

THE GROUNDWORK FOR SAFETY

Schools can build high-tech security and surveillance systems via networked security.

By Fredrik Nilsson



Studies have shown that school violence is most likely to occur when students are congregated and under less supervision, such as in hallways or common areas. (Canton High School, Canton, Miss.)

At a public high school in a suburban Florida town, the bell rings and students file into the hallways. Teachers stand guard in front of classroom doors, watching for misconduct. During lunch, teachers monitor the cafeteria. The one security officer for a student population of 1,300 makes his way through campus, on the lookout for anything suspicious. The school's main entrances remain unguarded as parents, teachers and students come and go throughout the day.

Scenes like these are common in schools around the country. Because many schools do not have a security system that enables them to monitor hallways, classrooms and other areas, they rely on teachers and staff to monitor daily activities. Although these methods may be well-intentioned, schools today need better security measures. In its Indicators of School Crime and Safety 2001 report (<http://>

NOTABLE

■ 1.1 MILLION

Number of students in 1999 who reported avoiding areas in school out of fear for their own safety.

■ 30

Percentage of students in grades 9 through 12 in 1999 who reported someone had offered, sold, or given them an illegal drug on school property in the year prior to the survey.

■ 342,000

Number of nonfatal crimes per year between 1995 and 1999 where the victim was a teacher.

■ 24

Number of hours per day that networked security cameras can monitor schools.

nces.ed.gov/pubs2002/crime2001/index.asp) the National Center for Education Statistics (NCES) found:

- 1.1 million students in 1999 reported avoiding areas in school out of fear for their own safety.

- In 1999, approximately 30 percent of all students in grades 9 through 12 reported that someone had offered, sold, or given them an illegal drug on school property in the year prior to the survey.

- From 1995 to 1999, teachers were the victims of approximately 342,000 nonfatal crimes a year, or 79 crimes a year for every 1,000 teachers.

U.S. Department of Education studies have found that school violence is most likely to occur when students are congregated and under less supervision, such as before or after school, during class changes or at lunchtime—the exact times when it is more difficult to keep an eye on all students.

Although school crime has decreased recently, the incidences that occur may be even more violent. In addition, the crowded conditions found at one out of every five schools hamper current security measures.

In light of these problems, schools are faced with the pressure to improve security measures and properly monitor campuses, often on constrained budgets. This can become a major undertaking because traditional security methods, such as hiring more security officers or wiring a building to support an analog closed-circuit television (CCTV) system, can be expensive and ineffective. Affordable and practical security solutions such as networked video systems are available to meet schools' needs for highly functional, low-cost surveillance.

The building blocks of security

The basis of a networked video system is the network camera. These can be confused easily with web cameras, but there are several key differences. Unlike web cameras, which must connect to a computer to operate, network cameras connect directly to computer networks and run on standard Internet Protocol (IP), the method for sending data from one computer to another over the Internet. This allows images to be sent over a local-area network (LAN) or over the Internet, which can open up opportunities for improved security and surveillance techniques.

Network cameras operate independently of PCs because they contain built-in image digitalization and compression, an operating system and web servers. The compression chip takes images received by the camera and turns them into a format that can be transmitted over the computer network and the Internet. The web server allows users to get images as well as manage individual cameras. In large systems with hundreds of cameras, software normally is installed on one PC to manage the operations of all the cameras. The operating system manages all of the camera's operations and applications. Essentially, a network camera

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is a small, highly specialized computer.

All of this technology allows network cameras to provide functionalities and benefits not possible with web cameras or analog CCTV systems. One school making use of the ability to transmit high-quality images over the Internet is Canton High School in Canton, Miss. It has 24 network cameras throughout the campus, enabling teachers, principals, security guards, police and remote security personnel to view campus activity 24 hours a day

over the Internet. In addition, the security company that installed the system observes the school in real time via the Internet from the company's remote monitoring station during off-hours. This eliminates the need for a nighttime security guard.

If a security incident occurs, police and rescue workers can log in to the cameras and see conditions inside the school, and help plan the safest path to the problem area. In addition, the school's security officers can be more

efficient during patrols.

Canton's principal, Stanley Blackmon, views the campus from his computer throughout the day and from home after-hours and on weekends. Speakers have been installed next to some cameras so that Blackmon can talk to students and let them know that he is watching.

Canton also has the option to install a wireless network throughout the school, giving administrators and security guards access to security images on handheld devices such as pocket PCs. Then, Canton's officers could easily view cameras from anywhere on campus and respond immediately to trouble. Cameras in remote areas can be set up with motion detection that alerts security guards to unexpected activity.

