

# Mass Notification Systems in K-12 Schools

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## Introduction

A fire erupts in the middle school cafeteria. A water main breaks, forcing an elementary school to cancel classes. A suspicious stranger is reported lurking on the grounds of the high school. Or in an extreme case, a crime suspect on school grounds puts everybody in the building in danger.

Recent history shows these emergencies can and do happen. And they require swift action by building and district administrators to protect students, faculty and staff from immediate threats to their safety while keeping parents and guardians updated. Every second is critical. Administrators must provide everyone involved with real-time information and instructions on what they should do, as well as provide outside first responders with the information they need to help ensure a safe resolution.

Technology plays a pivotal role. A mass notification system, which links a school district's communications and technology infrastructure with a comprehensive emergency response strategy, can save lives. When an emergency strikes, these systems allow officials to immediately notify all stakeholders through phone calls, e-mails, text messages, instant messages, loudspeakers or flat-panel displays.



The systems let district administrators broadcast messages to thousands of parents, students, teachers and staff simultaneously. If students are on their way to school, notifications can warn them to return home, or tell parents not to send their children to school.

The need for mass notification systems was made apparent after the attacks of Sept. 11, 2001, when the communications system failed in New York, hampering the ability of firefighters and police officers to save lives. In response, the Department of Defense directed all of its facilities to install mass notification systems. Today, much of the public and private sector are following suit. According to a study by research firm Gartner, 75 percent of Global 2,000 companies in the world will deploy mass notification systems by the end of 2007.

"Sept. 11 and Hurricane Katrina brought home to us the need to communicate better and have better emergency plans in place," says William Sako, chairman of security consulting firm Sako & Associates and senior vice president of Rolf Jensen & Associates. "We are a mobile society, and we need to reach everyone we can as fast as we can and give them enough information to keep them out of harm's way."

High-profile incidents such as the 1999 Columbine High School shootings in Colorado and the murder spree at a Pennsylvania schoolhouse in October 2006 proved the need to prepare for unseen horrors inside school buildings. The April 2007 Virginia Tech shootings had a chilling effect on the higher education community, but also compelled many of the nation's school districts to take another look at their K-12 security strategies and explore improvements to their emergency notification procedures.

In this white paper, security consultants, industry analysts and mass notification system vendors discuss how best to choose, install and manage a mass notification system in school districts. Specifically, this white paper will explain:

1. What is a mass notification system? A look at how the technology works, its benefits, a federal law that requires timely notifications, and return on investment (ROI);

2. How to purchase the right system. A look at choosing in-house versus hosted (outsourced) solutions, the key features to seek and the right questions to ask while evaluating systems;

3. Details of mass notification systems available from CDW•G;

4. Strategies for deploying a successful mass notification system.

## What is a Mass Notification System?

Effective communication during emergencies is essential. Mass notification systems typically use existing data and voice networks to deliver pre-recorded or live messages that alert parents, students, faculty and employees of emergencies and provide them with instructions, such as evacuating a building or going to pre-assigned rooms that serve as shelters.

A comprehensive mass notification system typically allows administrators and security personnel to immediately contact every parent, faculty member, staff member and student through phone calls, text messages (also known as short message services, or SMS), instant messages, e-mails and other alerts on the following devices:

- Internet Protocol-based phones
- Traditional analog and digital phones
- Desktop and notebook computers
- Mobile phones, personal digital assistants and BlackBerry devices
- Fax machines and pagers.

In addition, mass notification systems can broadcast messages indoors and outdoors through:

- Loudspeakers or paging systems
- Digital signage, such as LCD or plasma screens in buildings throughout the district (This is an important form of communication particularly for the deaf and hard of hearing.)
- Sirens or alarms.

Districts should also install video surveillance cameras to augment a mass notification system.

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“You need to see and hear what’s going on and evaluate the situation before you make a decision to evacuate people or tell people to duck and cover,” Sako explains.

Video cameras can work as a standalone system separate from a mass notification system. But linking the video cameras to a mass notification system has its benefits. Besides playing a role during emergencies, surveillance systems let administrators monitor high-risk areas of buildings in their district to reduce crime and vandalism. For example, some camera systems offer add-on technology that analyzes sounds and video, and notifies local police if it detects gunshots or other dangerous activity.

