

## **Storage Options for ProxSys Media Asset Management Systems**

The ProxSys family of Media Asset Management (MAM) systems offer unique and powerful options for media ingest, transcode, storage, archive and play-out. Key to the ProxSys solution is efficiently organized and secure storage of media. Whether the requirement is for online, offline or near-line storage, many options in a variety of different and scalable capacities are available. This document describes these different options and the parameters that need to be considered prior to planning a MAM storage strategy.

### **Determining the type of storage that is required**

The first question that must be answered when deciding on a storage solution is what type of storage is required. From a broad perspective, the type of storage will fall into one of three different categories; online, near-line or offline. Deciding on the type of storage will mostly be based on the availability needs of media. For instance, if daily or fast access is required to your media, then online storage is the best alternative. If archiving all your media with no time constraints is your application, then offline storage is the most economical option. Really, it is storage access time that must first be considered.

### **Online Storage Overview**

Online storage is a storage option that allows media to be quickly available to the user – typically within fractions of a second. It utilizes different hard-disk drive (HDD) configurations including internal disk drives (within the main MAM server itself) or external drives with fast connections and configurations. However, online storage is the most expensive method of storing media. Typically, high performance disk drives with a fast interface (fibre or SCSI based) are utilized. Costs also increase when RAID (redundancy) configurations are used. The common RAID 5 configuration, for example, has distributed parity for drive failure protection, but at the cost of only 63% storage space efficiency.

### **PX Online Storage Options**

*Internal Storage* refers to hard disk drives that are utilized for media storage inside of the main MAM system. On ProxSys, internal storage utilizes the RAID 5 configuration and 3.0Gbps SATA interface. Internal storage is available as an option on the ProxSys PX-1 and PX-10 and usually available in 4TB or 8TB capacities for both operating system and content assets.

*Direct Attached Storage (DAS)* is one or multiple hard drives with a controller attached directly to a PC or server (E.g., SAS RAID, USB drive, CF Disk, etc...). ProxSys PX-100, 200 & 500 servers typically have a SAS/Fibre Direct Attached Storage connection for content assets and backup configuration files. The operating system resides on internal RAID 1 hard drives.

*Network Attached Storage (NAS)* is typically Ethernet hard disk storage that is IP mounted from a client PC or server. The NAS file server is mapped via the primary server to receive

file requests from client PC's. ProxSys media servers can easily integrate into existing or new NAS environments.

*Storage Area Network (SAN)* is similar to NAS and is a remote storage device (hard disk, tape, library, Optical media, etc...) and appears as Direct Attached Storage to the operating system of the client PC. ProxSys media servers can easily integrate into existing or new SAN environments.

*External JBOD storage (Just a Bunch of Disks)* storage is a form of Direct Attached Storage and provides a large amount of storage using either SAS, SCSI or fibre interface. Interface speeds can range from about 640MB/s up to 6.8GB/s using the latest fibre technology. Like DAS, standard capacities range from 4TB to 24TB. JBOD storage is available as an option for PX-10, PX-100, and PX-200 ProxSys systems.

#### Offline Storage Overview

Popular forms of offline storage include data tape (LTO), and optical storage such as DVD, Blu-Ray disc, UDO, or holographic. While it is possible to quickly search for media that is stored using offline storage retrieval (using the same methods as searching media stored using online storage) of high-resolution content is a lot more time consuming. This is due to the fact that offline storage is typically done using a storage medium that is not directly accessible to the MAM server. Offline storage requires physical user interaction, i.e., physically retrieving a storage unit and inserting into a drive to access the requested media. For instance, it may be necessary to insert an LTO tape cartridge or Blu-Ray disc into a reader where the media will be retrieved and usually transferred to online storage for quick access. However, it may be very time consuming for this to occur. Offline storage is useful for media that is used infrequently such as your previous 6-months of source material.

There are several benefits of offline storage, including lower media costs, increased storage density, reduced power consumption, and in the case of non-volatile media like tape and optical, increased data overwrite security. For example, the cost of data tape is about \$0.34 per GB, which is one quarter the cost of typical online storage. The Write Once Read Many (WORM) characteristic of some tape and optical media gives added protection to being modified and/or deleted.

#### Nearline Storage Overview

Nearline storage is an intermediate type of storage that is generally considered to be a compromise between online and offline storage methods. The advantage of nearline storage is that it does not require the interaction of a user to physically retrieve the media. The location of media is readily accessible by utilizing a mass storage device such as a robotic tape library or a Blu-Ray jukebox. The tape cartridge or disc where the content is stored is quickly and automatically retrieved and the media copied to the local online storage. While access times are not as quick as online storage, nearline storage is significantly faster than manually retrieving offline media (one less step). While the up-front cost of a robotic storage library may be quite expensive, the cost advantage of quickly retrieving media can be significant.

