

Increase Revenues with Digital Video Surveillance Solutions Built on Familiar Storage Platforms

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With the migration from analog systems to digital systems, video surveillance has become a booming market whose growth is estimated to reach \$46 billion by 2013. At its foundation, a digital video solution is a storage solution that transfers digital recording data from a camera or cameras to capture servers and then disk drives where it is stored and accessible for a required period of time and then overwritten or archived. While a specialized surveillance system can cost hundreds of thousands of dollars, the ability to create a wide range of affordable digital video surveillance solutions using familiar storage controllers and disk drives allows storage solutions providers to claim a share of this exploding market.

In fact, a wide range of video solutions is required to meet the needs of diverse customers and vertical markets that are driving growth.

Who is the Typical Customer and What do They Need?

A typical video surveillance customer might be a retail store that only has video surveillance because it's required for insurance. This company uses a single camera that records low-quality video to disk on the capture server, and every 24 hours begins overwriting yesterday's data with today's data. For this customer and many other businesses, surveillance is a cost that can never be turned into a profit, so the goal is to minimize the solution cost.

Prisons are typical users who are also interested in low-quality video, but have many cameras and a huge number of storage disks.

Another typical video surveillance customer might be a casino that runs multiple cameras and saves high-quality data for as long as 14 days before archiving it. For these usages, large storage capacity is required and reliability is crucial – if the video surveillance system goes down, the casino has to close.

At the highest end of the market are applications just coming into use by organizations such as European cities and airports that need to capture video and then process it with sophisticated image analysis that can detect objects or faces for various purposes. The most advanced of these systems can identify objects or people in scenes and track them from frame to frame and camera to camera. Naturally, this type of solution requires extremely powerful processing.

While customer needs vary greatly in terms of requirements, expectations and pain points, all are interested in maximizing their investment. Yet, each of these situations can be solved effectively by a smart storage vendor who understands the key differences that a video surveillance solution requires.

Key Differences of Standard Storage and Video Surveillance Solutions

While, depending on its purpose, a typical storage solution will have variable read and write patterns, in surveillance solutions writing is the primary concern. When the data is needed to solve a crime or when a disk drive fails, the digital video surveillance solution must be able to accommodate reads and rebuilds without affecting the performance of the write operations that continue to record surveillance data to disk.

Cost-effective Performance

Performance is a much more finely tuned consideration for video surveillance solutions than it is for typical storage solutions.

For a single camera solution, the write speed of the camera determines the maximum performance of the solution.

However, the minute you add even one other camera, the performance dynamic changes. Now, the controller needs to be able to provide the throughput that allows two camera streams to be transferred simultaneously to a single storage server. As cameras are added to the solution, this throughput requirement increases. Yet, the most cost-effective way to accommodate multiple cameras is with a single controller that provides ample throughput to transfer all these streams to a single system of storage disks. So, for customers who may be starting with a single camera but anticipate the possibility of adding cameras, a controller that exceeds the maximum camera transfer speed isn't overkill at all.

The other time when strictly matching controller performance to maximum camera speed may be a serious limitation is when there is the need to retrieve data, such as when a robbery or another crime has occurred. Then, your customer needs to be able to review previously collected data without affecting the current data recording. Ensure that you provide customers with ample bandwidth to retrieve video when disaster strikes.

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Naturally, for intensive applications such as tracking people and objects, maximum performance and processing power is required.

Trusted Reliability

In video surveillance applications, reliability actually is something more like “predictability.” Your customers need to know that once the video solution is installed and turned on, it will run without fail, recording the data, saving it as long as specified, and ensuring the video is there if they should need it.

Ironically, failures often occur when the system moves from the steady write operation of the camera recording data to the disks to the mixed read and write operation required to review data while continuing surveillance recording.

One way to ensure the video will be there is through the use of RAID. For customers whose primary concern is performance, RAID 1 makes the least impact on performance by simply mirroring data to a second set of disks. However, it incurs the cost of a second full set of disks.

From an economical standpoint RAID 5 makes the most sense, since it removes only one disk per RAID set from active storage and stripes parity data across all disks for fault tolerance. With RAID 5, the video solution can survive the loss of a disk without losing data. However, having to calculate parity slows the write operation.

RAID 6 is similar to RAID 5, except that it requires two disks from each RAID set and provides the capability to survive two drive failures before data is lost. This can be critical if a second disk fails while a previously failed disk is being rebuilt.

Your choice of storage controller can help you provide the right data protection while minimizing the toll on system performance.

Controllers that rely on software RAID generally offer the lowest price point. However, software RAID places an overhead on system operation, requiring the CPU and operating system to carry some of the RAID load. With a hardware RAID controller, everything required for RAID is on the controller, so there is no drag on the system. Hardware RAID controllers interact directly with the disk drives and their firmware and are extensively tested to ensure that they behave correctly in extreme circumstances or when errors occur. Software-based solutions usually have to rely on an operating system specific device driver to behave properly in error cases – something that is much harder to control.

You can also choose a controller that enables RAID migration, allowing the RAID protection on the data to be dynamically changed. With this feature, data can be quickly written to a RAID 1 format and then migrated to RAID 5 or RAID 6 for longer-term storage or archiving, saving space and money.