## Other Benefits

In addition to crime alerts, mass notification systems can warn people of severe weather, such as tornados or hurricanes; class cancellations because of a power failure, a gas line or water main break, or other utility problems; and biological and radiological accidents, or other hazardous spills.

They can be used to notify parents, faculty and administrators of accidents that delay bus service to and from school, or on the status of a missing child or children. The systems also make ideal tools for providing updates on all these situations.

While mass notification systems are geared toward emergencies, they can also be used as a communication tool for nonemergency situations that can improve employee productivity and simplify everyday tasks. They work as an electronic call tree for situations such as school closings, delays, early dismissals, and cancellations of sporting events and other extracurricular activities. These systems can also replace aging analog intercom and public address systems still in use at many districts.

## Calculating ROI

ROI is hard to quantify because you can’t place a value on saving lives. If districts deploy the systems for nonemergencies, such as reminding staff members of meetings, then they can get a bigger ROI, says analyst Michael Osterman of Osterman Research.

Implementing one mass notification system can also save money to implement, upgrade and manage, compared with using a series of standalone systems.

“You don’t want to bombard people with messages, but if you use it the right way ... then you can have real benefits,” Osterman says.

## Purchasing the Right System

With dozens of vendors to choose from, it’s a daunting task to know where to start. During the request for proposal and evaluation process, district officials and information technology administrators must examine two key factors — system architecture and the features available — and ask the right questions to determine the best fit.

### Architecture: In-house Versus Hosted Solutions

Mass notification systems come in two varieties: in-house systems that districts install and manage themselves, and hosted Web-based solutions.

An in-house system is typically server-based software that ties into a district’s PBX or IP telephony systems, allowing them to broadcast messages over a phone system or Web page. Some systems require IP-based phones, while others support analog and digital phones.

An in-house system offers IT departments more control, making it easier to customize features and tightly integrate with the rest of the district’s technology infrastructure. But it also requires districts to have the IT staff, expertise and budget to install and maintain the system. Such a project could require the purchase of new servers and a network upgrade to ensure reliability, uptime and good performance.

A hosted solution requires fewer upfront costs and leaves the headache of managing a mass notification system to the vendor. But in doing so, IT departments have less control. Hosted systems typically offer several pricing options, including monthly or yearly subscriptions based on the number of users or how often the system is used.

A hosted service is good for districts with small IT staffs. But districts with large IT departments that can handle the workload are better off installing and managing the system themselves because they can more easily customize a solution to their needs, Sako says.

Districts that choose hosted solutions may face limitations if they want to interface the hosted service with their in-house technology because the vendor may not have the expertise to do the integration, Sako warns. Those choosing the hosted route need to ensure that their vendors offer good customer and technical support and ensure uptime 24 x 7, 365 days a year.

“Do what you can afford,” Sako advises.

## Features to Consider

Here are some key features that mass notification systems should offer:

- Flexibility in activating the system and sending a notification. Mass notification systems should allow administrators to use different devices, such as a district phone or password-protected Web page, to activate the system and send a message. Some systems even allow administrators to activate the system through their PDAs or cell phones.
- Support for multiple forms of communication. For major emergencies, district administrators need the ability to blast text or audio messages via phone, cell phone, PDA, pager, e-mails, instant message, and fax. Single messages can go to students, parents, faculty and staff, or customized messages can go to each group.
- Providing different administrative rights to users. Districts can give their presidents and senior-level staff full access, allowing them to send notifications to everyone in the district. But they can limit access to others, for example, allowing department heads to send messages to people in their departments.
- Support for multiple contact lists. A mass notification system isn't effective unless districts can create and maintain updated contact lists. A good system will let administrators create an unlimited number of contact lists for every need. For a districtwide

emergency, the contact list should include everyone in the district. For specific needs or issues isolated to one building, contact lists can include just the IT department, people responsible for specific facilities or the school's emergency response team.

- Reporting tools. The system can generate reports, tracking how many people the system contacted and on what devices. Some tools track successful transmission of the messages and the amount of time the notification process took from start to finish. Some tools also allow administrators to monitor the progress of a notification in real time.

