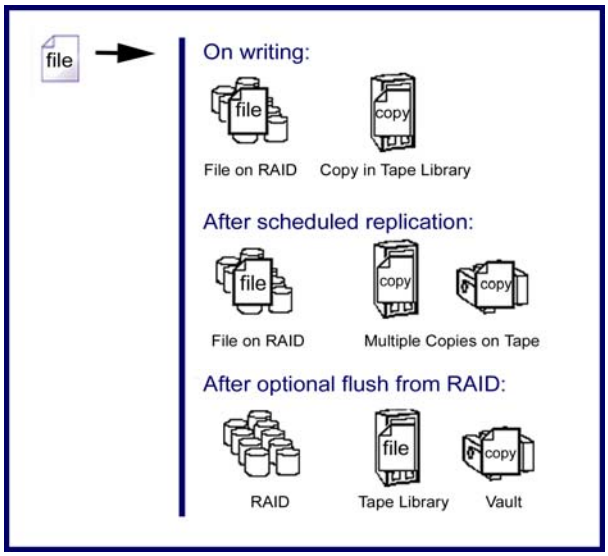
The system administrator defines policies that determine where data files are physically stored on the digital video archive. These policies support hierarchical storage management (HSM) and automatic tape cartridge replication.

The Video Edition 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 tape. In this case the file will be retrieved from RAID when accessed over the network.
- Near-line with at least one instance of a file on tape within the library and no instance on RAID. When a near-line file is accessed over the network, the XenData software automatically transfers the file from tape to RAID cache. As soon as the file transfer to RAID starts, the file is also transferred over the network.
- Off-line with no instance on RAID and one or more instances of a file on tape, all of which have been exported from the tape library.

Data protection is achieved by automatically generating multiple instances of a file. The XenData software can automatically produce copies of digital tapes for off-site retention.

A single server may have many different policies, tailored to the needs of the different file types 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 tape cartridge. After completion of this operation, there are two instances of the file – one on disk and one on tape.



Tape cartridge replication is optional and is scheduled according to an administrator policy. For a library with sufficient tape drives, it may be scheduled to occur immediately or within a defined time period. Alternatively, it may be scheduled to occur daily at a specific time. Following replication, the file is written on one or more duplicate tape cartridges and it becomes eligible for deletion (also termed 'flushing') from RAID.

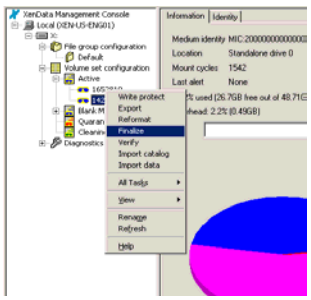
After deletion from RAID, the offline attribute bit is set and files are still available from tapes within the library. The Microsoft offline bit changes network timeout periods to allow retrieval of the file from media with long access times. On reading from tape, a file is automatically restored to RAID as it is simultaneously transferred over the network.

Enabling Partial Read XenData software manages very large files by using controlled file fragmentation. The administrator can optionally define policies that split large files into multiple fragments. This is performed by the XenData software in a way that is hidden from the applications that are reading and writing files and it is useful for multi-gigabyte files. With digital video there is often a need to read only a portion of a very large file. For example, consider reading a portion of a 40 GB file that has been archived with a policy that splits it into forty 1 GB fragments. In this case, when a portion of a file is being read from tape, the software instructs the drive to rapidly seek to the start of the first fragment that contains the required portion of the file. The system then only retrieves the fragments that contain the requested data. Without the controlled fragmentation provided by the XenData software, the complete 40 GB file would have to be read from tape, which would take many minutes. In practice, this approach of using controlled file fragmentation is very easy to implement and greatly enhances performance when dealing with large files.

Ease of Administration

The physical storage location of files is driven by policies set by the administrator. Options include:

- automatic duplication of data tapes
- setting file retention times on RAID cache
- grouping of files on specified tape sets



Archive administration is performed using the XenData Management Console. It is a Microsoft Management Console snap-in and provides the Administrator with a familiar and easy-to-use tool for system management.

Easy File Transfer between Archives

XenData archives running the MX64 Edition on multiple servers and those running the Video Edition on a single Windows server fully support tape cartridge interchange. When a tape cartridge becomes full, a contents catalog is automatically written to the end of the tape. The contents of a tape cartridge can be imported into a new archive by reading the catalog which takes only a few minutes.

The MX64 and Video Editions use the same contents catalog. This allows for rapid interchange of data between MX64 and Video Edition systems. It also means that an organization can start with the Video Edition and then easily migrate to the MX64 Edition.

The ability to easily and rapidly transfer tapes between XenData archive systems, whether running the MX64 or Video Edition, can be routinely used in two different ways:

- transfer of duplicate data tapes that are automatically created at a primary site to another XenData archive at a disaster recovery site
- sharing of video files between group TV stations

Video Edition Features and Benefits

Standard File System The entire archive appears as a standard Windows file system within a single logical drive letter. The solution uses the standard Windows offline file attribute to identify when a file is no longer online. **Benefit:** seamlessly integrates with standard applications and existing network infrastructure without modification.

Microsoft Security XenData Archive Series software is fully integrated with the Microsoft Windows security model, based on Active Directory. **Benefit:** effortlessly integrates with existing security, minimizing system administration.

Automated Tape Cartridge Replication Replication of tape cartridges is automatic and follows the policies defined by the Administrator. **Benefit:** it is easy to generate tape cartridge replicas for off-site retention for data protection purposes.

Offline Tape Cartridge Management The system retains meta-data for offline tape cartridges. **Benefit**: the system supports an unlimited number of tapes 'on the shelf'.

