



# Video Surveillance Data: Using it Now and Later

January 2014



## Contents

<b>Abstract</b> .....	<b>3</b>
<b>Introduction</b> .....	<b>3</b>
Valuing Video Data .....	4
<b>Storage Considerations</b> .....	<b>5</b>
Storage and Management of Digital Assets .....	6
<b>Adding Digital Computer Tape</b> .....	<b>6</b>
Advantages of Digital Tape Media .....	6
<b>Conclusion</b> .....	<b>8</b>

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## ABSTRACT

Video surveillance is increasingly used to protect organizations from theft, meet regulatory and legal requirements, gather data for future analysis, and for protection worldwide. As surveillance becomes increasingly common, and with camera resolution and frame rates improving continuously, the amount of video to be stored and accessed is growing dramatically. However, video is typically only kept for a very brief period, in spite of the potential for using older video content later for forensic or legal purposes that could be of significant benefit to the organization. The cost of storing and accessing surveillance video content is a strong barrier against longer term retention and the many associated benefits.

This barrier can be eliminated by adding one component to your storage architecture: easy-to-use VMS system with tiered storage that includes affordable digital tape. Adding digital tape to your existing architecture allows you to easily and affordably retain video content for a longer period while freeing up disk space for real-time surveillance content.

Using digital tape to store very large quantities of video and other digital content has been proven cost-effective in industries that deal with digital video, massive storage challenges, and the combination of both. These industries have developed cost-effective storage models that rely on a combination of disk and digital tape. These models can be easily adapted to meet video surveillance market requirements.

## INTRODUCTION

The massive growth of data is evident, especially to anyone dealing with video content. The numbers are staggering: in 2011, an estimated 1.8 zettabytes (ZB, equal to 1.8 trillion GB) of data was generated and replicated, with this quantity expected to double every two years.<sup>1</sup>

Video surveillance is especially affected by data growth. Content quantities rapidly increase with the continuing and escalating use of surveillance. As image resolution steadily increases, video content file sizes grow and storage becomes even more of an issue. TechNavio's analysts forecast the Global Video Surveillance market to grow at a compound annual growth rate of 28.1 percent over the period 2012- 2016.<sup>2</sup>

Because of this, as well as the cost of adding disk, many in the surveillance field store video for very short periods, always on disk. By deleting data after a short stint on disk, space is again available for incoming video content.

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<sup>1</sup> John Gantz and D. Reinsel. "Extracting Value from Chaos." IDC iView whitepaper, June 2011. <http://www.emc.com/collateral/analyst-reports/idc-extracting-value-from-chaos-ar.pdf>, accessed February 2013.

<sup>2</sup> TechNavio, "Global Video Surveillance as a Service Market 2012-2016," February 8, 2013. <http://www.technavio.com/content/global-video-surveillance-service-market-2012-2016>, accessed February 2013.

This tendency to keep potentially valuable video for shorter and shorter periods continues as increased camera frame rates and resolution makes video files even larger.

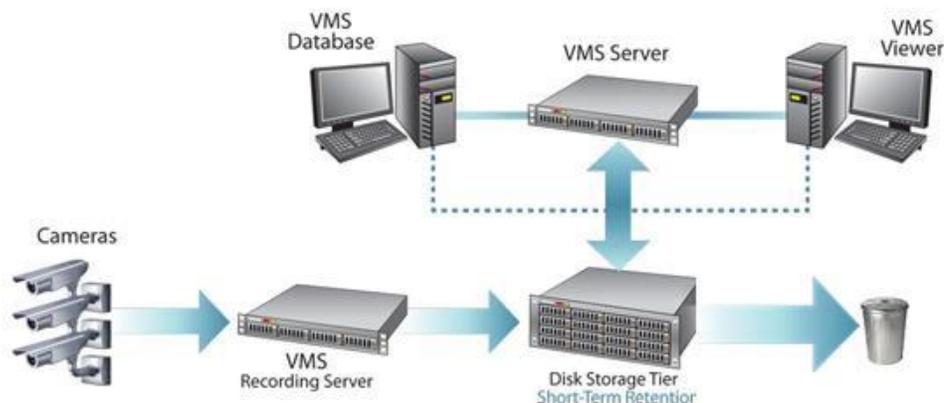


Figure 1: Traditional IP video surveillance retention architecture

The good news is that an alternative approach is available and affordable. By adding a storage component – digital tape –that complements existing disk storage, organizations can store surveillance video for pennies / GB for longer periods and at higher resolutions and frame rates

