## Slash Your Storage Costs *and* Get Longer Retention

Using hard disk only systems —the traditional approach— for all of your video surveillance storage means you're paying too much, you're sacrificing retention, and you're probably missing out on the highest quality recording you can afford. Phoenix RSM provides an extremely scalable solution for storing the highest quality video footage for months or even years at a fraction of the cost of using a traditional hard disk only system.

Solution Cost Comparison
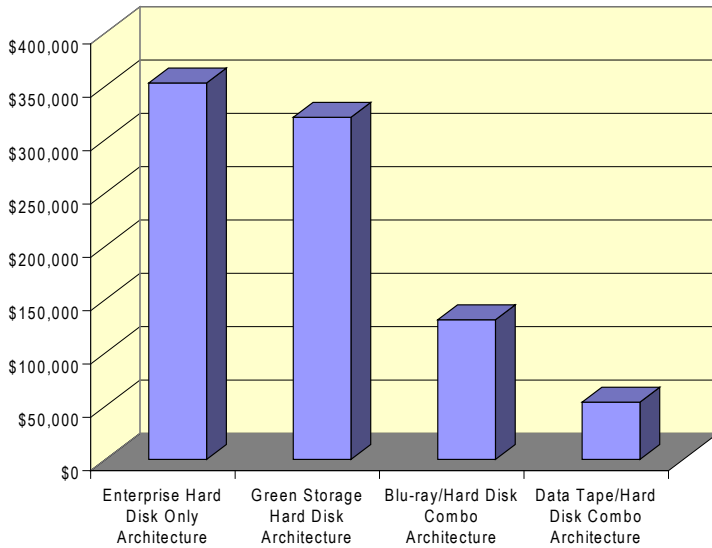
Solution Cost Comparison: Total Cost of Storing Video from 25 3MP Cameras Continuously Recording for 2.5 Years (Calculations on Page 4)

Q: How can Phoenix provide such affordable long-term retention?

A: Phoenix does this by combining online, near-line, and offline storage devices. Phoenix RSM can initially capture video onto a smaller capacity traditional hard drive and then migrate it efficiently to less expensive storage such as "green storage" hard drive arrays, Blu-ray jukeboxes, or data tape libraries. The video remains under complete management and readily available for fast search and playback.

Q: How does Phoenix RSM provide readily available video for fast search and playback?

A: Phoenix RSM has a unique ability to create efficient **low-resolution companion files** for recording to primary storage. The companion files are typically only ⅒ of the size of the originals, so you can retain **significantly more video** on the primary hard disk storage device. The quality of these preview videos allows you to easily review and identify the scenes of interest and designate clips for original video export.

Because these companion files are so much smaller, they require much less storage space and bandwidth to recall and review. This gives the user a quick and easy way to search for required video and review it for needed scenes.

Q: How is this more affordable than traditional solutions?

A: A key feature of Phoenix RSM is its ability to manage less expensive tiers of storage resources. When integrating multiple tiers of storage, you can expand your capacity and retention periods by purchasing only additional *offline media,* such as RDX hard drives, Blu-ray discs, or digital computer data tapes. This lets you realize **significant savings from the traditional approach**, where you must spend thousands of dollars on additional hard disk storage units.

When you compare the cost of the actual storage media, you see that

Media Cost Comparison	
	Hard Disk *11 cents per GB (Enterprise Class)* *6 cents per GB (Green Storage)*
	Blu-ray *14 cents per GB*
	Data Tape *4 cents per GB*

the per-gigabyte costs of media options vary dramatically. Data tape, such as **LTO**, costs about four cents per gigabyte based on current market prices, while enterprise class hard disk systems typically cost 11 cents per gigabyte.

Not only is offline media less expensive, it is also more durable and can be kept for **decades**. With a 15 to 30 year archival storage life for data tape and up to 50 years for Blu-ray, these media are durable and reliable. LTO5, introduced in March 2010, provides 1.5 TB of capacity on a single data tape cartridge.

Q: How does Phoenix RSM provide the most relevant video search results?

A: Phoenix RSM has the most extensive list of metadata fields of any video surveillance management application. This user-customizable metadata allows for the most relevant search results by allowing users to quickly find "the needle in the haystack."

When more and more video is retained for longer periods of time, it becomes critical to provide a quick and easy way to search and play back video. By delivering search results against relevant metadata matches –and utilizing the smaller low-resolution companion files– users can quickly review video recorded over a long retention period.

### Q: How does Phoenix RSM retrieve the video from offline storage?

A: After the user has searched for video using the associated relevant metadata and selected video of interest by reviewing the low resolution companion files, Phoenix RSM retrieves the original resolution video. If that video is located on offline media that is still in the storage unit, no human intervention is needed. If that required piece of media is completely offline, Phoenix RSM instructs the user as to which offline media to re-insert. Phoenix RSM then immediately locates the specific original video segment and places a forensic copy of the original back on the user's hard drive or other desired destination.