Flexible Capacity

Depending on customer needs and RAID requirements, capacity can be another critical issue in creating a surveillance solution. Capacity starts at the disk level, where hard drives are being introduced that have been optimized for surveillance applications, in capacities ranging from 250GB to 1TB.

For customers with one camera who write over their low-quality



data every day, a single capture server with a couple of disks and no other storage system might be enough. However, for customers with the need to retain and archive data from multiple cameras, storage scalability is crucial.

While the most cost-effective high-capacity drives are SATA, a SATA-only controller forces a 1 drive to 1 port limitation on the solution. So, a 4-port SATA controller would connect to a maximum of 4 drives. On the other hand, a Unified Serial™ SATA/SAS controller incorporates a SAS interface that supports SATA disks and provides access to maximum scalability through the use of SAS expanders.

You may also choose Unified Serial controllers that provide ports for both internal and external expansion. This provides the most flexibility in meeting customer needs, as disks can be directly attached and external storage systems can be added.

Because the flow of data being written to disks cannot be interrupted, it is critical for video surveillance that scalability be dynamic and can be accomplished without requiring the server to be turned off.

Choosing the Right Storage Controller

The simplest way to meet such a variety of customer needs is with a single family of controllers that offers models that provide the level of support that each customer requires, from the single camera store to the multi-camera high-performance environment. Yet, because it's a single family, there's no need for additional testing, qualification, or training before you build new solutions.

The Adaptec Series 5 family of SATA/SAS RAID controllers is a good example of one family of Unified Serial storage controllers that are ideal for surveillance solutions of all complexity. Because they support both SATA and SAS technologies, they provide maximum SATA drive performance and maximum scalability using SAS expanders (approximately 200TB using SATA drives).

Choose from space-saving MD2 low-profile models with:

- 4 internal ports
- 8 internal ports
- 8 external ports
- 4 internal and 4 external ports

For additional scalability, choose half-length, full-height models with:

- 12 internal and 4 external ports
- 16 internal and 4 external ports
- 24 internal and 4 external ports

An industry-leading dual core RAID on Chip (ROC), DDR2 533MHz write cache and a x8 PCI express host interface add performance that has been tested at 800 MB/sec (up to 5X faster than competitors) in write-heavy environments.

These controllers combine hardware RAID with the Adaptec RAID Code (ARC) to offer the maximum RAID protection, including RAID levels 0, 1, 1E, 5, 5EE, 6, 10, 50, and 60.

- RAID Level Migration allows the RAID level on stored data to be modified.
- Copyback Hot Spare ensures that when a failed drive has been replaced, data is automatically copied from the hot spare back to the restored drive, allowing the hot spare to stay in the same place.
- Online Capacity Expansion allows capacity to be expanded without powering down the server.
- Support for array sizes up to 512TB provides support for the latest high-capacity disk drives.

An additional benefit of choosing Adaptec Series 5 RAID controllers is the simple, centralized management provided by the Adaptec Storage Manager™. No matter how large or complex the video storage system becomes, it can be remotely scaled and configured and the RAID arrays monitored through a single centralized interface using secure, encrypted communications.

Choosing the Right Storage Disks

Disk drives optimized for video surveillance are designed primarily for streaming video and an easy choice to enhance the performance, reliability and capacity of your solutions. As with the controller, it often makes the most sense to work with a single product family that offers the flexibility to meet a range of needs without requiring new testing or training.

The SV35.3 Series™ from Seagate are the only hard disk drives specifically designed to enable security solutions providers to accomplish more with less, providing a wide range of capacity, performance, reliability, and extra features.

Built on Seagate's perpendicular recording technology, the SV35.3 Series™ drives are available in capacities of 250GB, 500GB, 750GB and an industry-first 1TB. This massive capacity allows the storage of up to 289 days of digital video or 32 days of high-resolution video.

Longer archival periods are only one of the benefits of hard drive-based systems with this abundance of storage capacity. The enhanced range of capabilities also includes:

- Higher image resolution/high-definition video recording/megapixel video recording
- Increased active camera deployments
- Intelligent video analytics

In terms of performance, these drives are optimized for recording multiple, simultaneous video streams to support the most demanding video surveillance applications, and provide up to 3Gb/s sustained performance, for moving video data in single- and multi-drive environments. Additionally, read/write profiles can be tailored for specific video applications, including video only or a combination of video and data. This ensures smooth, reliable video streaming as well as high-integrity database updates.

Designed for heavy write duty cycles and 24x7 operation, the SV35.3 Series™ offers exceptional reliability with a mean time before failure (MTBF) of over 1 million hours and an annual failure rate of less than 1 percent. Intelligent workload monitoring takes corrective action when it senses specific workload profiles that can stress key system elements.

Conclusion

For vendors who are already providing storage solutions, the digital video surveillance market offers a natural opportunity for business expansion. With video surveillance solutions incorporating many of the same components as storage systems, the latest storage components provide the features and optimization required to meet the needs of video customers.

Practically any storage solution provider can successfully increase revenues by gaining an understanding of the areas explained in this white paper where video surveillance applications differ from general storage applications, and then by simply integrating familiar controllers and hard disks for maximum profit.



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