## Other Important Questions to Ask

It's also helpful to ask the following questions:

- How long does it take to activate the system?
- Does it provide indoor and outdoor coverage?
- Is the system scalable and customizable?
- Is it compatible with your hardware, operating system and in-house phone system?
- How much does it cost to implement and maintain?
- How much technical expertise is needed to manage and maintain the hardware, software and network?
- Is it easy to integrate with other parts of your disaster recovery and business continuity strategy?
- How do you secure your list of contacts?
- Is it easy to update the contacts database and can you add contacts located outside the district?

## CDW•G's Offerings

CDW•G provides mass notification systems from Berbee Information Networks, Computer Instruments and Roam Secure. Berbee offers a system called InformaCast, which is tightly integrated with Cisco's Voice over Internet Protocol equipment, including IP phones.

Computer Instruments' e-IVR software supports Avaya and ShoreTel's IP telephony equipment, as well as traditional analog connectivity to most PBX platforms. The Roam Secure Alert Network (RSAN) provides text-based emergency alerts.

Here's a closer look at the vendors' offerings:

## Berbee's InformaCast

Berbee's InformaCast, originally built for the Department of Commerce following the Sept. 11 attacks, is a highly scalable and customizable server-based software solution that allows districts to simultaneously send audio and text messages to any combination of Cisco IP phones, computers or the company's own IP-based loudspeakers. Berbee, a CDW company, also recently added support for SMS text messages to cell phones and PDAs.

Users can send live, pre-recorded or scheduled broadcasts to one or more groups of contacts through a password-protected Web page or an IP phone's menu, says Ken Bywaters, Berbee's director of voice products. School employees can receive the messages, either as an audio message on their PCs or IP phones, or as a text message that pops up on their PC or the menu window of their IP phones.

The advantage of the InformaCast system is that it is IP-based. The audio and text messages travel on the local area network, allowing the central administration office to reach all the buildings on the district's network simultaneously.

In addition, InformaCast's architecture takes up very little bandwidth and does not overwhelm the converged voice and data network. The audio messages are sent via multicast and are not actual phone calls on the public switched phone network. If administrators send one audio or text message to phones and PCs, that one message takes up the same amount of bandwidth, whether the message is sent to two devices or 2,000 devices.

In contrast, with other solutions that send actual phone calls, traditional phone lines can become overloaded and go down, Bywaters warns.

InformaCast encompasses three pieces:

- InformaCast IP Broadcasting Solution. Server software for mass notification. It requires at a minimum a Windows 2000 or Windows 2003 server running on a 2.5 gigahertz Pentium-class processor and 1 gigabyte of RAM. It also requires Cisco Unified Communications

Manager, formerly called CallManager, an IP-PBX that routes and manages phone calls over the network. The software is compatible with most Cisco 7900 series IP phones. InformaCast automatically pulls phone information from the Cisco Unified Communications Manager to create paging zones, which are different groups of people to send messages to.

- InformaCast Desktop Agent. Software installed on users' computers to receive audio and text messages. The agent plays the audio on the computer, while text messages pop up on the screen — a communications tool that is more immediate than e-mail.
- InformaCast Compliant IP Speaker. Easy-to-install loudspeaker systems for indoors and outdoors. The speakers, manufactured by Atlas Sound, support Power-over-Ethernet connections and require only a RJ-45 connector to connect to the data network. (The system also allows districts to connect non-IP speakers using a connector called Zone Controller Hardware.)

Berbee offers a PushToTalk application for Cisco's IP desktop and wireless phones, which allows two employees, or a large group of employees, to turn their phones into a virtual walkie-talkie. "You can hit a button to talk to everyone in the security department in multiple locations and say, 'Have you seen a person in a black windbreaker?' and you're not burdening the phone system," Bywaters says.

Another benefit is that users can receive an emergency notification, even if they're talking on an IP phone. The technology allows administrators the option of forcing users to hear the emergency audio notification, even while they're talking on the phone.

InformaCast is best suited for employees, but can also be used to alert students by having them install the InformaCast Desktop Agent, Bywaters says.

Berbee can customize InformaCast to meet any requirement that districts may have. For example, if a district wants to include the ability to send text messages to cell phones, the Berbee staff can customize that functionality into the solution.

Berbee also supports integration with Axis surveillance cameras.

