SECURITY Technology & Design

IP Case in Point: Dealing with Complex and Large Video Storage Needs

Adding network video surveillance to Kentucky's Department of Juvenile Justice

By Fredrik Nilsson

Advances in network video systems, including better resolution, higher frame rate and highly-scalable systems call for increased uses of storage. The added capabilities and flexibility provided by IP surveillance systems, such as recording and saving large amounts of data on a continual basis, place greater demands on storage hardware.

The first iterations of video surveillance relied on analog systems that recorded to VHS using physical tape which would then be cataloged and stored. DVR-based systems developed and were less costly to maintain and archive, and also took up less shelf space through the use of DVDs. But higher requirements have emerged that DVR-based systems have a difficult time addressing. IP surveillance fills those needs with easily accessible digital archiving where captured video is stored onto a hard drive or in a storage array, giving the user immediate access to requested data at disk speeds. In addition, IP surveillance systems are very scalable and offer redundant systems of storage which protect valuable data from being lost.

As the benefits of IP surveillance are fully realized, more companies and organizations in the public and private sector are migrating from DVR-based systems to network video systems. In doing so, they are leveraging the power of storage solutions to maximize the efficiencies of an open system and solve challenges that DVR-based systems cannot address.

The evolution of IP surveillance constantly brings new players to the market, and as in other IT fields the emerging leaders focus on specific sectors. Storage is a discipline with very fast development cycle, and extreme reliability requirements. EMC is recognized as a market leader in the storage field with more than $10 billion in revenue and a reputation for knowing all there is to know about large storage systems. When a state government department was looking for a surveillance system with demanding storage needs, it was a natural choice to evaluate IP surveillance and EMC's solutions for it.

Case In Point

In late 2005, the Kentucky Department of Juvenile Justice (DJJ) updated an antiquated analog tape system. In doing so, they implemented an advanced network video system in order to ensure a safe environment for the treatment and education of youth committed to care, while providing increased accountability and protection of facility staff.

The DJJ had a few primary concerns as it related to their video surveillance system. First, they needed to ensure the custody, safety and treatment of the youths entrusted to them by the judicial system. In addition, they needed to maintain staff safety and aid in employee management. The final concern was related to data storage and security. Overall, the DJJ needed a system that would enable the storage of video data and the ability to access it easily and quickly. Storing a large volume of video surveillance files was as important as accessing those files in a fast turn-around emergency situation.

Before choosing a network video system, the DJJ surveyed the existing surveillance capabilities and determined that the department's needs had outgrown the installations for correctional-based management currently in place. The bulk of the system, comprised of different video solutions, was analog tech-

nology that combined analog cameras with VCR tape recorders. Some of the more recent upgrades included newer analog cameras with a digital video recorder (DVR). None of the systems were IP-based. An internal review determined that some facilities did not have any functioning video capability and those that did have video surveillance capabilities were using an archival retrieval process that was based on outdated and often inoperable technology. The existing archival processes did not allow for efficient management and retrieval of recorded incidents.

Before embarking on the implementation of an entirely new system, the DJJ created benchmarks that would help define the requirements for more effective surveillance. The primary goal was the implementation of a turnkey system that would not have to be managed long-term on an individual facility basis and would create a standard of operations across all facilities. DJJ was also interested in an IP-based system because it provided a level of scalability that would accommodate future growth and/or changes.

Scalable Systems

The DJJ implemented several solutions from the EMC Corporation, including their Surveillance Analysis and Management solution, which provided advanced video content management and analytical capability. The solution also combined hardware and software that accelerated the storage, archiving, fast searching and analysis of surveillance data. The updated system helped the DJJ migrate away from a proprietary platform based on PCs to an open enterprise platform allowing for increased flexibility, scalability and security. The system also enabled the department to install more cameras throughout its locations and centralize the storage of remote video feeds. Ease of scalability for a network video system will be increasingly important to organizations like the DJJ in providing centralized IT oversight, determining new placements for future cameras or a possible shift in the focus of duties at a specific facility.

The EMC Physical Security solution includes common Dell servers, network cameras, EMC high availability software and an EMC Clarion storage array. Network cameras take advantage of Cat 5 cabling and IP technology to capture and transmit the data to a server where it is collected, indexed and then stored on the Clarion array.

Sensible Storage

There are a number of considerations when calculating storage requirements. For example, the user must take into account the number of servers deployed in a system, which is decided by the number of cameras installed. A server can accommodate 15-100 cameras on average depending on three things: the level of resolution being used; frames per seconds; and the recording dynamics. One element to consider includes the number of hours a day each camera will be recording. Some systems can be set to record 24-hours a day while others are utilized only in off hours, or are motion activated. All of these variables can be controlled with within the solution and will factor into the number of servers needed to appropriately store the data.

Storage arrays can be quite small or quite large depending upon the predetermined criteria. The DJJ system can accommodate anywhere from five to 15 terabytes (TB) of storage, while an airport saving footage 24-hours a day at a very high resolution may be running 100 TBs of storage. While high frame rate and high resolution offer clear images and the ability to zoom in for greater detail, it also requires multiple levels of storage. Organizations like the DJJ must accurately assess the level of granularity required in video surveillance situations prior to implementation.

In addition to calculating appropriate storage needs, organizations must evaluate issues of redundancy through remote storage. By saving video in multiple locations including off-site storage, organizations ensure a solid disaster recovery plan. Video from a smaller server within a facility can easily be sent to an off-site facility with larger storage arrays. This will keep data safe and minimize the threat of footage being lost should an on-site server be destroyed through nefarious or accidental means. Servers equipped with Redundant Array of Independent Disks (RAID) can work in clusters or replicate data with other serves even farther way.

The DJJ rolled out its IP surveillance solution into six of the 30 facilities. The average installation included 50-100 Axis network cameras per facility, including dome, fixed and Pan/Tilt/Zoom (PTZ) cameras. Because some facilities were installed with analog cameras prior to the upgrade, the DJJ implemented video servers/encoders (also Axis units), which easily digitize and incorporate information from existing analog cameras.

Benefits Beyond A Networked Solution

Video surveillance is a powerful preventative tool. One of the best ways to measure the benefits of a security device is by the lack of incidents and security breaches. Beyond those benefits, the DJJ's IP-based network video system captured incident accountability and showed youth and staff in positive situations.

"The search engine within the solution is state of the art; providing sophisticated user-friendly analytics, and is immediately responsive," said Michael Dossett, deputy commissioner of the DJJ. "After almost two years of analysis, we are confident that our solution remains the best possible one for the unique issues we face in the Kentucky Department of Juvenile Justice."

The DJJ's migration to a network-based security system not only enabled them to increase security and find storage solutions that could scale to size as their operations grow, but it has allowed them to provide a higher level of care to all the youths in the facility and may serve as a model for other juvenile justice systems across the country.

Fredrik Nilsson is general manager of Axis Communications, a provider of IP-based network video solutions that include network cameras and video servers for remote monitoring and security surveillance.