Total Cost of Ownership

Legend:
- Data Tape Architecture
- Blu-ray Architecture
- Green Storage Hard Disk Architecture
- Enterprise Hard Disk Architecture

Total Cost of Ownership for 25 3MP Cameras Continuously Recording at 15fps for 2.5 Years

This feature, in concert with the low-resolution companion files, enables the original high resolution videos to be stored on offline media, unaltered and untouched, always under full management. The offline original video is not needed nor called upon until the user wants to export it for further review or inspection.

Q: Can you explain the Total Cost of Ownership (TCO) advantage?

A: The per-gigabyte cost of available media is only part of the story: after all, the media can't do much until it is inside a hardware device (disk array, data tape library, optical jukebox, etc.).

The Total Cost of Ownership —the cost of the media, **plus** the storage device, and the associated electricity costs of operating the devices— varies widely. The Total Cost of Ownership graph above shows the **dramatic differences in the cost profiles of data tape, Blu-ray, and hard disk systems when increasing retention**. With Phoenix RSM, you can mitigate the cost of a traditional hard disk only storage system that rises steeply and steadily for each incremental retention period. By integrating various storage devices in a multi-tiered storage repository, you achieve significant cost savings. A Blu-ray retention solution, while initially more expensive due to the relative cost of Blu-ray optical jukeboxes, rises at a much slower rate than hard disk since you need only buy additional discs to expand your capacity. The data

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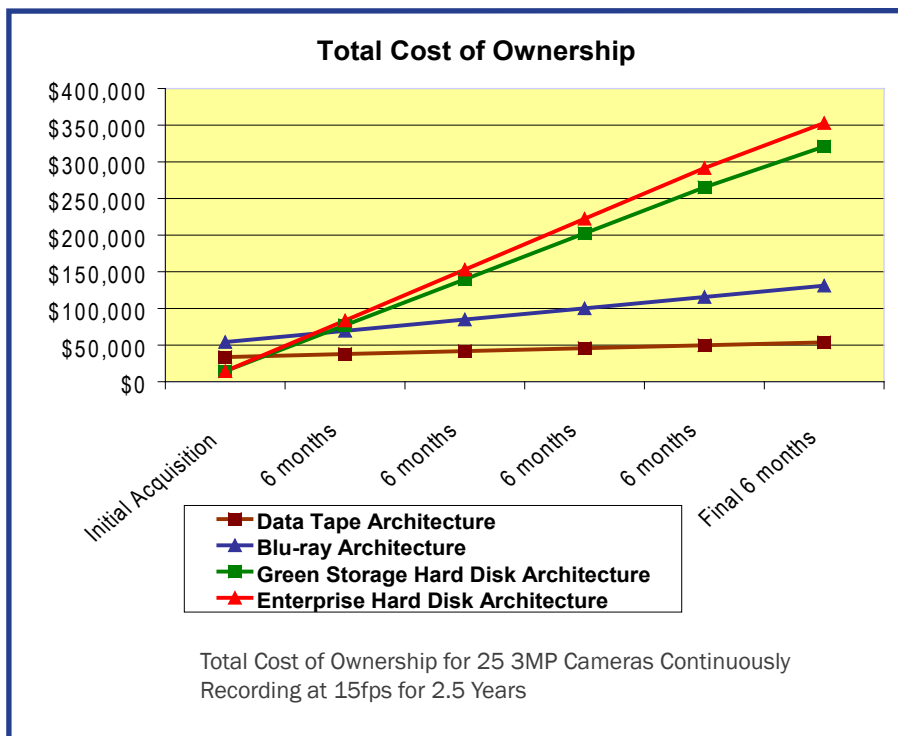
tape solution is by far the most economical, with a modest initial acquisition cost and then only the cost of purchasing additional data tape cartridges.

Users can integrate a primary hard disk storage tier coupled with an additional tier of the newer "green storage" hard disks. A solution could also include the removable RDX hard disk technology as offline media. Blu-ray offers a compelling TCO price advantage coupled with a familiar CD likeness. Digital computer data tape, such as LTO4 and LTO5, provide excellent cost savings.

We encourage organizations to find the best use of one or all of the various storage mediums available and let Phoenix RSM manage the overall storage repository for the longest term retention possible and the most affordable cost advantages.

Keep the Video from 25 3MP Cameras Continuously Recording at 15fps for 2.5 Years

Storage and Bandwidth Calculator

Camera Resolution:	3MP (2048x1536)
H.264 or MJPEG:	H.264
Images per second:	15
	max frame rate for 3MP = 15fps
Compression Setting:	Med Compression (Medium Quality)
Detail of Image:	Medium (Parking Lot/Atrium)
Numbers of Days of Storage:	30 days
% Motion Detection Activity:	50% motion activity in 24 hr day
Hard Drive per camera:	782 GB of Storage
Bandwidth per camera:	4.83 Mbps

** *Increased motion activitiy causes H.264 file sizes to increase* **

** *This is for estimating purposes. Actual results may vary.* **

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Calculation of Storage Required to Store the Video from One 3MP Camera Using H.264 for 30 Days (Medium Compression, Medium Detail, 50% Motion Activity)

We can see how the effect of the strikingly different cost profiles translates into dollars with the following example. Let's say you wanted to keep all of the video collected from 25 3-megapixel cameras continuously recording at 15 frames per second for 2 ½ years.

