

Look at Media Storage as a Revenue Opportunity

DAS, NAS, SAN — choosing the right storage is key to profit. *By Jeff Whitney*

A DVR system is composed of industry-standard components, including a standard PC motherboard and power supply, an analog-to-digital converter, one or more native disk drives, and an operating system.

The video surveillance solutions being deployed today often require more video retention with better image quality than ever before. The demand is largely driven by increased regulations, new applications using video and ever-present external threats. While this presents challenges to security integrators, it also delivers significant opportunities. Storage is typically one-third to one-half the cost of today's video surveillance, but it is often hidden in the price of DVRs. Finding ways to cut the cost of surveillance systems and reduce the amount of storage, while simultaneously achieving new retention, reliability and performance needs, are key to an integrator's standing as a customer's trusted advisor.

The difference between storage technologies isn't in the disk drives themselves, which all come from a small group of original equipment manufac-

turers. The real difference is how the storage system is architected to meet specific video requirements.

Three storage solutions are widely used today — DAS, NAS and SAN.

DVR DIRECT ATTACHED STORAGE (DAS)

DVRs have proven to be a reliable and dependable platform, with about 70 percent of surveillance systems being DVR-based, most using DAS storage.

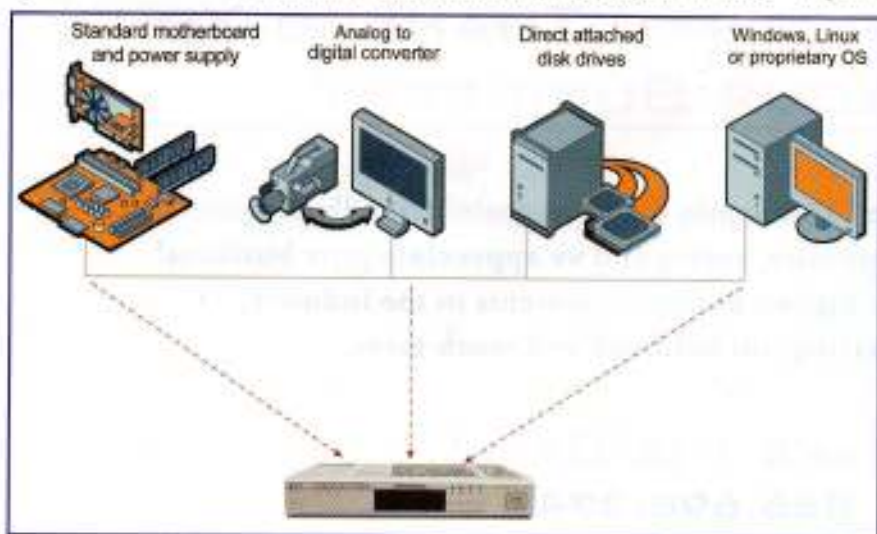
DAS began with the first IT disks, and was brought to physical security with the DVR. With DAS, the DVR is closely integrated with "captive" proprietary storage — disk capacity that is exclusive to that specific DVR system, just like storage in a desktop or laptop PC, and supplied by the DVR manufacturer.

High-end DVRs may include RAID data protection, hot swap disks and fault tolerance, which improve reliability and administration. Most DVRs support multiple disk drives in their enclosures, and some can be upgraded by the security integrator for further capacity growth.

DVR storage pricing is the baseline for video surveillance. Other solutions must deliver similar pricing or offer significant other savings and features to be competitive with native storage expansion of the DVR.

While DVR DAS storage is the most prevalent technology in video surveillance, it also has the greatest number of challenges.

First, in order to stay within warranty requirements, expansion drives can only come from the DVR manufacturer. This can make the disks seem quite expensive



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compared with identical drives available on the open market, a common complaint from end users.

Second, DVR disk expansion is often limited, so that when additional capacity is required a new DVR often is added. While it provides good short-term revenue for the integrator, this model risks a competitor offering a less expensive solution.

DVRs and their DAS storage are "data islands," self-sufficient and unconnected to other storage. Should one DVR have unused storage and another be at capacity, it's not possible to share between them to balance usage and utilization. Thus security professionals often overprovision their DVRs in order to reach desired capacity and retention, when some might require significantly less capacity.

When a DVR fails, DAS storage in that platform cannot be accessed easily by another. Recording halts until the component or DVR is replaced, or cameras are re-cabled to another system, interrupting the retention schedule.

