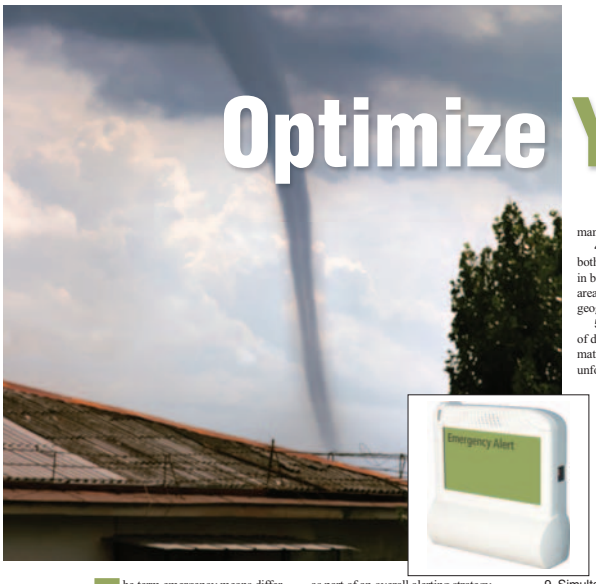
Optimize Your Alerting System

A well-engineered emergency alerting system combines primary and secondary systems to enhance notification.

By Myron Anduri



The term emergency means different things to different people. When considering all of the ramifications for mass notification, it becomes clear that only situations with a high probability of injury or loss of life from immediate circumstances can be considered an emergency. To address situations that require immediate attention, an effective mass notification system must have the ability to notify all of those affected in real or near-real time. The time from when an alert is initiated to when the affected citizens receive the alerts must be mere seconds. This immediate alerting method should be considered by a user to be the primary alerting method.

Software-based alerting methods that use public communications mediums such as cell phones, e-mail, landline phones, and local TV and radio alerts, are considered secondary alerting methods. While these methods have benefits and should be considered as part of an overall alerting strategy, they can never be considered effective for primary alerting. Inherent delays in information delivery and inconsistency of end-user device availability make these methods ineffective for immediate primary alerting.

Primary Alerting

The goal of a primary alerting system must be to quickly alert and inform citizens and clearly communicate what recipients are supposed to do. The system should also have the capability to deliver an "all clear" message when a threat is over. The nine major features of effective primary alerting systems are:

1. Speed. From dispatch to the device, the process should be counted in seconds.
2. Sound. Unmistakable audible alerting followed by clearly understood speech.
3. Sight. Visual text messages in as many locations as practical.
4. Location. Delivery of both audible and visual alerts in buildings and outdoor areas over potentially vast geography.
5. Repeatable. Delivery of dynamic follow-up information as the situation unfolds.
6. Simple. Intuitive operation by persons working under extreme stress.
7. Reliable. Incorporation of well-proven technology with few points of routing.
8. Affordable. True mass emergencies are rare; the system cost can't outweigh the benefit.
9. Simultaneous. Everyone receives the information at the same time.

Alerting systems with those nine features generally use digital wireless technology, whereby a dispatcher initiates a message that is transmitted to any number of devices located in an affected geographic area. When considering large-sized areas such as university campuses and municipalities, digital wireless technology — or paging — becomes the only practical, cost-effective method of delivering messages. A typical system consists of a transmitter, antenna and user software. The software can reside on a dedicated PC or on an existing computer system used by the dispatch center. The software allows the dispatcher to send the alert information to the transmitter, where it's then broadcasted to end-point devices.

Historically, primary systems that operate this way deliver an "on" command to siren systems. We almost universally know these as tornado warnings. In some beach areas, siren systems are used for tsunami warnings. While effective for people who are outdoors and are familiar with what the siren means, these systems fail at alerting for other emergencies and for people indoors or those hard of hearing. New effective systems deliver either siren or horn-type alerting and follow it with text and voice messages. The system software allows a user to intuitively deliver device control commands along with text messaging. More advanced devices that use text-to-speech technology to convert a text message to speech and deliver it through an amplified speaker. The text-to-speech technology allows text messages to be delivered to digital displays and voice speakers simultaneously with one transmission.

Secondary Alerting

Secondary alerting methods are defined as methods of notification that use public communications networks and attempt to reach citizens through cell phones, e-mail, landline phones or local media. These various methods differ greatly in the time required for the message to be delivered and in the "hit rate" of those that receive the message. A benefit of secondary alerting is that it can alert people who aren't in the immediate area of an emergency but will benefit from being informed of the event. The greatest disadvantage of various secondary alerting methods is that the user can't control the process. The speed the messages are delivered and the hit rate of delivered messages are always unknowns. Secondary methods are by their characteristics a shotgun approach to alerting; they send a large number of messages and hope a reasonable number get to the end recipient in time to be effective.