First calculate the amount of storage you would need to keep the video from one camera for one month. We will use a storage calculator provided by Arecont Vision to find the amount of storage needed. The calculation assumes a frame rate of 15 fps, with medium compression (medium quality) and 50% motion activity, for 30 days. We will use this amount to find the total capacity required to store the video from 25 cameras for 2 ½ years. Finally, we'll compare the cost of that storage capacity using a traditional hard disk only solution, a less expensive "green storage" disk solution, a Blu-ray/hard disk combination solution, and a data tape/hard disk combination storage solution.

Total Storage Capacity Needed:

The calculator shows that 782 GB of storage is required to keep the video from one camera for 30 days.

- 782 GB per month per camera x 25 cameras = 19,550 GB per month for all 25 cameras
- 2.5 years = 30 months
- 19,550 GB per month x 30 months = 586,500 GB of storage
- This is about **594 TB** (adjusted for actual number of days in 30 calendar months).
- 594 TB / 800 GB storage capacity per data tape cartridge = 743 cartridges needed to store 594 TB

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The comparative equipment costs of the 594 TB of storage are summarized in this table:

Cost Comparison for Storing Video from 25 3MP Cameras Continuously Recording for 2.5 Years				
	Traditional Enterprise Architecture	Green Storage Disk Architecture	Blu-ray Architecture	Data Tape Architecture
40 15-TB HD Storage Units with enterprise drives [1]	$313,954	n/a	n/a	n/a
1 15-TB HD Storage Unit with enterprise drives [2]	n/a	$7,849	n/a	n/a
39 15-TB HD Storage Units with green storage drives [3]	n/a	$273,937	n/a	n/a
3 15-TB HD Storage Unit with enterprise drives [4]	n/a	n/a	$23,547	$23,547
Blu-ray optical jukebox [5]	n/a	n/a	$19,330	n/a
Blu-ray Disks @ $7 each [6]	n/a	n/a	$77,769	n/a
9.6 TB LTO Data Tape Library (without media) [7]	n/a	n/a	n/a	$3,705
Tape Cartridges @ $29 each [8]	n/a	n/a	n/a	$20,358
Phoenix RSM Software Licenses [9]	$38,999	$38,999	$10,299	$6,098
Total	**$352,953**	**$320,784**	**$130,945**	**$53,708**

The Most Affordable, Scalable Solution for Long-Term Retention

Phoenix RSM provides you with multiple storage resource options, the ability to utilize low-resolution companion files, and metadata searches that return relevant video, all managed for optimal performance.

With Phoenix RSM you can "pay as you grow" by simply **purchasing additional offline media as you need to expand**. In contrast, the traditional hard disk only solution requires that you buy additional disk-based storage units as well as the media. As soon as you've filled a previous unit you need to purchase an entire system each time you need to expand your retention, requiring substantial periodic outlays of money.

A Phoenix RSM positioned solution is by far the least expensive option when it comes to video lifecycle management. At just a **fraction** of the cost of traditional hard disk only solutions, Phoenix RSM systems utilizing a combination of storage resources delivers the best Total Cost of Ownership. They provide the most affordable solutions on the market today, scaling from a few gigabytes to petabytes for the longest retention, while providing ultra-fast video retrieval and playback and complete video surveillance asset management.

Notes:

n/a: Component not applicable for that architecture.

[1] Price of a D-Link xStack Storage SAN Array/Network DSN-3200-10 15 bays (diskless) at Buy.com at 04/25/11 is $6,199. Price of Western Digital WD1003FBYX 1TB internal hard drives at 06/07/11 at Buy.com is $109.99. $109.99 per disk x 15 disks needed = $1,650. (Diskless SAN + 15 high performance drives) x 40 units required = $313,954.

[2] From Note 1 above: The price of D-Link diskless SAN array from Note 1 above + cost of 15 high performance disks = $6,199 + $1,650 = $7,849.

[3] Price of a 1 TB SATA 3G 5900 RPM Seagate ST1000DL002 Barracuda green drive is $55 at www.tigerdirect.com 06/07/11. (Diskless SAN + 15 green drives) x 39 units = $273,937.

[4] (Diskless SAN + 15 high performance drives from Note 1) x 3 units = $23,547.

[5] The price of a DISC Group BD-1000 Blu-ray jukebox is $19,330 at www.opticaljukeboxes.com on 04/25/11.

[6] The price of a Maxell Blu-ray BD-R Dual Layer 50GB 1-4X JC disc at www.amazon.com on 06/15/11 is $7.00. $7 x 12,000 disks = $84,000.

[7] The price of a Tandberg 9.6 TB T24 LTO-4 Data StorageLibrary on Buy.com on 04/25/11 is $3,705.

[8] The price of a FujiFilm LTO Ultrium 4 Data Cartridge (800 GB) on Buy.com on April 25, 2011 is $29. 702 additional tape cartridges are needed to store 594TB. 743 x $29 = $20,358.

[9] Based on Phoenix RSM MSRP Pricing as of Feb. 1, 2011.

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