Low- to mid-level DVRs may not offer advanced data protection, disk drives, components or fault tolerance. Yet, some DVR manufacturers and integrators report that failed drives and resulting lost video are the main problem encountered. If you consider service calls your company has had to make you likely have seen this issue.

Low- to mid-level DVRs and NVRs also often do not include advanced notification of disk failures or recording issues. When an operator's station is unattended, or the operator is busy with other tasks, an alarm that reports to the management console is effectively useless. Such problems should include e-mail and Web alerts, notifying one or more employees and the supporting integrator of the issue, and not wait for discovery of lost video.

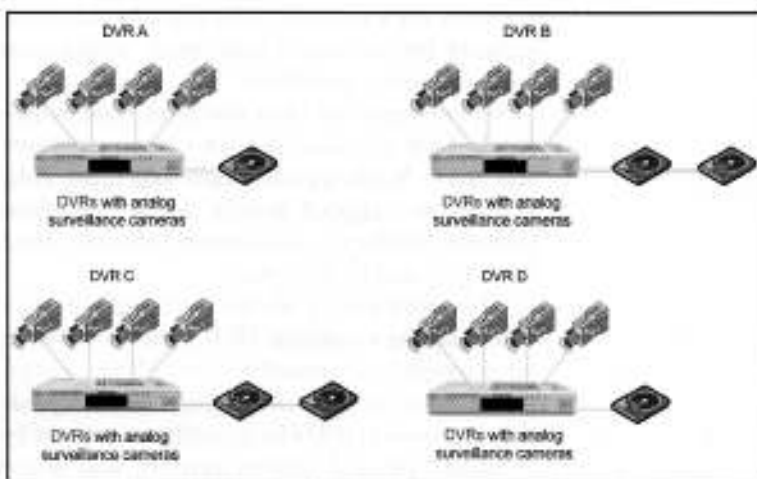
EXTERNAL NETWORKED ATTACHED STORAGE (NAS)

Network attached storage is commonly found in workgroup and departmental IT use. Video is stored as individual files on an external storage system, supported by its own operating system to provide an interface between the DVR and the storage over the CIFS or NFS protocols.

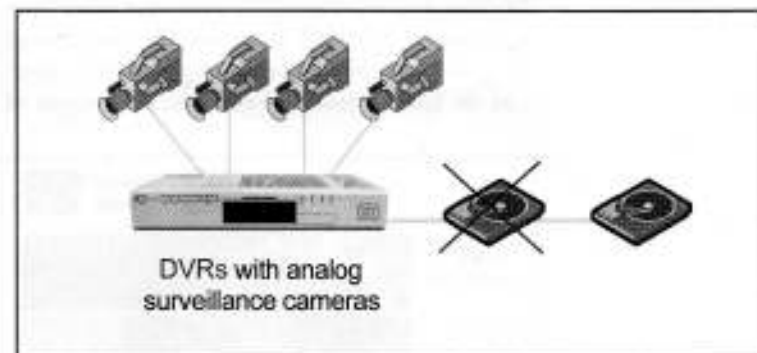
Under NAS, multiple DVRs can access the same shared storage, eliminating the data islands of individual DAS-based DVRs. The NAS becomes the primary recording platform, and internal DVR storage used only for the operating system.

For individual DVRs, buying extra capacity is common to ensure enough is available.

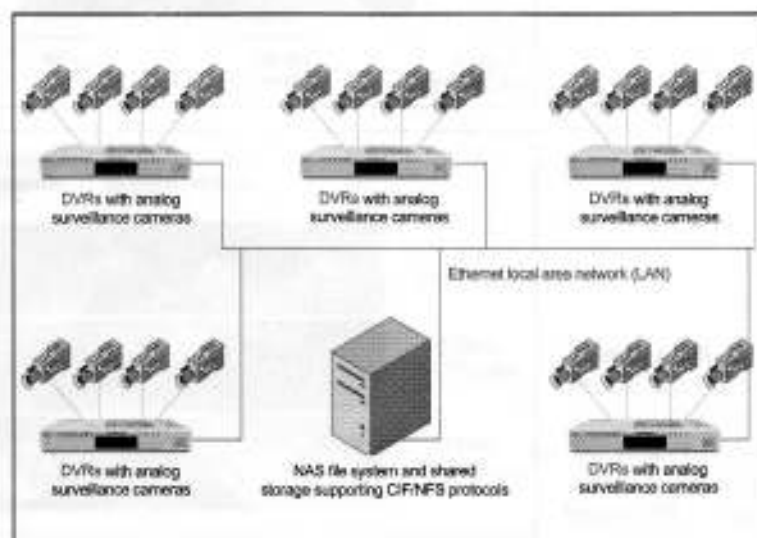
NAS has a positive impact on storage utilization, because storage that previously might have been



Individual DVRs are self-sufficient for storage, each with their own captive DAS storage, independent from one another. Each is its own "data island."



