

## CASE STUDY

# The New Hall Monitor

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## SECURITY MANAGEMENT

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### » SYNOPSIS

Buncombe County School System (BCS), located in North Carolina, recognized the need to enhance school security and decided to install state-of-the-art IP-over-Ethernet surveillance systems. BCS does not have a security department, so the task fell to the IT group.

After more than a year of investigation, On-Net Surveillance Systems, Inc.'s (OnSSI's) NetDVR software was selected, as were cameras by Axis Communications. Common camera placements in all schools are inside the main entry and exit points as well as in lobbies, cafeterias, gyms, main hallways, and other areas where students are known to congregate. Outside, cameras are placed to monitor student and teacher parking lots, bus loading and unloading areas, drive-up student drop-off zones, and other areas as needed.

The county saved 20 to 35 percent by taking care of installation itself. And because it also maintains the systems in-house, IT estimates that it has probably cut costs in backend maintenance by 60 percent.

At each school, data is stored locally for one day and then is archived to a storage server. Typically, user access is given to the principal, the assistant principals, the SRO, and administrative staffers who cover for the former.

The IT team has been working with the local emergency call center to give operators access to the system so that they can log in, view the incident, and type in quick notes for responding fire or police teams.

Thus far, installations at all of the county's high schools and middle schools have been completed and work at the elementary schools is slated to begin next year. Since the installations began, incidents in schools of all types have dropped.

**IDEALLY, SCHOOLS SHOULD BE** safe environments where the only worrying statistic is a drop in average test scores. However, according to the National Center for Education Statistics, crime incidents were reported in 96 percent of high schools, 94 percent of middle schools, and 74 percent of elementary schools in 2006. Given those numbers, it's not surprising that a 2004 National Association of School Resource Officers survey found that 78 percent of school resource officers (SROs) said they had taken weapons from students during that year.

One North Carolina county decided that it needed to proactively address the problem. The measure it pursued was to put state-of-the-art surveillance systems in its schools.

Buncombe County is vast. The hub of its 770 square miles is the city of Asheville, the economic and cultural center of mountainous Western North Carolina, with a population of more than 206,000. The Buncombe County School system (BCS) employs 4,000 people to teach and serve the district's approximately 25,000 students, who hail from a broad swathe of socioeconomic levels and world cultures.

The escalated security climate of the school violence that had made national news and a rise in the number of countywide incidents and break-ins, led the district to review safety and security in its 41 elementary, middle, and high schools.

The review found numerous issues that security needed to address, including more break-ins, vandalism, and incidents of graffiti. As one example of what was found, an older school, originally located in a residential neighborhood, had become entirely surrounded by businesses. Traffic roared by, and strangers regularly crisscrossed the property.

As a result of the study's findings, the county decided it would allot funds over a period of years to install, maintain, and upgrade video surveillance systems at all the area schools. Because BCS does not have a security department, the job fell to the IT department. The BCS superintendent tasked the IT group with creating, installing, and operating the surveillance system.

At the time of the review, there were also no access control systems in any of the schools, however, most had intrusion alarms, and all had fire alarms. The intrusion alarms are remotely monitored by a service provider. If the budget permits, the county may address the issue of access controls in a few years. Meanwhile, it was decided that surveillance should be given the higher priority.

When Eric Arthur joined BCS in 2002 as technology support specialist, the surveillance system became his project.

#### The Software

Finding the right software for the system was challenging. Most of the county's schools were older facilities like the one mentioned earlier; others were newer buildings that followed a

## Schools K-12

standardized template. That meant that the system would have to be scalable and tailored to fit each building, functioning as “a standalone that I could manage remotely from our central office,” says Arthur.

On the plus side, there was no legacy camera system to deal with. “We were fortunate that we did not have much in the way of surveillance already in place, so we did not have to think about converging—trying to use the cameras we already had in place and trying to recoup that money,” he says.

“We had three high schools with anywhere from a four- to six-camera system in place. These had been purchased by the school principals but no one ever maintained them, so by the time I even looked at them, out of those three locations, we only had five cameras running,” he explains.

The search began with a massive stack of folders from vendors promoting the advantages of their products that had been collected by Arthur’s supervisor. The IT team began to go through them to familiarize themselves with the kinds of CCTV technology available. “We began a spreadsheet with vendor names and product highlights,” Arthur recalls. “Then we started calling some of the vendors of interest to come in and show us what they had.”

