

Choosing the Right Storage Technology for Video Surveillance

The video security landscape continues to evolve - creating a growing need for higher capacity, and higher performing storage to support it.

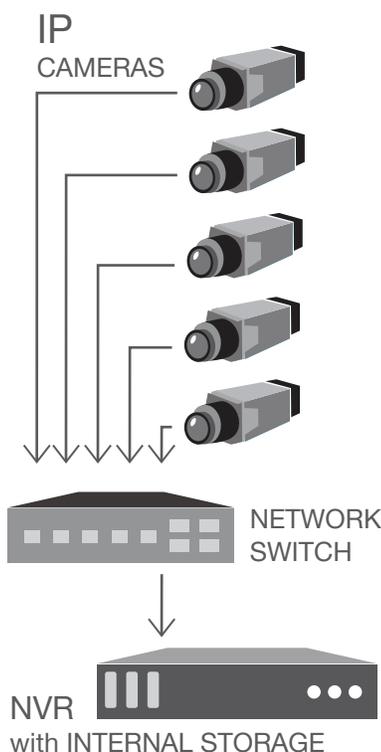


Figure 1: Direct Attached Storage Architecture

Why SAN Makes Business Sense

In the last ten years we have witnessed the rapid transition from analog to digital recording technologies which utilize all IP cameras. These IP cameras have made it possible to record higher resolution images than ever before by using advanced compression technologies and commercial grade image processors. These high resolution cameras, coupled with the demand for longer video retention times, have driven the need for increased amounts of storage. The days of recording from a finite number of cameras are over. Today's security systems need to be designed to scale for increased camera count, higher retention requirements, and evolving camera and surveillance technologies.

The technology cycle is not going to slow down; in fact it will only accelerate. Customers stand to benefit by rolling out these advancements quickly—in increased organizational safety, protection from expensive lawsuits, uninterrupted business continuity, and the valuable insights they can gain from video that will allow them to drive their businesses forward. However, they will also face obstacles as they try to use existing infrastructure, built for a finite number of cameras with much lower resolution.

A critical component of video surveillance infrastructure is data storage storage, which is arguably the biggest investments made in an overall IP Security system. Security directors have the responsibility to ensure that the storage architecture they choose today has the ability to scale for tomorrow as technology continues to evolve, and it should do so without the need for a “forklift” upgrade. With so many storage technology options available for video security, it can be easy to choose an option that appears to be the best relative to its cost today, but the total cost of ownership may not make sense when considering the big picture.

This document will assist you in choosing the best type of storage for your unique video security needs.

Storage Options Direct Attached Storage (DAS)

Traditionally used for smaller, all in one video solutions, a DAS is simply a unit that has storage media that are directly connected, and accessible by, a single Network Video Recorder (NVR). This type of system mimics the more outdated DVR technology in which the software comes bundled with the hardware, and is generally tied to one particular vendor. The hard drives can be located inside the same physical unit as the server and/or in an expansion chassis that is physically connected to the NVR via serial attached SCSI (SAS) or fiber channel. A DAS unit does not have the flexibility to easily scale over time. Adding additional cameras and storage to a DAS architecture could potentially be very costly due to the fact that a new server would most likely have to be added as well, and changing the Video Management Software may result in a complete hardware replacement cost.

Summary: The DAS architecture can work very well for smaller video security installations, however it is limited in its ability to scale without a high price tag and complicated administration tasks.

SAN is an excellent fit for a security application that needs to be scalable and flexible as business grows and camera technology evolves.

Traditional IT World External Network Storage

As the size of installations grow to 100s and 1000s of cameras and days of retention increase to multiple months and years, DAS is simply not the option. That takes us to centralized external storage. In the traditional IT world, external network storage comes in two flavors:

1. Block Storage systems that are accessed through a Storage Area Network (SAN) over Fiber Channel or iSCSI.
2. File storage systems that are access over IP network (NAS)

For Video Surveillance storage where performance, low latency recording and minimal or zero loss of frames is critical, a block storage system is the best option available.

Storage Attached Network (SAN)

Large security systems for enterprise class environments generally call for large numbers of high resolution cameras and extended video retention times, usually more than 30 days. We frequently see these types of systems in industry verticals such as Casinos, City Surveillance, Airports, and Grow Facilities; however due to cost effectiveness and ability to scale, they are quickly becoming more and more popular in mid-tier installations as well. A storage solution for this type of camera environment exceeds the capabilities and cost effectiveness of a typical DAS solution, and offers a more robust architecture that has the ability to scale over time. This is why a SAN is an excellent fit for a security application that needs to be scalable and flexible as business grows and camera technology evolves.