When a DVR drive or other component in a DVR fails, recording stops.



A NAS storage system connects multiple DVRs together for shared storage.

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unused in one DVR can be shared by another. Thus, not every DVR has to be equipped with maximum capacity, but can share a larger pool, cutting costs with less storage purchased.

NAS systems can offer advanced features like RAID, fault tolerance, and hot-swap components and disks. While typically more expensive, NAS systems so equipped usually deliver long-term customer satisfaction and support both entry-level and higher-end DVR systems.

While NAS pricing always will be less than the cost of adding a complete DVR, an entry system is often competitively priced to internal DVR storage.

But, there are some challenges. The NAS products that connect to DVRs typically are not sold by traditional physical security vendors, who would prefer customers purchase DVRs instead of adding external storage.

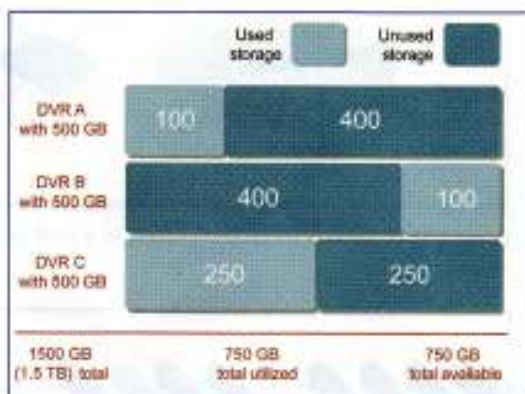
NAS solutions usually are offered by IT storage vendors who deliver identical products for e-mail, database, human resource systems and other business uses. While NAS is an excellent technology for general-purpose IT needs, many of these products do not address the workload challenges of

video surveillance. IT products are well designed for a balanced read-write workload, not for a write-heavy video environment where 90 percent or more actions are non-stop writes to disk.

This can lead to long-term performance problems for the surveillance system, and a challenge for the supporting integrator. As an example, the file-based operating system in a NAS system can result in fragmentation of video stored with repeated use due to file system requirements. Gradually, performance drops as the storage grows fragmented, and since the surveillance system may require non-stop recording, there may never be time to defragment, causing increasing problems.

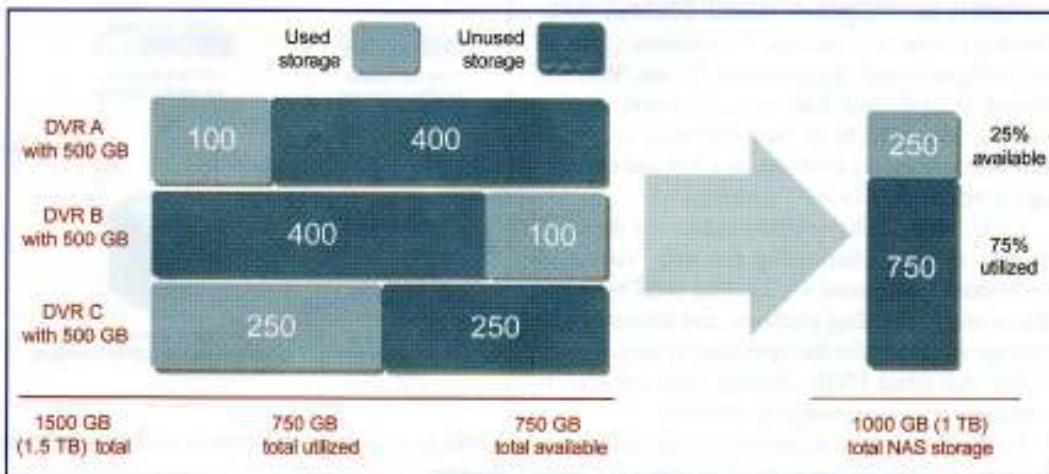
The overhead of NAS systems also may provide some performance issues in a heavily used system. For this reason, NAS systems work best in small systems unlikely to need longer retention periods, but require higher uptime and lower total storage costs than adding DVRs.