After more than a year of investigation, feeling better educated to move forward, the IT team brought in a consultant engineer with experience in school surveillance systems installation. “He helped create an RFP based on the system requirements,” says Arthur, which in addition to the aforementioned scalability, required that the system have a “user-friendly, Web-based interface and not [one that was] client-software based.” The IT department also had to be able to install and maintain the system, says Arthur.

When the bids came in, only two choices stood out. The first contender, a product geared toward airports, was eventually eliminated, because it was not user-friendly. “The interface was cumbersome. It also had every bell and whistle, and we knew it would be a lot of wasted money, because most of it would go unused,” Arthur says.

The winner was On-Net Surveillance Systems, Inc.’s (OnSSI’s) Net- DVR software. Designed for singleserver deployments of up to 64 cameras at a single site, NetDVR met the RFP demands for nonproprietary, open-architecture technology. Among the other winning

aspects, says Arthur, was that it accommodated a wide range of IP cameras, rather than dictating specific models.

### Cameras

Based on his past experience, the engineer suggested the use of several types of IP cameras by two prominent manufacturers.

However, during the first installations at several high schools, Arthur discovered that one of the camera types had a poor user interface and the other brand allowed settings changes to be made at the camera itself, possibly giving kids a way to tamper with it. These were the only installations the engineer assisted with, because the IT team felt confident enough to proceed on its own thereafter, says Arthur.

Arthur reviewed IP cameras by Axis Communications, and he subsequently turned to that product line for further installations. “We found three or four models in the Axis line that would work for everything,” he says.

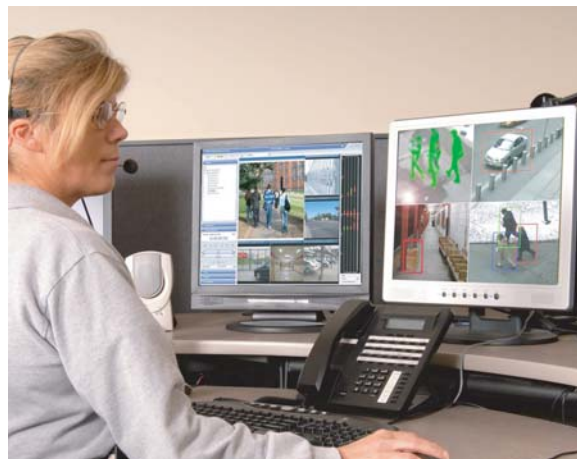
In the several dozen installations that have occurred, as well as in those that are ongoing, color, high-resolution, IP-digital, fixed cameras have been used. Pan-tilt-zoom (PTZ) cameras have not been used because, “We found that for the cost of PTZ cameras we could put more fixed cameras in. And because we don’t have somebody sitting there monitoring the feed all the time and driving the cameras, PTZ was of less use than fixed cameras,” Arthur says. Each camera plugs into a parallel local area network (LAN). “We knew our existing one was not the strongest,” he explains. “At the time, I had a pallet of leftover switches...and [my supervisor] told me to use them up. The camera plugs into a power-over-Ethernet hub; that hub goes into one of the switches on the network, and then a high-end workstation. The software actually pulls the feed from the camera across the network.”

Wiring is unshielded twisted pair, category 5e cable. The wiring was installed by the IT department, which saved labor costs.

Arthur says that the total cost per camera is \$4,200.

### Users

Under the old system, there was no central monitoring station for the few cameras in place. With the new project, while the district is vastly expanding the number of cameras, it kept this model, which does not count on 24/7 live monitoring. Instead the system is



“As soon as a system goes in place, there tends to be a series of incidents that are solved because of the cameras.”

used to spot-check. There is the ability to monitor live, off-site, but primarily the school administration uses it “as needed,” explains Arthur.

While the SROs have been granted user access, no one wanted them to be chiefly responsible for surveillance or to have the main workstations in their offices. It was feared that the SROs would reduce the amount of time they spent patrolling if a traditional monitor sat on their desks flicking through the feed from multiple cameras. Additionally, says Arthur, “The SROs maintain protected files inside those offices, and giving us the keys so that we would have access to work on the system would compromise the security of those files. We ended up putting the workstation in a secure closet where network system equipment is stored.”

Each school has its own PC hosting the NetDVR software and servers where the camera feeds are processed and recorded. Camera feeds can be accessed by any authorized users from their own desktop PC as needed. The closets are kept locked and are only accessed by IT staffers working on

the system or others, such as SROs or principals, as needed.

Arthur manages the system user population at each school. “I meet with each principal to discuss and finalize the access list for each location,” he says. Typically, user access is given to the principal, the assistant principals, the SRO, and administrative staffers who cover for the former.