A SAN differs from a DAS in that the SAN allows for multiple NVR units to connect to a single storage system at the block level for video recording. Connecting the NVR's to the SAN is generally accomplished by iSCSI or Fiber Channel. The NVR will see the storage allocated by the SAN as a local disk drive just as if it was directly connected, and the file system would be maintained by that NVR. A GUI interface on a web browser from any server connected to the storage system network allows for centralized management of the SAN. This creates efficiency and ease of management.

As the camera system grows, storage servers or expansion units can be easily added over time to extend capacity, without requiring the administrator to re-architect the camera to NVR network. This allows for complete scalability of the storage system. In addition to scalability, the tight coupling of storage and software is effectively removed, allowing for the flexibility to change VMS software without the need for a "forklift" upgrade of the hardware. Finally, this type of architecture allows for greater redundancy as it eliminates the single point of failure that is found in a DAS environment.

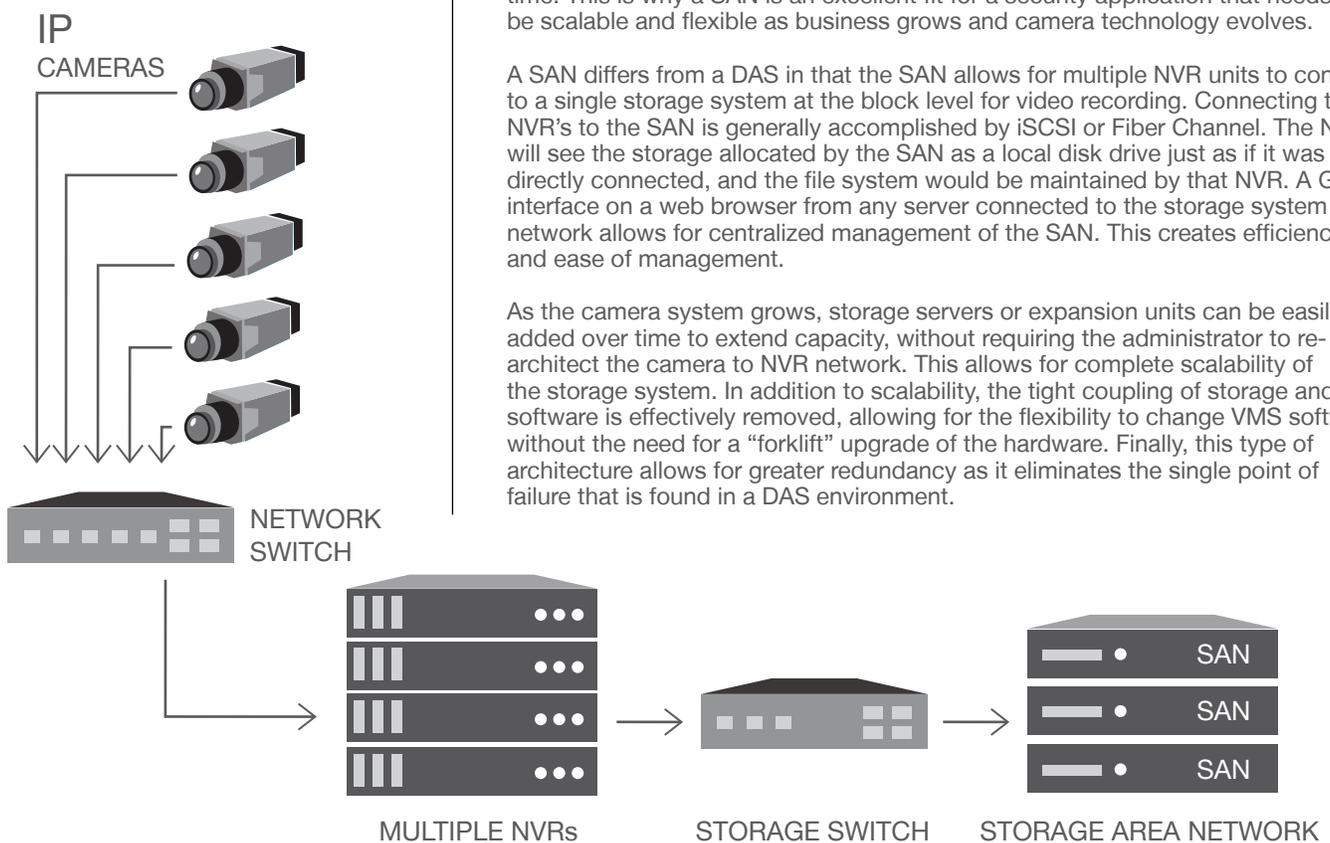
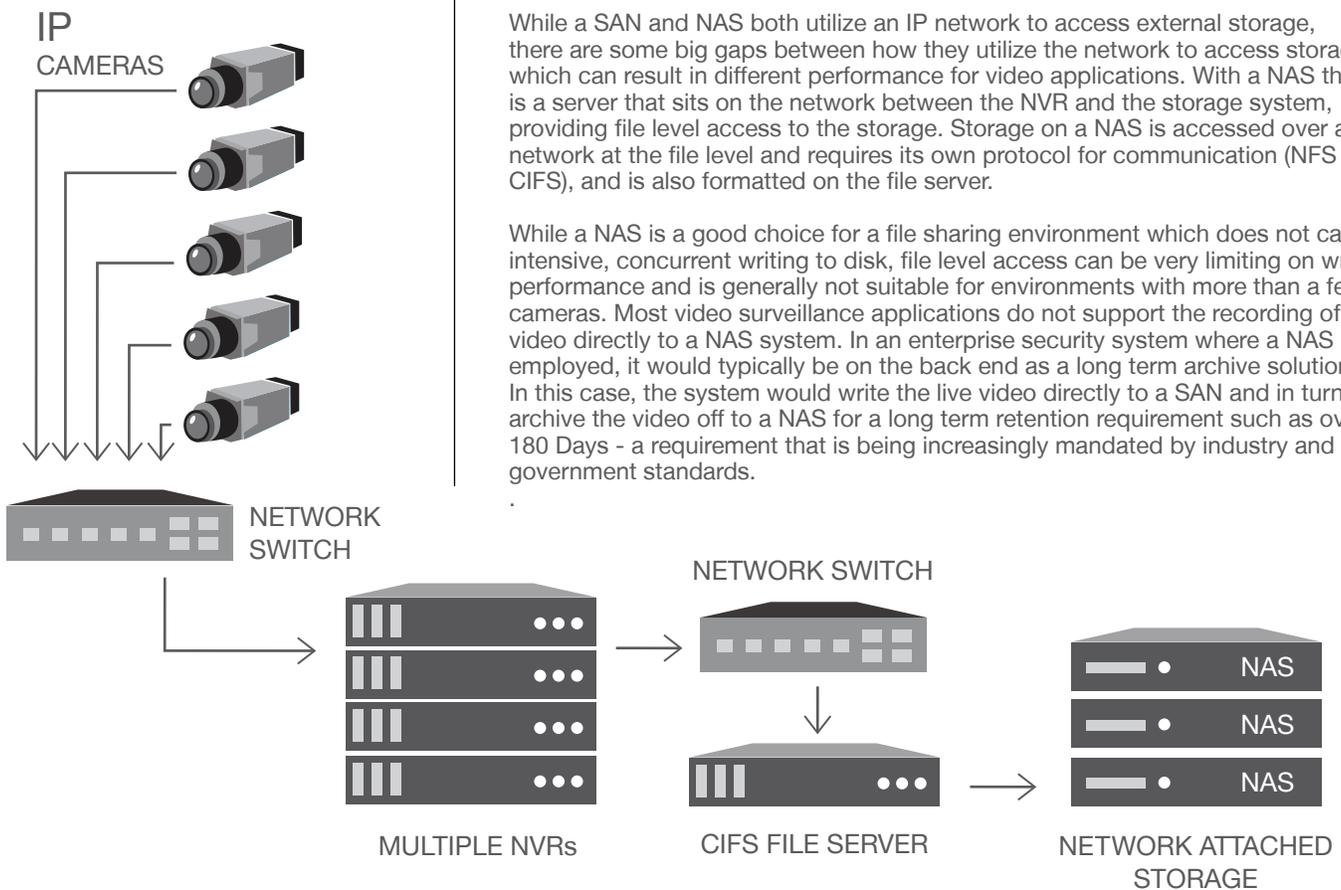


Figure 2: Storage Area Network

Summary: The SAN Architecture provides a very flexible storage system for medium to large security installations, providing the cost effective ability to scale easily as your storage demands change over time.



Network Attached Storage (NAS)

While a SAN and NAS both utilize an IP network to access external storage, there are some big gaps between how they utilize the network to access storage which can result in different performance for video applications. With a NAS there is a server that sits on the network between the NVR and the storage system, providing file level access to the storage. Storage on a NAS is accessed over a network at the file level and requires its own protocol for communication (NFS or CIFS), and is also formatted on the file server.