When selecting a NAS, video optimized solutions should be selected. To verify this optimization, select only NAS that is tested and certified with multiple cameras, video management sys-

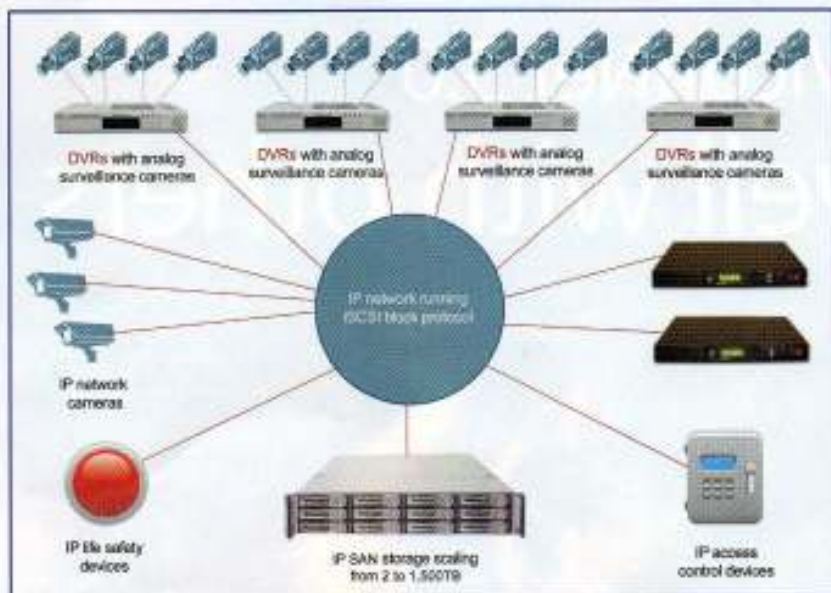


Individual DVRs can vary widely in storage utilization. In this model, although all three DVRs are equipped with 500GB of DAS storage, DVR A is 25 percent utilized (75 percent unused), DVR B 75 percent and DVR C 25 percent. The unused storage was purchased at extra cost, and 50 percent in total is unused. Yet DVR B is nearing the point of running out of storage, requiring either additional drives to be added, some cameras to be moved to another DVR for recording, or retention periods reduced.

When network storage is used, one-third less total capacity could provide better utilization — 75 percent — for reduced costs and better availability.



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IP networks can support DVRs with existing analog cameras, IP network cameras, NVRs, and other IP-based technology including life-safety and access control, and all can share the IP SAN storage.

tems, analytics, DVRs, and other components for the surveillance system.

NAS solutions not focused on the specific workloads of video storage won't have successfully certified with many of these physical security vendors. For the security integrator, this can lead to costly support problems and customer satisfaction issues long after installation. Certification often can eliminate warranty concerns, and ensure fewer problems when installing NAS.

EXTERNAL STORAGE AREA NETWORKS (SAN)

Storage area networks are the newest technology to be adopted for video surveillance. Like NAS, SAN offers external storage shared by multiple DVRs,

eliminating storage islands, but over the SCSI protocol. If a DVR fails, the storage continues to be available and the video to be accessible. In advanced SANs, fault-tolerant designs allow recording to continue non-stop, without fragmentation.

Unlike NAS systems, SANs write in the same block format used by IP cameras. This eliminates the need for an operating system layer between the DVR and storage, reducing overhead while eliminating a potential support conflict for the integrator.

With advanced management capabilities developed for IT, SAN systems optimize and reduce the amount of storage more effectively than other offerings for significant customer cost savings with better ROI.

The first SANs used Fibre Channel (FC) technology, and have been proven to reliably deliver very high performance storage, capable of supporting the most challenging IT applications. But FC SANs are also many times more expensive per terabyte than typical storage for physical security, and require significant storage expertise. This has typically limited FC SANs to large corporate IT environments, not for departmental or small-medium business usage.

Consider IP SANs, which deliver the benefits of FC, but at a fraction of the price. Just as importantly, the best IP SANs do not require extensive storage knowledge, yet are ideal for IT applications such as storage consolidation and can be optimized for video workloads using the iSCSI block protocol.

		
Cost of typical DVR with 750GB drive	Cost of typical DVR with 750GB drive	Cost of typical DVR with 160GB drive connected to 4TB IP SAN storage less than cost of 2 DVRs with total 1.5TB
Feature Comparison: Stand-alone DVR with DAS storage vs DVR with IP SAN		
<ul style="list-style-type: none"> • Individual storage island • No sharing of capacity • No protection against disk failures and failover to other DVR 	<ul style="list-style-type: none"> • Individual storage islands eliminated • Sharing of capacity means DVR can be equipped with minimum disk for cost savings • Less total storage required, providing cost savings • Full protection against disk failures and failover to other DVR • Single storage management for all storage 	

The illustration at right allows one to perform a cost-comparison between a stand-alone DVR with DAS storage and a DVR with IP SAN.