### “ Common camera placements are inside the main entry and exit points and in lobbies, cafeterias, gyms, and main hallways. ”

“We establish how much access each person has. We can limit it by camera,” he states. For example, a secretary may only need to monitor visitor comings and goings through the main front doors.

Users view camera feeds by opening their PC Internet Web browser and going to a login page. If an incident occurs, users can review clips, “or if I get the call, I can remotely log in to the workstation and produce the AVI file, or clip, that they need or do research on the event,” Arthur says. Principals and assistant principals can also log in remotely so that they can monitor the school as needed when they are at meetings, training, or conferences.

At each school, data is stored locally for one day and then is archived to a storage server. “We don’t have policies in place setting a certain number of days to retain the data; we shoot for about 12 days before it is written over,” he says. “Usually, in that time, I am alerted if something happens, and I can remotely store that entire archive centrally here at our location or somewhere else on their school network. Anything that is considered an incident, we have files of that stored, and they are not overwritten.”

#### Installation

The new systems were installed first in the high schools, after which the process was repeated at middle schools, and then progressed to the elementary schools. The reasoning was simple: There are about 21 elementary schools, with about three of them feeding into each middle school. “It was decided to do the elementary schools last because of the sheer number of them... and [because there are] more incidents in the high schools and middle schools,”

Arthur explains. In addition, there is a greater staff to student ratio at the elementary schools. “Students are also much more controlled at that level. For example, there are no student commons,” Arthur explains.

The superintendent and the school board prioritized which high schools got the system first. The main factor was the number of incidents of crime at each local school—such

as vandalism, robbery, and break-ins. “They went right off of incident reports,” Arthur states.

Before each school received its system, the IT team met with

the SROs and the school principals and vice principals to review coverage plans and receive feedback. For example, Arthur says, a school SRO might point out that from his experience student fights break out in a certain area ignored by the current plan or the principal might be aware of places that were frequently tagged with graffiti or vandalized. IT used the input to adapt the plan, adding needed cameras and eliminating cameras that would serve little or no purpose.

Arthur further refined the individual coverage plans with the help of representatives from the Sheriff’s Department SRT and SWAT teams. They helped IT locate the main workstation strategically so that it would have a greater chance of being optimally accessible to, say, a SWAT team, in an emergency.

**Camera placement.** Common camera placements in all schools are inside the main entry and exit points as well as in lobbies, cafeterias, gyms, main hallways, and other areas where students are known to congregate. “We don’t go in classrooms or offices,” Arthur says.

Outside, cameras are placed to monitor student and teacher parking lots, bus loading and unloading areas, drive-up student drop-off zones, and other areas as needed.

**Provider interaction.** Arthur says that during the early installations, software provider OnSSI was “very responsive.” The company provided training for the IT staff and worked one-on-one with them, since they were acting as their own integrator. “We’re odd that we’re a school system that actually designs, builds, installs, and then maintains these systems too,” notes Arthur.

That approach has engendered a large cost

savings. “In the overall cost of the original installations, we probably saved 20 to 35 percent,” he says. And, “in the long haul, because we maintain the systems ourselves, that has probably cut our cost in backend maintenance by 60 percent.”

Arthur reports that there were no substantial or unconquerable problems. The systems were put in and operated as planned. “As far as getting it running, it has pretty much been plug and play,” he states. There has, however, been a need for adjustments, such as to storage capacity, as discussed later.

**Phased approach.** The countywide upgrade has been a multiple-year process, as noted. It began several years ago. Once the six high schools were completed, installations began in the seven middle schools, and that phase was wrapping up at press time. The middle schools received an upgraded version of the NetDVR software.

This year was supposed to see the first system installations at the elementary schools, but the county decided that it was more important to upgrade the software at the high schools so that additional newer model cameras could be added.

In addition, they needed to address some data storage issues with the installation of additional hard drives. For example, there have been cases where what was believed to be adequate storage for 12 days suddenly was not enough.

Out of the blue, Arthur explains, “I’m getting e-mail messages saying that the archive is full.” The cause was sporting events. Basketball season, for example, means that gyms, which are usually open until 8 p.m., are now open until midnight, creating longer days and the need for more recording per day.

**First-responder access.** The IT team has been working with the local emergency call center to give operators access to the system so that they can log in, view the incident, and type in quick notes for responding to fire or police. In addition, Arthur says that Asheville city police, who have jurisdiction over about six of the schools, are currently equipped to allow police officers to use wireless hot spots to log into the system from their vehicles, but IT has not arranged access yet. “We began with the emergency call center because they interface with everybody.”