An additional benefit of network cameras is that images can be stored to hard disks rather than videotapes. While security video stored on tape becomes grainy as tapes are recorded over, images on hard disks are digitized so that the disks can be used many times without a decrease in image quality. It also is much easier to locate image sequences on hard disks. Instead of manually searching through hours of videotape to find a particular event, searches can be done quickly. Recording video on hard disks rather than tapes also means that no one has to manually change tapes, further reducing the risk of human error.

More security, less money

Network cameras connect directly to computer networks, so schools can use the wiring that already connects offices, computer labs and classrooms to the Internet. If no such wiring exists, it generally is much less expensive to wire buildings with computer network cabling than it is with the coaxial cabling required for analog CCTV systems.

Operation is also more cost-effective with networked video because images can be viewed from any computer with web access and a standard browser. By contrast, analog CCTV systems require that video feeds be pulled back to a centralized room with dedicated monitors. In addition, network cameras are generally self-maintained, and



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software programs can send an alert if one fails.

Sending information over the Internet raises concerns for the security of that information and the network on which it travels. There is an increased need to protect images from unauthorized users and to prevent viruses from spreading throughout computer systems via unprotected network cameras.

To address the first concern, networked video systems can be password-protected so outsiders cannot access images or make changes to the security system. Passwords also can be set to give different people varying levels of control. Some passwords will allow users to only view images, while others will give them the ability to make administrative changes to the cameras.

To guard against viruses, most network cameras' operating systems are read-only, meaning that no commands can be written into the program. Therefore, even if a virus attacks, it would not be able to write itself into the operating language of the camera and spread through the network camera connections.

Some schools also will have concerns about video streams being too large and consuming too much bandwidth, which is the amount of data that can be sent over the network at any given time. This could adversely affect other applications, such as accounting and word-processing programs, and diminish the network's performance.

If bandwidth is limited, then the amount of information cameras send over the network can be reduced by decreasing image quality or by lowering the frame rate, which is the number of images sent over the network every second. For security and surveillance applications, frame rates can vary from about one or two frames per second, to full-motion video at 30 frames per second. Regardless of how many frames the available bandwidth can support, it generally is better to reduce the frame rate before reducing image quality because security applications usually stress the importance of clear, detailed images.

A proven solution

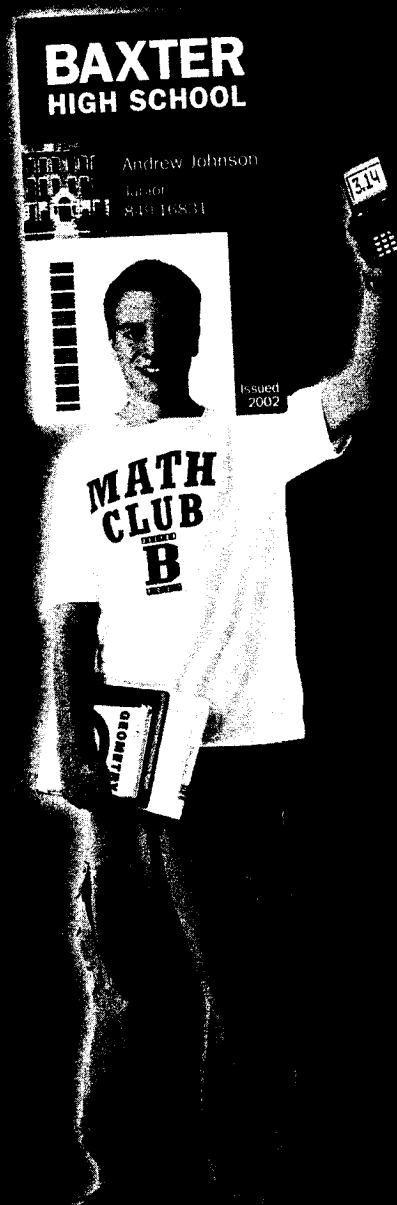
As school crime is becoming increasingly more violent, schools are finding that they have substantial security problems that require cost-effective yet flexible security and surveillance solutions. Schools such as Canton High School are discovering that they use cost-effective security resources to improve the quality of life on their campuses and create a safer, more productive environment.

In the case of Canton, the network cameras also proved to be an unobtrusive way to help students and teachers feel safe.

"Now you can't get into a fight and say that you weren't in it because the cameras saw you there," said one senior student at Canton High School. "It's better that they have the cameras—I feel personally more safe to be here." ■

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