The advantage of nearline storage is a savings in high energy costs from spinning disks and the use of inexpensive, long shelf-life tape or an optical storage medium. Nearline storage

is useful in applications where there are massive amounts of data. Typical video centric workflows consider nearline/offline applications when reaching 24TB and higher.

#### PX Offline Storage Options

*Tape* – To date, the most popular form of offline storage is data tape. Currently, the most common data tape is LTO-4. LTO cartridges typically are between 100GB and 800GB in capacity, and connect to a computer via a tape drive (typ. WORM – Write Once Read Many) with a SCSI or fibre interface. While proxy video and metadata stay stored online (stub) in the MAM system, high-resolution material is stored on tape. Tape storage is ideal for situations where retrieval of high-resolution content is not time sensitive.

*Blu-ray* – Blu-ray is becoming a more and more popular form of offline storage. Using single or dual layer optical discs of either 25 or 50GB capacities respectively, Blu-ray provides an alternative to tape for offline storage. Archiving material to disc and later access to that material is done using a Blu-ray drive which typically resides on the MAM system itself. Like tape, proxy video and metadata are stored online in the MAM system while high-resolution material is stored on Blu-ray disc. Blu-ray storage is also ideal for situations where retrieval of high-resolution content is not time sensitive, but consider a few other factors; Blu-ray is not sensitive to magnetic fields, is readily readable from a desktop computer, and Blu-ray is rapidly dropping in price as its cost per GB rides the consumer adoption curve. However, even though there is very little spooling time (compared to tape), file transfers times are very slow.

#### PX Nearline Storage Options

*Hierarchical Storage Management (HSM) or Tertiary Storage Management (TSM)* is a data storage technique that allows frequently used content to be stored on nearline storage libraries such as LTO tape or Blu Ray disc. According to a set of predetermined rules such as project or content expiration, last access time, etc., content can be manually or automatically migrated to nearline storage. When archived material is requested for download via the proxy (stub), the HSM system migrates the content from the nearline storage back to the online storage for repurposing.

#### **Storage Needs Analysis**

Below you will find questions, charts, and examples that will help you determine the type and size of storage you will need for your ProxSys MAM solution. If you have questions or comments, please feel free to contact a Focus Enhancements representative.

#### **Contact Focus Enhancements**

For more information on our Media Asset Management solutions or to request a demo of our ProxSys PX and MA-Series solutions please contact us:

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#### **Online Demo Request:**

[www.focusinfo.com/rfi/px\\_ent\\_prd\\_info\\_req.asp](http://www.focusinfo.com/rfi/px_ent_prd_info_req.asp)

**Questions to help determine your Media Asset Management Needs:**

<b>Archive</b>	
1. Which internal format should be used? ProxSys offers the default options of DV25, DV50, DVCPro, HDV, MPEG2, Other formats?	
2. How long is the duration time (in days, weeks, or months) for the captured material?	
3. Does a metadata model exist (metadata field definitions) and are timecode coupled fields desired?	
4. Which data security is necessary? Are there existing security rules? Does a back-up or data redundant system exist?	
5. Are there existing User Right Management (LDAP) server?	
6. Is a migration of data necessary?	
7. Does a database with metadata exist and / or raw material (i.e. video files without descriptive data)?	
<b>HSM/Nearline &amp; Backup</b>	
1. How long do we have to ingest the customers legacy data?	
2. How much data and how many files needs to be ingested?	
3. Once legacy data is loaded, how much new data every day will be ingested (# of files and avg. file size), and is there a specific time frame that this must be done in?	
4. What type of recall service level agreement is in place with the customer?	
a. # of files per hr?	
b. Avg. size of file?	
c. customer expectation of a reasonable file/s recall time?	

## **Determining the amount of storage that is required**

Before deciding on a type of storage, it is important to establish how much storage is required. Below is a table that details the storage requirement for native storage of different video formats.