The call center will have full access to camera feeds from every school by January via a Web page currently in development. Call center operators will be able to click on

a county map showing all schools, then on the school they want to view, and a login window will appear. Once logged in, they will be able to choose the camera views they need.

### Public Response

To ensure that the public is well informed about the system, Arthur says that he has made it clear to administrators that he will be happy to present information on the system whenever he is asked. He has also pushed for detailed information about the surveillance system to be placed in each school's student handbook and for it to be discussed with students, teachers, and parents. Arthur can only suggest these options. County policy is that each principal is the judge of how—or whether—the information is released at his or her school.

Teachers and administrators have, in the main, expressed support for the surveillance system. "What I hear from staffers is that the cameras have given them credibility when there is an incident at the school and the parents say 'My kid would never do that.'" When they take that stance, "We show the clip," he states.

However, Arthur has had to correct teachers' misunderstandings of the system's use. While visiting one school, he says that he heard a teacher tell a kid that he'd better behave in the restroom because there was a camera in there. He pulled her aside to say "no way."

His informal polling of parents has led Arthur to believe that about 60 to 70 percent of them support having the surveillance systems in the schools. Students, especially those wielding the pen—or keyboard—are usually less enthusiastic. "They frequently write articles in school papers about how it impacts their privacy," Arthur says. "When that happens, I ask to meet with the editors and discuss why and how we do it."

He finds that the students often have little or no real understanding of private versus public space. "I say, 'You think we're invading your privacy because we're watching you—but aren't you in a public area? Do you feel your privacy is violated in the convenience store or the gas station?' Most of them say no. So I ask, 'Why not? Because there are cameras at these kinds of places watching you, too.'"

Once it is explained to the students that the intent is to enhance their safety and security rather than to spy on them, "Usually most are okay," Arthur says, although he tells of

one high school newspaper that ran no fewer than three negative articles about the system in one edition, despite Arthur's attempts to explain that it is there to protect the students, because "students are the school's most valuable asset. Brick and mortar can be replaced, but they can't."

### Results

Since the installations began, incidents in schools of all types have dropped. "The interesting thing we've noticed is that it's cyclical," he says. As soon as a system goes in place, there "tends to be a series of incidents that are solved because of the cameras, then the students become very good and the incident numbers drop. Then they seem to slowly forget that the cameras are there, and incidents go back up. They're busted by the system again, and the numbers of incidents drop."

While the decreased numbers of fights and break-ins can be measured, the system's deterrent factor cannot. Arthur says he likes to help that factor along. "If someone gets caught, we let the kids know. It's not hidden."

For example, "We have had a few serious fights where it has been used to prosecute students and have them removed from school completely. We've had a couple of staff members who have been prosecuted for theft, too," says Arthur.

One memorable incident took place earlier this year. Students at one of the high schools reported a sickening smell and began to fall ill. All 1,500 students were evacuated, and a

bioterrorism unit was summoned to fully decontaminate everyone after a hazardous materials test found that it was "a substance in the sulfur and mustard gas realm," Arthur recalls.

Pulled camera footage showed several students playing around with a glass vial, dropping and breaking it, and then throwing it into a trashcan near where their peers began to sicken. The vial, it was ascertained, held an anti-rape defense liquid made to be broken on an attacker by the victim. The bioterrorism unit then stepped down, but not until about 40 students had been put through the decontamination process.

"This was a student's personal protection, and it was an accident, but they tried to cover it up and hide what they had done. It led to aggravated issues that were prosecuted by the parents of other students and not the school system," Arthur says.

The only area where no noticeable decline has occurred is in incidents committed by outsiders. While those numbers have basically stayed the same, the system has provided evidence that has helped the authorities to aggressively investigate and prosecute those incidents.

Word of the systems' successes has spread beyond the Asheville area. "We've consulted with a lot of other school systems. They've come to look and asked for our input on the RFPs they are creating for their own systems," he says. ■

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### Intelligent IP Video Surveillance

On-Net Surveillance Systems, Inc. develops advanced non-proprietary, open architecture, Intelligent IP Video Surveillance solutions. OnSSI's systems deliver feature-rich camera management, sophisticated recording and archiving, and automated video alerts based on intelligent analysis and detection. NetSwitcher, OnSSI's revolutionary IP based video surveillance control platform, can be utilized in a desktop monitoring or command center video wall environment. It integrates intelligent analytics, greatly enhances productivity, and enables sending any camera view to any local or remote display on the network, via a map-based, touchscreen interface. With over 20,000 deployments, OnSSI's systems can be found in a wide range of municipalities, federal and local government agencies, as well as corporate, industrial, and educational settings.

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