Partial Read of Large Files 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. XenData software supports partial reading of large files. **Benefit:** enhanced performance when dealing with large files

Multiple Tape Set Support The software allows file groups to be allocated to specified groups of tapes. **Benefit:** the Administrator can group related files together on the same set of tapes.

Open Standard Tape Format Open standard TAR file format is used on the tape, allowing the tape cartridges to be read using third party utilities. **Benefit:** the use of open standards on industry standard hardware ensures the long term availability of data.

Dynamic Expansion of Tape Sets The system will dynamically expand tape sets to meet capacity demands. **Benefit:** this minimizes system administration.

Highly Scalable The Video Edition software supports a wide range of tape libraries with capacities up to multiple Petabytes. A second tape library can also be added to the system.

Email Alerts Notification of hardware errors or archive system problems is provided by e-mail alerts and / or on-screen messages.

Video Edition Case Study: KATV - Little Rock, Arkansas, USA

KATV is owned and operated by a group company Allbritton that operates ABC-affiliated stations in seven markets: Washington, DC (WJLA); Birmingham, AL (WBMA/WCFT/WJSU); Harrisburg, PA (WHTM); Little Rock, AR (KATV); Tulsa, OK (KTUL); Lynchburg, VA (WSET); and Charleston, SC (WCIV). In addition, Allbritton owns and operates a 24-hour cable news channel in Washington, DC, NewsChannel 8 and publishes The Politico.

KATV has been archiving clips for 50 years and has over 35,000 hours in their video tape library that contains footage from ABC going back to the 1950's. In addition there are many hours of content relating to President and Hilary Clinton that are frequently accessed

The Challenge

KATV was archiving news content to in-house networked attached storage (NAS) and wanted to improve the level of data protection as the NAS provided only a single incidence of each video file in a single location, Furthermore, each time they ran out of storage space expanding the NAS put a strain on their budget. They archive between 20 and 30 GB per day of news content at each station.

Solution Provider: Video Technics

Video Technics, supplies the global broadcast industry with workflow solutions built around the company's IT-based media servers. Video Technics' Apella™ and NewsFlow™ products streamline the entire production process, and feature inherent proxy editing, embedded ingest/playout tools, and digital asset management. The NewsFlow solution features fully integrated video archive management via XenData video archive software and Qualstar video archive systems.

Solution Key Components

- Video Technics' NewsFlow™ solution for news (via ENPS) and master control (via Sundance)
- Apella LCS Media Servers, including proxy browser, database cluster, 6.0 TB of RAID-protected NAS, a media exchange Server (VTMX) for satellite and Pathfire content.
- Qualstar BQ20 video archive system with an IBM based archive server and 20 LTO-4 cartridge robotics tape library.
- XenData Archive Series software, Video Edition

Solution in Detail

KATV uses a Video Technics NewsFlow solution for news (via ENPS) and master control (via Sundance) that includes four Apella LCS Media Servers for playout and ingest, a VT Proxy Browser embedded in AP ENPS, a VT Database Cluster with instant failover capability. Near-line content is stored on a 6.0 TB NAS, while a VT Media Exchange Server (VTMX) is used to transfer satellite feeds and Pathfire content over the network. Content creation is performed using the VT News Edit Plug-In on multiple Final Cut Pro workstations. The solution has a total of eight VT Studio Pro NLEs and four NewsFlow Field Editor notebooks. The video archive system comprises an IBM based archive server from Qualstar, which has 2TB of RAID as a cache drive for the Qualstar robotics tape library. The library holds 20 LTO-4 tapes each capable of storing over 70 hours of DV25 content.

Inside the library are two IBM LTO-4 tape drives for concurrent reads and writes to the archive. Running on the archive server is video archive management software from XenData.

The XenData software makes all of the archived video files appear within a single standard Windows logical drive which means that NewsFlow can write to and read from the archive as though it were a standard shared disk-based logical drive.

The XenData archive software is fully integrated with the Video Technics NewsFlow so that clips can be archived and restored directly from the Video Technics proxy editor screens. This allows the KATV news staff access to a very large archive from their desk. KATV produces 4 news shows a day with approximately 24 minutes of DV 25 content in each show. In total KATV archives around 400 clips per week that have been aired or are historically newsworthy. The news team wanted to retain raw footage as well as finished programs and so their archiving needs were exceeding their current hard disk drive solution. Adding the LTO tape archive system gives KATV 1400 hours of content accessible on line and unlimited content on the shelf. Each tape can hold approximately 71 hours of DV25 content so content on the shelf occupies far less space than their current video tape library. KATV decided to replicate their archived content for disaster recovery purposes. A duplicate LTO tape is created automatically by the XenData software. The system is set up to update the duplicate LTO-4 tape at midnight every evening. The duplicate tapes are then exported out of the robotics tape library for safe storage and fresh blank tapes added. The current configuration will allow KATV to have 2 years of content near-line and older content exported to the shelf. The XenData software manages the content on the shelf as well as in the library, making retrieval of deep archived content simple to do.

The Future

KATV will expand their archive library from 20 slots to 44 slots in the near future, giving them even more content available near-line. They plan to refine their workflow and optimize the system by retaining archived content that is frequently accessed on the disk cache of the system in addition to storing it on LTO tape. They also plan to use the Qualstar / XenData systems independently from the Video Technics NewsFlow archive to protect content stored on their NAS RAID including commercials and raw footage that hasn't yet been processed. The video archive system will also be used to archive and protect raw footage from their Firestore camera disk drives. Adding a remote LTO-4 tape drive to the system will allow KATV to locate the exported archive on a bookshelf in the news room and provide the News team access to deep archived content simply by inserting a bar-coded tape cartridge for the shelf.

The Qualstar robotic library at KATV is field expandable from 20 to 44 LTO-4 tapes.