Format	Bit Rate	File Type	Resolution	GB/hour
<b>High-Definition Video</b>				
MPEG -2	10–50 Mbps	Program Stream; Transport Stream; Elementary Stream; MP@LL, MP@ML, MP@H14, 422@ML	Up to 1080i All 18 ATSC formats	3.5 - 26
HDV	19/25 Mbps	.m2t; .mov (QuickTime)	720p; 1080i	10 - 13
Panasonic DVCPRO HD	100 Mbps	P2 MXF; .mov (QuickTime)	720p; 1080i	52
XDCAM EX	19-35 Mbps	MP4	1440 x 1080i; 1920 x 1080i	13 - 18
<b>Standard-Definition Video</b>				
DV, DVCAM	25 Mbps	AVI Type 1; AVI Type 2; RAW; .mov (QuickTime)	720 x 480/576	13
DVCPRO, DVCPRO 50	25/50 Mbps	P2 MXF; .mov (QuickTime)	720 x 480/576	13 - 26
MPEG-1, MPEG-2	1–50 Mbps	Program Stream; Transport Stream; Elementary Stream; MP@LL, MP@ML, MP@H14, 422@ML	720 x 480/576	0.5 - 26
<b>Audio</b>				
MPEG Audio Layer 1–2	32 kHz–48 kHz	—	—	—
MPEG-2	32 kHz–48 kHz	—	—	—
<b>Graphics</b>				
TIF, BMP, PNG, JPEG, GIF	—	—	—	—

In addition to high-resolution video media, one must include the other items that will be stored in the MAM system. Proxy video, NLE projects, graphics, documentation, audio, pictures as well as many other file types within ProxSys MAM systems all add to the total capacity requirements. It is also important to determine how quickly data will be required in order to calculate the best ratio and organization of online, offline or nearline storage. For instance, you may require all content for current projects to be online, while previous projects can be archived as offline or nearline storage. For example:

If you have ten editors working on separate 30-minute programs each week, your weekly output is five hours of program material. Assuming a 20:1 ratio of source footage to the finished production, which would be a total of 105 hours of material. Let's define "current projects" to be a 2 week duration. Now you will need to have 210 hours of material online. For DVCPRO HD editing, you would need 10,920 GB (210 hours X 52 GB/hour). Although that is about 11 TB of storage, to accommodate other stored files besides high-resolution video, and some percent of overflow, you would probably need an additional 50%, or about 17 TB of online storage.

Extending this example further - if you desired your workflow to maintain eight weeks of nearline or offline storage beyond the two online weeks. You would then need four times more, or about 68 TB of nearline or off-line storage. In order to efficiently and effectively

determine and manage your storage, you will need to make decisions based on content value, workflow accessibility and of course time-management.

**Summary:** The table below summarizes the different storage options available for ProxSys.

Online						
Technology	Typical Configuration	Cost Reference	Storage Capacity Range	Media Capacity Range	Key Partners	Notes
Internal RAID	SCSI or Fiber, RAID 6	3TB \$2,800	Up to 8TB	500GB or 750GB	IBM	Up to 8 internal drive bays on ProxSys PX-10 Systems
External RAID (DAS)	SCSI or Fiber, RAID 6	6TB \$5,760	Up to 24TB	1TB	Rorke	Four Drive Slot per 1RU. Typical configurations- 2, 4, 8, 16 or 24TB. Expand up to 4 chassis (88TB)
External RAID (NAS)	SCSI or Fiber, RAID 6		Up to 24TB	1TB	Rorke	Four Drive Slots per 1RU. Typical configurations- 2, 4, 8, 16 or 24 TB
External JBOD	SCSI or Fiber, RAID 6	8TB \$9,399	Up to 24TB	1TB	Rorke	Four Drive Slot per 1RU. Typical configurations- 2, 4, 8, 16 or 24TB. Expand up to 4 chassis (88TB)
Near-Line/Offline						
Technology	Typical Configuration	Cost Reference	Storage Capacity Range	Media Capacity Range	Key Partners	Notes
DVD/Blu-Ray Robotic Library	600 slots	JVC Blu-ray Jukebox; \$60,000	Up to 30TB	4.7GB 25 or 50GB	JVC	
Ultra Density Optical (UDO) Robot	24 to 638 slot libraries	Plasmon Gx24; \$10,000	1.4 to 38TB	UDO1 30GB; UDO2 60GB	Plasmon	
Data Tape	LTO-2, 30 slots	Overland NEO 2000; \$17,000	Up to 12TB		IBM, Powerloader, Overland	
HSM Software					Point Systems, Qstar	Likely to require 3rd-party IT consultant
TSM Software					IBM	Likely to require 3rd-party IT consultant
Optical Duplicator/Publisher	300 disk capacity desktop/rack-mount publishers with integral label printer	Rimage 5100N Blu-ray; \$18,000, DVD; \$14,000			Rimage, Primera	

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