If administrators want to tie a video surveillance system with InformaCast, the Berbee staff can write a custom application that tells all video cameras to point to the direction of an incident once the mass notification system is triggered.

"It's software, so we can offer a high level of flexibility to meet customers' needs," Bywaters says.

The InformaCast system, which can be installed quickly and easily, can scale to meet the requirements of school districts of all sizes. A server with a minimum configuration of a 2.5GHz processor and 1GB of RAM can immediately send notifications to 10,000 devices. The speed of the notifications depends on the speed of the network, but in typical cases, notifications to 10,000 devices will take less than one minute.

## Computer Instruments' e-IVR software

Computer Instruments' e-IVR Emergency Response system is customizable server-based software that allows school officials to make phone calls and send text messages and e-mails to faculty, staff, parents and students through multiple devices, such as landline phones, cell phones, PDAs and PCs. The software can also send pop-up messages to premise-based PCs located throughout the district's wide area network.

Administrators can send notifications through a password-protected Web site, or through a PDA, or any landline phone or mobile phone. "You can just call in, put in your extension and password, and the e-IVR system authenticates you to access the system," says Brandon Herring, the company's director of sales.

The system, which runs on Windows, gives users the flexibility to send messages on the fly using "text to speech," or through pre-recorded voice messages or pre-written messages. With the text-to-speech feature, an administrator can type a message, and the e-IVR software, through a robotic voice, reads the message when people pick up their phones. The text-to-speech feature can support multiple languages, so

administrators can type a message in Spanish, and the application will read the message in Spanish.

Computer Instruments offers add-on applications for its e-IVR for education system:

- Absentee Notification, which automatically notifies parents of a child's absence;
- Homework Hotline, which lets parents or students hear homework assignments through messages recorded by teachers;
- Community Notification, which broadcasts messages of emergencies or upcoming events by phone, e-mail or fax.

The e-IVR software is also programmable, allowing individual users to prioritize how they may be reached, whether it's through a phone call to their work phone or a text message to their cell phone first. But if it's a major emergency, administrators can simply dispatch an alert to every person's device using all forms of messaging, including phone calls, e-mails, text messages and numeric paging. Administrators can use e-IVR to send notifications to specific groups of people in the district.

If phone calls are unsuccessful because of a busy signal, the system will retry the phone number up to three times, or if voicemail picks up, the system will leave a message. In addition, the system can ensure successful delivery of a phone call by asking people to press "1" to acknowledge that they received the message.

Contact lists, featuring people's phone numbers and e-mail addresses, can be easily created and updated. Districts can direct parents, faculty and staff to log onto a Web page to input their contact information, or they can send e-mails to everyone and have them respond with their contact information. Administrators can also add the contact information for people outside the school district, such as first responders.

A contact list can be housed on a spreadsheet and imported into the e-IVR software. Computer Instruments can also customize contact lists and store them in a secure SQL server database or in Active Directory, where people's e-mail addresses are already stored, Herring says.

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The e-IVR system is highly scalable. As part of the mass notification system, Computer Instruments provides Intel-based servers that support up to 384 ports, meaning one server can make calls to up to 384 phones simultaneously. The server — powered by dual Intel Xeon processors — features dual power supplies and RAID 5 (redundant array of independent disks) hard drives to help ensure availability, reliability and redundancy.

If a 10-second message is sent through a 384-port server, the mass notification system will be able to make nearly 14,000 calls in 15 minutes or nearly 28,000 calls in 30 minutes, while the system is simultaneously sending text messages and e-mails. Districts can also cluster several 384-port servers together, resulting in faster notifications.

The e-IVR system tracks message delivery with detailed reports, including whether people received the messages. It also allows users to monitor in real time the progress of a notification being broadcast, Herring says.

Computer Instruments also makes its e-IVR mass notification system available as an outsourced, managed service. The company charges a per-port monthly fee, as well as extra fees for add-on features, such as text-to-speech capability.

## Roam Secure's RSAN

RSAN is another software-based system that sends text alerts to many types of devices. It uses SMS to reach cell phones, e-mail accounts, PDAs, BlackBerrys, Treos, satellite phones and XM Satellite radios. Roam Secure says its network works with any SMS device and can send 18,000 messages per minute/per server running the software.