While a NAS is a good choice for a file sharing environment which does not call for intensive, concurrent writing to disk, file level access can be very limiting on write performance and is generally not suitable for environments with more than a few cameras. Most video surveillance applications do not support the recording of live video directly to a NAS system. In an enterprise security system where a NAS is employed, it would typically be on the back end as a long term archive solution. In this case, the system would write the live video directly to a SAN and in turn archive the video off to a NAS for a long term retention requirement such as over 180 Days - a requirement that is being increasingly mandated by industry and government standards.

Figure 3: Network Attached Storage

Summary: While a good choice for long term archival of video footage, the NAS is not typically recommended for the recording of live video in most video security systems.

NAS is generally not suitable for environments with more than a few cameras.

Why SAN is preferable over NAS for Live Recording

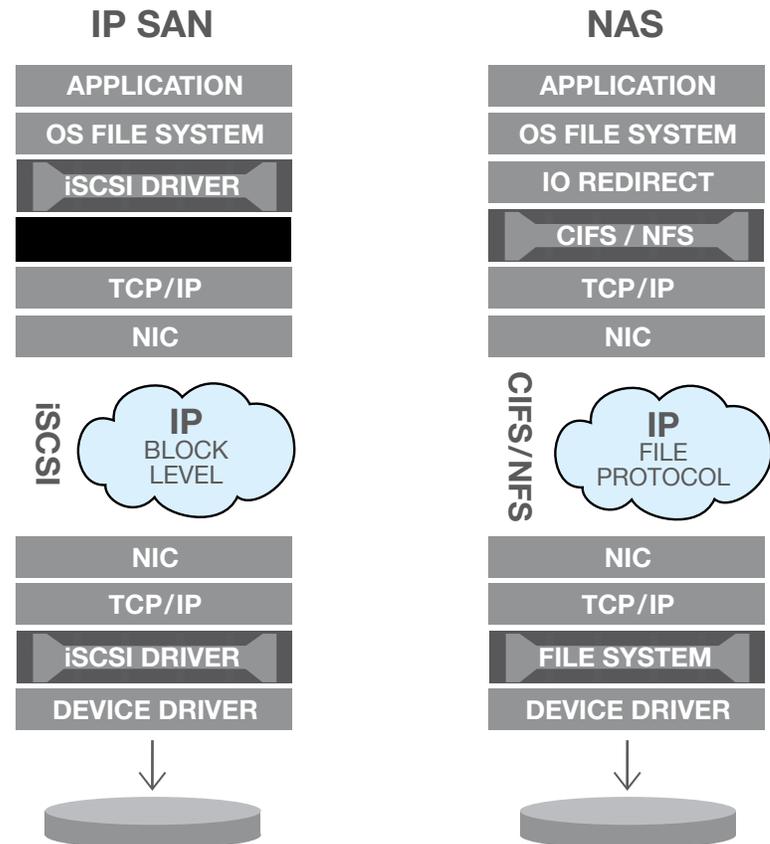
In both storage options, the writes to the storage are done by the VMS software. While different VMS softwares handle writes differently they all require a stable and consistent interface. The primary differences between SAN and NAS when it comes to VMS are the stability and persistence of the interface, and the layers of management that the storage system tries to impose on the incoming data.

FC and iSCSI are much more stable and persistent

Many studies have found that dedicated interfaces such as FC and iSCSI are much more stable and persistent than IP based NAS interface. Also SAN systems can be configured with minimal to no layers of management, and present the storage just as disk. This gives VMS software the best performance, without interference from dedupe algorithms and other checksums filters from interfering with VMS data.

SAN systems can be configured with minimal to no layers of management, and present the storage just as disk.

With NAS systems, to replicate this type of environment, it is possible to get similar performance, but it would result in replicating SAN like environment. In particular the NAS would need a dedicated storage network for VMS to maintain the persistent connectivity that VMS database requires. The mere existence of the filesystem itself is an additional layer of management that VMS needs to navigate before flooding the disks with data.



Storage Systems Designed for Video Surveillance

Seagate provides storage systems that are designed specifically for the demands of video surveillance. With capabilities to manage high resolution video retention, provide high throughput capacities, and the ability to scale easily to meet current and future retention needs, Seagate is the storage manufacturer in the world that delivers systems comprised of components engineered by us, and that are then tested, and optimized to work together flawlessly. This not only allows for advanced software engineering innovation, but it also allows us complete control over the component procurement process. From the enclosure, to the controller, to the disk, our systems represent better value, better technology, and enable better insights from data. All Seagate storage systems are tested and certified in our Video Security Performance Lab located in Longmont Colorado, and provide an open platform approach to protect storage investments now and in the future.