Rapid data growth is a common problem across many industries. The challenge of retaining and accessing digital assets affordably has been addressed by organizations in:

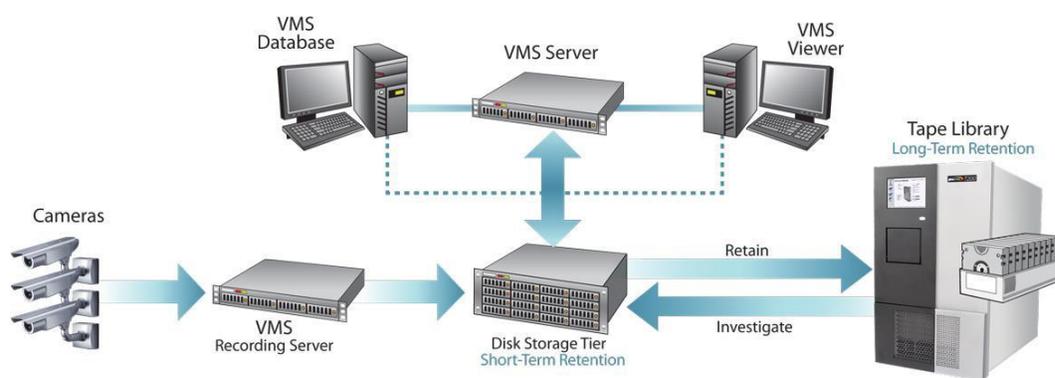
- Media and entertainment
- High-performance computing (sometimes referred to as supercomputing)
- Oil and gas
- Genomics

This architecture can be readily adapted to serve the video surveillance market.

## VALUING VIDEO DATA

Often, until some specific or threatening event occurs, the value of older video content is unrecognized. This follows a common pattern: you don't need homeowners' insurance—that is, until your house catches fire. Surveillance video is similar. You don't know the value of the deleted video until you need it, but don't have it, for forensic or legal purposes. Increasingly, the value of older video content and other forms of digital data are now better understood and more highly valued. Some organizations are committed to storing all their surveillance data; others may only now start considering the option of longer-term retention of video content.

The good news is that it's easy to affordably store video surveillance data for a longer period of time. Simply continue all but one of your current practices and add a VMS storage and content management system with tiered storage including digital tape. This system can include integrated software and hardware to allow users to easily record, retain and retrieve video. Then, instead of deleting video content, the VMS storage management system automatically transfers the original high-resolution video to digital tape at user-defined intervals. Low resolution copies of the video are maintained on disk so users can quickly search video regardless of where it is stored. When needed, the original high-resolution video content can be quickly copied from digital tape back to disk.



**Figure 2: Modern video surveillance recording and storage architecture**

Adding a digital tape tier allows organizations to afford much longer video retention periods -- from months to years. The digital tape storage tier also provides additional protection by automatically making a redundant copy of original surveillance video and databases.

## STORAGE CONSIDERATIONS

Digital tape technology provides an affordable and effective storage method that addresses each of these operational expense considerations:

- Finite data center space
- Ongoing energy costs, including power used to run and cool equipment
- Scaling storage to handle the incoming flood of video data
- Technology upgrades to keep pace with evolving video camera capacities and formats
- Reduces staffing requirements, since fewer staff hours are needed to manage tape compared to the resources required to manage disk



## STORAGE AND MANAGEMENT OF DIGITAL ASSETS

Disk and digital tape data storage technology has been around for more than 60 years, and both have emerged as contemporary and complementary technologies that each play a role in storing video content.

Disk is the most widely used storage medium in the surveillance market for the following reasons:

- It is already familiar, as video assets are typically stored on a server's hard drive
- Content is easy to access
- It is fast, allowing for rapid retrieval and playback of video content on demand

However, disk is also expensive when used to store huge quantities of video content, and needs to be replaced far more frequently than tape, which makes it less appropriate for longer-term storage. For short-term storage, disk is clearly the appropriate medium. For longer-term storage, use digital tape. This is sometimes referred to as a multi-tiered storage model, with disk as a primary tier, and tape as a secondary tier.

