



Commonwealth of Kentucky

2007 NASCIO Recognition Awards Nomination
Category: Information Security and Privacy

Real Time Digital Surveillance

Department of Juvenile Justice

This project will address the convergence of technologies required for implementation of a real-time digital video surveillance system. The solution will provide for the upgrade of analog and legacy systems and will enhance the capabilities to provide improved services in safety and security of the youth entrusted to the Department of Juvenile Justice. The system will further provide the ability to network statewide facilities and centrally archived video data for an extended period of time.



Executive Summary

This project was chartered after an examination by the Commonwealth of Kentucky's Department of Juvenile Justice (KY DJJ) of surveillance systems at its 30 state-wide custodial facilities. The residential sites are tasked with providing safe and secure housing, education and treatment services. KY DJJ realized the need for a more comprehensive, efficient solution. Only one-fourth of its 30 facilities had any kind of video surveillance in the form of closed circuit television (CCTV) cameras feeding analog images to VHS tapes for storage. And only half of those sites employed digital video recording (DVR) to capture surveillance images. There was no automated or centralized collection, analysis, and storage of video data. In addition, staff members needed to spend hours manually reviewing video material before they found the clip they needed.

To address these issues, under the direction of Commissioner Bridget Skaggs Brown, KY DJJ completely re-examined its surveillance and data management approach. Joining forces with EMC Corporation and security technology partners, the agency has developed an all-digital surveillance system that is supported by online storage management capabilities. Based on EMC's Surveillance Analysis and Management Solution (SAMS) software and EMC storage, the new system has been implemented at six high-security KY DJJ facilities.

For the first time, KY DJJ staff can now quickly and easily search surveillance data online by multiple parameters – such as event, date and time, camera field, or security device. In fact, employee time to search for video segments has been reduced by more than 50 percent. This contributed to a 50-plus percent improvement in the efficiency in its surveillance operations as well as its data storage, search, retrieval and analysis procedures. At the same time, industry-wide estimates put cost savings at 20-50 percent for the SAMS-based surveillance system compared with digital video recording (DVR). Faster, more efficient access to video archives has meant KY DJJ staff can more closely monitor youth behavior, allowing them to more effectively resolve issues and even prevent the development of dangerous situations. we examined in those years and completed dec 06

This powerful solution is already at work in six key facilities and will be extended to over 20 medium and high security facilities, which were included in the scope of this project. After this initial rollout is completed, the KY DJJ will implement a central surveillance data archive at its primary data center that will be linked to each remote facility. The critical local data will be mirrored to EMC archival storage at the central site, providing data redundancy and protection against the loss of vital data.

Ultimately, the KY DJJ has even more ambitious plans for its centralized surveillance information storage and management system. The agency plans to integrate the SAMS-based surveillance system with the separate IT systems currently handling the agency's administrative applications. The goal is to create a virtual, or paperless, environment for the whole agency. This will transform the way the agency functions, making its data management and storage significantly more efficient and cost-effective. The bottom line will be delivering a higher level of service to the citizens of Kentucky while maximizing the benefit of taxpayer dollars.

Project Description

An examination by the Commonwealth of Kentucky's Department of Juvenile Justice (KY DJJ) of its surveillance systems resulted in the decision to dramatically upgrade its surveillance infrastructure – in fact, to rethink its whole surveillance monitoring, analysis and storage strategy. At the time, only one-fourth of its 30 custodial facilities across the state had any video surveillance, and only half of those had digital video. The agency's primary form of video surveillance consisted of closed circuit television (CCTV) cameras feeding analog images to VHS tapes for storage.

Further, there was no automated search ability. If staff members wanted to find the video recording of a critical event, they would have to locate the relevant, date-labeled tape in their tape library. Then, they would have to manually fast-forward or rewind until they recovered the event in question – a process made even more difficult because there was no time-date stamp or other internal dating to serve as a search guide. This was a tedious, time-consuming, and inefficient process.

In addition, with the analog system, the KY DJJ had no centralized surveillance or storage capability. Each facility captured and stored surveillance images independently. So, if a critical event took place at one location, officials at KY DJJ headquarters or other facilities couldn't view the activity in real time, which would help them contribute to immediate decisions. Without a redundant, centralized "copy" of video data, the only records were the physical tapes at each site, which could be lost, misplaced, or overwritten.

The KY DJJ recognized that this approach was not meeting its primary mission, to provide a secure, protected environment for both juveniles and its staff members. It needed to extend video surveillance to 20 of its more secure facilities, supplementing existing access and identity control systems. Moreover, the agency needed to automate and digitize the surveillance process so that video and other surveillance history would be well protected and easily accessed.