A designated RSAN administrator can send alerts from a computer, cell phone or other wireless device to everyone registered on the network. Messages can be scripted or written ad-hoc.

Message recipients on the network can register multiple devices or e-mail accounts, with the limits set by the RSAN administrator. They register online by sending a text message.

RSAN also supports two-way communication. That means recipients can respond to messages, allowing them to provide vital information in case of an emergency. RSAN stores messages and responses in a Web-based application, creating a summary and audit trail.

Roam Secure can be deployed in-house or as a hosted solution in redundant geographically dispersed data centers. The vendor offers consulting services for implementation, maintenance, training and testing. It also offers a system tuneup for in-house systems, which includes a database integrity check, database scrub for invalid addresses, system performance testing and optimization.

Districts using RSAN can also tie into the Roam Secure Information Exchange. RSIX lets districts link to other RSAN systems outside the district, even in other parts of the country. Security staffs can share information and resources via RSIX. The RSIX community includes local and state government first responders in several metropolitan regions.

## Digital Signage

CDW•G sells plasma and LCD screens that can be used as part of a mass notification system. Sony offers 32-inch to 50-inch displays. Administrators can use networking cards to connect the displays to the LAN, which allows them to centrally manage and broadcast messages onto the screens.

Samsung offers 40-inch and 46-inch displays with built-in mini computers running Windows XP Embedded. Administrators can link the displays to the LAN, and broadcast messages — including scrolling messages across the display — through Samsung's MagicNet software.

## Video Surveillance Cameras

Axis Communications provides two dozen IP-based indoor and outdoor video surveillance cameras that institutions can easily install on their networks. Through a Web browser or software, administrators and law enforcement can track individuals moving throughout district buildings and react to situations more quickly and accurately. Administrators can also print

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photos from the network cameras and use a mass notification system to send pictures of crime suspects for possible identification.

Features of Axis network cameras include motion detection sensors, wide-angle lenses and the ability to pan, tilt and zoom. PTZ dome cameras, which are good for parking lots, athletic fields and building perimeters, offer 360-degree views and up to a 35x optical zoom that allows users to see objects 500 feet away.

Several indoor camera models also support Power over Ethernet, which can save money in installation charges and can provide constant uptime when plugged into a switch that is running on an uninterruptible power supply.

Axis also provides network video servers that allow schools to integrate existing analog closed-circuit TV cameras into their new IP-based surveillance system.

LenSec makes software that can manage thousands of IP-based cameras. Through Web-based software, safety officials can monitor and control the cameras with a click of a mouse. The Web-based management software shows the locations of the cameras through a map of all the buildings in a district. Users just click on the cameras to view live or recorded footage.

LenSec also offers add-on modules that can analyze sound or video images and detect gunshots or other dangerous activity, such as a car driving the wrong way down a street at high speeds, says LenSec general manager Scott Frigaard. To store the video footage, LenSec advises institutions to invest in a storage area network that features terabytes of storage.

The actual size of a SAN varies depending on how much footage institutions want to store. Previous customers have installed SANs ranging from 2.5 to 23 terabytes.

## Deployment Strategies

A mass notification system is about more than just technology. Institutions must create detailed emergency preparedness plans. High-level administrators, facilities managers and security staff must meet to discuss every possible scenario and how the entire district should respond, Sako says. In the process, the district should create a database of pre-written emergency notification messages, so leaders can quickly send notifications when situations arise.

Emergency notification systems need to be carefully engineered to provide a high level of survivability. That means thinking about emergency power, redundant network connectivity and the use of multiple communications channels.

Because budget constraints will prevent most districts from building a completely redundant technology infrastructure, they often need to try a tiered approach to mass notification systems. If the LAN is down, then use a Wi-Fi hot spot — if the district has one — to send notifications, Sako says. If that's down, then use two-way radios.

If they don't work, then use a bullhorn. And if all else fails, administrators need to go outside and shout, he says.

## Conclusion

School districts are a microcosm of the real world, where crime, disasters and other bad things can happen. Fortunately, advances in technology, particularly in new communications software and tools, allow districts to build effective mass notification systems that make their schools safer. Today, a mass notification system at the ready can give everyone on campus peace of mind. Tomorrow, it can save lives.