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In a DVR with DAS, writes to disk are performed sequentially one drive at a time, regardless of how many drives the DVR is equipped with. Recording speed is therefore limited to the capabilities of the individual DVR system.



IP SAN offers features that can deliver better performance than traditional DAS storage in DVRs.

For example, disk striping (or RAID 0) allows a DVR to write to a group of disk drives simultaneously, resulting in much better performance than when writing to a single drive which is limited by the DVR hardware.

IP SAN offers more capacity than any other solution for video surveillance. Some IP SANs start with as little as 2TB, perfect for one to five

DVRs with a handful of cameras, or for edge recording. The best of these systems can scale to 1,500TB or more, enough for thousands of cameras with multi-year retention periods.

Just as in NAS solutions, security integrators need to ensure that the IP SAN vendor understands that video storage differs from IT workloads. This usually can be demonstrated with list of physical security vendors whose products have been certified to work with the IP SAN solution.

Some IP SANs continue to be priced as an IT solution, making them non-competitive for many video surveillance needs. Select an IP SAN that is price-competitive with DVR storage, less than the price of adding another DVR.

Equally important, the customer's current investment in DVRs, NVRs, analog cameras, video

management systems, analytics and cabling should be protected when deploying IP SANs. Some solutions are entirely focused only on new deployments, and ignore the investment customers have made in their security systems. IP SANs supporting existing infrastructure are the smart choice, protecting customer investments while limiting possible disruption. The resulting hybrid that an IP SAN storage upgrade delivers eases the customer into the benefits of IP, positioning the integrator as a trusted partner looking out for their best interests.

A demonstrated ability to support other IP-enabled technologies such as access card readers, life safety, or even IT applications can deliver further customer cost savings while providing new sales opportunities to the integrator.

IT terminology remains connected to some of the IP SAN products that are offered to the physical security industry. From an administrative perspective, there is no reason why a security integrator or practitioner should have to learn IT terms, but instead they should continue to configure and administer their storage systems in terms of retention, frame rate and resolution. IP SAN reduces the administrative burden with hot swap components and data protection. But such benefits are lost if ongoing administration is overly complicated. Common labor-saving functions like automated e-mail/Web alerts are a part of simple management delivered by the best IP SAN solutions.

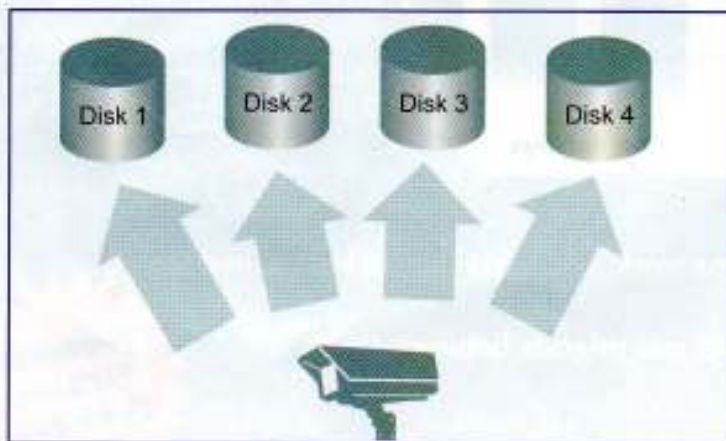
THINKING ABOUT STORAGE

All three storage technologies are appropriate for different aspects of video surveillance. Native DVR storage using the DAS model continues to be the default choice, but may not be the best long-term selection for the customer or the integrator.

Understanding specific customer requirements is the way to select the right storage. Unfortunately, storage is often an afterthought, to be plugged into the solution after the cameras, video management systems, and other components have been selected. Integrators should think of storage early, ensuring that the solution fits the specific needs of the customer. With a little planning, integrators can position the right storage solution for their customers every time, while opening up new opportunities for revenue. ■

ABOUT THE AUTHOR

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In a DVR with an external IP SAN, the camera feed can be written across a stripe of multiple disks. This not only bypasses the sequential nature of DAS writes, but eliminates the performance issue of the DVR's write speed.