To address these issues, the KY DJJ, EMC Corporation, and its security technology partners embarked on an effort to address the complex process of developing and implementing its new surveillance, storage and management system.

Due in large part to budgetary considerations, it took a phased approach, first deploying the system at its six highest-security facilities around the state. At each of these "core" sites, content-addressed (video) data from security cameras and data from other access control devices are aggregated on a Dell server running EMC SAMS software. Then critical, "event-flagged" data identified by SAMS is archived (stored) locally on EMC CLARiiON CX systems, providing 9 to 13 terabytes of storage capacity at each site. This data is easily searchable and can be quickly retrieved for viewing.

One of the largest benefits of the project for the KY DJJ has been the implementation of the Technical Product Display (TPD) template they developed with EMC Services.

Michael Dossett, Deputy Commissioner of Support Services at the KY DJJ, said, "As we moved into the planning process, it became clear that we needed a methodology for determining at each site the surveillance level, size, technologies required and support issues. At the same time, we had to scale our data storage, analysis and management systems to accommodate each location's needs over time."

"The rollout to our initial six sites has already provided measurable benefits; including improved facility management, a safer environment for both youth and staff at the facilities that are already online, and more efficient use of staff and physical resources."

With the sophisticated TPD template in hand, teams consisting of KY DJJ, EMC, and security business partners visit every agency facility, some in remote parts of the state. A site survey is conducted, determining the number of cameras, their locations, and degree of surveillance (24-hour or record-on-motion). The TPD is a powerful modeling tool, giving the IS team the configuration for a specific site, the actual number of cameras, and the opportunity to “stress” the configuration to failure states. Thus, they can determine, with great accuracy, the storage capacity, and scalability over a specified period of time.

Once the initial phase is complete, the KY DJJ will implement a second phase which includes a central surveillance data archive at its primary data center, linked to each remote facility via the agency’s existing fiber optic network. Data generated by the many different kinds of surveillance devices and cameras will be stored on the EMC CLARiiON systems for local use as well as mirrored to EMC Centera content-addressed storage at the central site. From the central site, KY DJJ staff will be able to identify and retrieve specific video segments, view archived video, perform queries, and generate a wide range of reports.

As an example of a second tier implementation, the use of EMC Documentum, SAMS, and Centera replication software would facilitate the movement of data across KY DJJ’s different storage levels and geographical distances, providing centralized data access and protection against loss of vital data. As part of the KY DJJ’s information lifecycle management (ILM) strategy, this software will ensure that copies of surveillance data at each site will time-out and be overwritten after a predetermined period of time. As a result, the storage load at each facility is minimized, which is especially important as video consumes large storage capacities. With more efficient storage usage at each facility, backup processes are quicker and storage management costs are lower. Moreover, there is less need to replenish the infrastructure with additional storage capacity.

One of the KY DJJ’s major project goals is to build a system that doesn’t stress the surveillance infrastructure. To avoid the problem of latency – delays in data traffic due to overwhelmed communications pathways – the KY DJJ will use EMC PowerPath software for automated path management and load balancing. At the same time, EMC OnCourse software will manage the aggregation of data from remote, distributed sources to the central storage repository.

Ultimately, the KY DJJ has even more ambitious plans for its centralized surveillance information storage and management system. Dossett added, “We want to integrate our SAMS-based surveillance system into a virtual, or paperless, environment for the whole agency. In fact, it will go beyond just being paperless and will enable us to integrate functions and modalities that are now totally separate. That includes treatment protocols, financial data, personnel files, and other internal records. It will truly transform the way we do business as an agency.”

Significance to State Government

The Kentucky Department of Juvenile Justice is one of the first states to undertake implementing an automated, centralized digital surveillance analysis, management and storage system. Today, the vast majority of state juvenile justice agencies rely on the kind of standalone, analog surveillance, including videotape recording of closed circuit television (CCTV), that the KY DJJ is rapidly phasing out of its operations.

The KY DJJ’s implementation of a “paperless” surveillance data management system is powerful proof-of-concept for other state agencies. Most important, it enables the KY DJJ to more effectively meet its mission of providing safe environments for the education and treatment of youth under its care in addition to ensuring staff accountability and protection. The agency now does a more extensive surveillance, retains and stores the resulting data more effectively, and gives its staff the means to search, analyze and report on the importance of that data.