The mass notification product marketplace is full of vendors selling software that allows a user to send text-message alerts to large numbers of cell phones, e-mail addresses, pagers and PDAs. In this method, a user enters the relevant contact information of prospective end recipients into a database. In an emergency, a user can pull desired recipients from the database, enter a specific message and then send the messages to the recipients. Once the send button is clicked, the software begins delivering the e-mails to the Internet and text messages to various cell-phone providers. Originally designed for relatively small groups — 1,000 or less — often receiving nonemergency messages, the software products are now being marketed for large group applications in emergency situations.

At first glance, this may look like an answer to many mass notification problems. While these software systems have their place, it's important to look deeper into this type of alerting and understand the significant limitations inherent in these systems.

Reliance on outside systems. The software sends messages to various third parties. The reliability of these third-party systems at any given time is unknown and completely out of a user's control. We have all had the experience of interrupted Internet and of cell-phone calls being dropped.

Slow delivery. Even under the best conditions, when a user's network and all the third-party networks are operating at full speed, large batches of messages will take significant time to be delivered. It isn't possible with current technology to batch bulk text messages to cell phones and PDAs. It's still a serial process. A university or small-sized municipality can easily have 30,000 or more names in a database that need notification. Large schools may have 60,000 or more. With text messaging, it's lucky if a major system can reliably send out 10 messages per second in a given geographic area. If we assume that a cellular system may have to handle 25,000 messages, then it can take 25 minutes before the last recipients receive the message. That lag time doesn't include the software, which has to batch and deliver messages to the providers. Under the best conditions with everything working perfectly, users can expect a minimum of 30 minutes before a large batch of messages is delivered.

Ongoing Database Management. For software to have benefit, it must have a relevant database of recipients. In the case of a university with 30,000 students, you can reasonably assume that among students, faculty and employees there will be turnover of about 10,000 recipients per year. This requires the manual entry of 10,000 new recipients and the judicious deletion of 10,000 others. There are also updates to existing recipients who change phone providers or e-mail accounts. Even


A high-decibel warning system

systems that require the end recipients to opt in and enter their information themselves still need an administrator to delete them when they leave the area. If deletions aren't kept current, the database will balloon in size during a few years and dramatically slow the delivery process. The entire database has to be managed carefully and needs to be considered as a recurring cost when evaluating the price of software.

Fractional alerting. How does the end user know it's an emergency message? When alerting recipients using text massaging or e-mails, a user has no control over or knowledge of how many people receive the message. Clearly, if an intended recipient doesn't open her e-mail or look at the text message, she won't know of the emergency. If a professor has a classroom policy that all phones are turned off, then no one in that auditorium will be alerted. If the emergency message is sent in the middle of the night, it's likely that few will see it.

Significant potential for hacking. Software programs that allow for mass messaging are available to anyone. It is possible that a malicious event could take place where a criminal develops a database of recipients in a given area. False or misleading information can then be sent to large numbers of people that at best is a terrible prank or at worse is a foil to aid a larger criminal act. If an institution educates its recipients that text messaging is its primary alerting tool, then the intended recipients become highly vulnerable to a criminal hack.

Ideal Mass Notification

An ideal mass notification system for emergency use has a well-engineered primary system using installed devices at physical locations that deliver multisensory alerting with clear information. This alerting system is then enhanced with a secondary system that delivers text messages to a variety of end-user devices including cell phones, pagers and e-mail. A well-engineered system will allow primary and secondary systems to be initiated by a single action of a user. One click of a mouse delivers the message to all the various devices.

By using widely available digital messaging — paging networks — in combination with carefully crafted client software, a reliable mass notification system can be constructed that fulfills the necessary requirements. Digital messaging allows for fast transmission of messages to any number of fielded alerting devices located in and around a campus. Client software allows for simple and intuitive delivery of alerts to these devices. At the same time, the software delivers that alert text message to any number of cell phones and e-mail accounts. As the emergency unfolds, a user can then deliver updated information to the fielded devices at any time.

New effective systems deliver either siren or horn-type alerting and follow it with both text and voice messages.

In addition to the ability to achieve the desired alerting results, paging also delivers the lowest possible system cost because the technology is well proven and has been in mass production for decades. While cell phones have cut into the market for traditional personal pagers, digital messaging is still the communications link of choice for thousands of first responders and hospitals nationwide. ■

9 Features of Effective Primary Alerting Systems

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