## ADDING DIGITAL COMPUTER TAPE

Most data-intensive environments, including the media and entertainment industry, use tape for longer-term retention. Of the zettabytes of data generated and replicated in 2011, over 70 percent were stored on tape.<sup>3</sup>

## ADVANTAGES OF DIGITAL TAPE MEDIA

Tape has many unsung features that work well for video content storage. Along with providing affordable, long-term storage, tape is highly reliable, and has a low total cost of ownership compared to disk. It also scales affordably and easily, and is very secure through options such as automatic copy and encryption.

**Costs:** It costs less to purchase digital tape systems. Often costs are one-third and in some analyses as little as one-seventeenth of the acquisition costs of a disk subsystem. According to a study by the Clipper Group comparing the cost of tape and disk systems, tape is a fraction of the cost of the same amount of disk.

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<sup>3</sup> Fred Moore. "Tape Storage Future Directions and the Data Explosion." Horison, Inc. <http://www.horison.com/TapeStorageFutureDirectionsDataExplosion.pdf>, accessed February 2013. <sup>4</sup> Information Storage Industry Consortium (INSIC). op. cit., p. 31.



**Power Use:** Digital tape requires far less data center power than disk requires to power and cool the same amount of storage. According to a 2010 study by the Clipper Group, disk requires as much as 238 times the energy expenditure for tape, when factoring in power use and cooling requirements over each subsystem's lifespan.<sup>4</sup> The same study reported that the energy cost alone for disk approaches the total cost of ownership for tape. Tapes draw no power at all when the library is not in use.

**Scalability:** One of the perhaps unexpected features of digital tape storage is its incremental and correspondingly affordable scalability. Adding one LTO-6 tape adds 2.5 terabytes (TB) to a tape subsystem, with typical costs for LTO media of less than 3 cents per GB.

**Reliability:** Technologically, the reliability of data on the digital tape is at least a factor of 2-3 (which is 100 – 1000 times) that of disk subsystems. The National Energy Research Scientific Computing Center (NERSC) conducted an internal study in 2009 and found that tape had a 99.9991 percent reliability rate. In their experience of reading 40,000 tapes, only 35 tapes had any issues at all when data was retrieved.<sup>5</sup>

**Security:** Tape by nature is secure because it is offline as soon as it is written and stored. Storing tapes in a library, as opposed to outside of a library, is sometimes referred to as nearline storage. Nearline storage protects tape from the traditional risks associated with a disk subsystem, including viruses, hard bit errors, and disk failures during rebuilds. While the time to retrieve content from a tape may be a few minutes—longer than it takes to retrieve from a hard drive—the video content remains secure until you need it, and can quickly be copied to disk for viewing.

**Active Archiving:** Digital tape is used for actively archiving data in the media and entertainment and in the high-performance computing markets. This proven archiving method extends a file system so that you can find data that is on disk and on tape in the same way. Active archiving supports rapid access to data on disk as well as relatively rapid access to data on digital tape. Using a data mover application, you can automatically move older data to tape, where the tape is written and then stored in the library. To retrieve content, simply issue a command.

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<sup>4</sup> David Reine and Kahn, Mike. "In Search of the Long-Term Archiving Solution—Tape Delivers Significant TCO Advantage over Disk." Clipper Notes, Report #TCG2010054R. <http://www.clipper.com/research/TCG2010054.pdf>, accessed February 2013.

<sup>5</sup> Jason Hick. "Leveraging the Business Value of Tape." Presentation to Fujifilm Global IT Executive Summit, June 8-10, 2011. [http://www.nersc.gov/assets/pubs\\_presos/Fuji2011BusinessValueOfTape.pdf](http://www.nersc.gov/assets/pubs_presos/Fuji2011BusinessValueOfTape.pdf), accessed February 2013.



## CONCLUSION

Advances in tape and disk technologies continue to reduce the costs associated with video content storage. For organizations struggling to store the increasing quantities of content generated by video surveillance systems, Spectra recommends using disk as you have always used it, then adding a retention system that includes digital tape for storing older video content. Savings from such a system can be redirected to other business requirements, such as adding higher-resolution cameras, increasing frame rates, and retaining content for longer periods.

## Deep Storage Experts

Spectra Logic develops deep storage solutions that solve the problem of long term storage for business and technology professionals dealing with exponential data growth.

Dedicated solely to storage innovation for more than 35 years, Spectra Logic's uncompromising product and customer focus is proven by the largest information users in multiple vertical markets globally.

Spectra enables affordable, multi-decade data storage and access by creating new methods of managing information in all forms of deep storage—including archive, backup, cold storage, cloud, and private cloud.

For more information, please visit <http://www.spectralogic.com>.