This implementation serves as a model of how state governments can more effectively manage, share and protect their mission-critical data. At the same time, they can realize major cost-savings and maximize their very limited budget resource. This is matched by the much more efficient use of staff time, which translates directly into cost-savings and the ability to deliver higher-quality agency services with fewer people.

Benefits Realized by Service Recipients, Taxpayers, Agency or State

The KY DJJ's surveillance and data storage system brings major benefits, both direct and indirect, to the agency's staff and management, Kentucky state government and administration, the citizenry, and also residents of its juvenile justice facilities. The most immediate positive impact is for the KY DJJ itself. Based on implementation to date, the surveillance upgrade is meeting or exceeding all of its intended goals. These include:

- More than 50 percent reduction in the amount of time employees spend searching for surveillance videos and related data;
- A 50-plus percent improvement in efficiency of surveillance operations, due in large part of savings in staff time devoted to managing, storing and retrieving critical surveillance data;.
- Dramatically faster access to surveillance data, with centralized management, fast, online search ability and data retrieval capabilities; and
- Using powerful EMC SAMS search engine, KY DJJ staff can now quickly and easily search surveillance data online by multiple parameters – by event, date and time, camera field, or security device.

In addition, it is estimated that surveillance technology expenditures for the SAMS-based system are 20-50 percent lower than with the previous digital video recording system.

For KY DJJ, there are both immediate and long-term gains. In addition to the improved surveillance described above, the KY DJJ now has:

- An enterprise-class IT infrastructure that includes integrating analog and digital security devices;
- Powerful software tools for real-time video surveillance, data collection, and retention;
- Surveillance analysis applications software for access and review of video and other data at the desktop or via wireless devices;
- The TPD deployment template, which makes each new installation of the surveillance easier and more accurate, giving the Information Systems team a reliable tool for determining current and future storage needs; and
- The ability to more easily make changes, such as increasing or reducing the number of cameras, changing their location, employing cameras with different resolutions and speeds (frames per second), or altering the surveillance mode (24-hour vs. record-on-motion); and
- Increased scalability, allowing the KY DJJ to easily and efficiently add more storage capacity to those facilities and applications that need it the most.

Within the KY DJJ, the constituency most directly affected by the new surveillance system is the security personnel at the individual facilities. Improved electronic surveillance means that they can keep a better handle on the movements and activities of juveniles in their care. This not only enhances security but better protects the safety of both the juveniles and the supervisory staff. If an unusual event occurs, there are now better, more comprehensive video records of what activities actually took place, ensuring more rapid, effective resolutions and the opportunity to put preventive measures in place.

For the citizens of Kentucky, the people who ultimately control the funding and oversight for the KY DJJ services and operations, this is a win – win situation. They want the maximum benefit for their tax dollar. The new KY DJJ surveillance management system is significantly more cost-effective than the old, analog approach and at the same time ensures best practices security and business solutions at juvenile facilities.

Return on Investment, Short-Term/Long-Term Payback

In addition to the new comprehensive surveillance capabilities, one of the primary drivers behind the KY DJJ's project was cost-efficiency. In short, the goal was to get maximum operational benefit for their technology dollar.

In accordance with Commonwealth of Kentucky policy, the KY DJJ can not provide quantitative figures on the exact short-term or long-term cost of the program or the previous surveillance system. However, the new solution already implemented at six of the 20 targeted facilities has generated a 50-plus percent improvement in surveillance operating efficiency. The KY DJJ expects these benefits to be replicated at each new facility as they come "online."

As a significant project, the KY DJJ received approval for the scope of the project, overall number of sites involved, and the total cost. The agency is implementing the upgrade on an incremental, site-by-site basis, which helps mitigate the budget impact. The process was made significantly more efficient with the development of the TPD template, which provides a mechanism for quickly and accurately determining the optimal size and architecture of the surveillance and data storage infrastructure at each site.

Once the KY DJJ's centralized data archive is deployed, further fiscal benefits will be achieved. The solution will enable the most critical surveillance to be offloaded from the local sites, freeing up valuable storage capacity for new, incoming data.

Additional payback for the surveillance data management system will come with its integration with the KY DJJ's separate IT infrastructure supporting its many business applications. This has the potential to transform the agency's basic procedures and workflow, giving staff a whole new level of information access, retrieval, storage and management. In fact, it can serve as a model beyond the KY DJJ to other areas of Kentucky state government, showing other agencies and departments how they can use existing IT infrastructure to dramatically improve efficiency and productivity.