

January/February 2009 • Volume 27/Number 1

EMERGENCY NUMBER PROFESSIONAL

The Official Publication of the National Emergency Number Association
www.enpmagazine.com

MAGAZINE

The National Emergency Communications Plan

Is an All-Encompassing Dispatch System Truly Effective for Each Organization?

Emergency Notification Systems: Technologies, Policies and Practices

Plus: 9-1-1 Goes to Washington Preview, page 19



Emergency Notification Systems: Technologies, Policies and Practices

GEORGE MOLCZAN AND RICK COX

Emergency notification systems bring with them a host of issues regarding implementation, policies and procedures. As with other emergency and public safety systems, they should have built in redundancy, overflow and interoperability.

Emergency Notification Systems (ENS) are a key tool for public safety agencies and is being used in a number of different variations across the US and elsewhere. For example, when a Tornado Watch is issued by the National Weather Service or is sighted nearby the campus police at Agnes Scott College, near Atlanta, manually activate their tornado siren to warn students and local citizens of the possible disaster. More than 1.4 million automated telephone calls were made to citizens and businesses in the path of Hurricane Ike in September 2008 and continued to be made after the storm passed to alert them as to clean-up progress and status of critical infrastructure. In the wake of the April 16, 2007 campus shootings at Virginia Tech, Sacramento State University (CA) implemented an electronic ENS which sends out text messages to cell phones and e-mail accounts of students, faculty and staff in the event of a significant incident on campus.

ENS choices range from basic legacy systems to state-of-the-art. Legacy systems may be sirens located in strategic areas, manually activated by emergency responders, while the state-of-the-art is sophisticated computer based systems with graphical interfaces which can, where permitted by local and state regulations, use information from 9-1-1 Automatic Location Information (ALI) databases and other sources. Many state-of-the-art systems also include self registration capabilities for cell phone, VoIP and pager users. As with any technology, ENS brings with it a host of issues regarding implementation, policies and procedures and as with other emergency and public safety systems ENS should have built in redundancy, overflow and interoperability.

Emergency Notification Technologies

It is no surprise that we now have more ways to notify people of emergencies than ever before and the list of options is growing. However, having more options also makes it more difficult to determine which method, or methods, will best serve our needs. As always the issues of cost, complexity, reliability and user friendliness will impact our decision making in this area and must be considered before choosing any of the options described below, and in **Table 1, page 23**. In reviewing the following choices, consider the speed at which notifications can be delivered, the amount of information that can be conveyed, the reliability of that delivery and finally, if there is an option for the recipient to respond in any way. In Table 1 notification time frames are defined as Short, under 30 minutes, Medium, from 30 minutes to one hour, Long, over one hour and Very Long, two hours or more.

Personal Notification

Personal Notification can range from a loudspeaker-equipped vehicle going down the street, or folks knocking on doors. This is very old technology that is extremely time-consuming and probably not a first choice in this day and age. Information provided must be brief or the messengers will never complete the notification process, and any feedback is purely local.

Warning Sirens

Warning sirens notify a larger number of people in a much shorter timeframe than personal notification, however there are limits to the amount of information that can be provided with this method and many people won't hear them due to loud machinery, music, TV, etc. There is also no way for the recipient to respond or reply, which means that the initiating agency has no way of knowing what percentage of the audience they actually reached.

Radio and TV

Radio and TV notification includes the Emergency Alert System (EAS), formerly known as the Emergency Broadcast System, which has been improved in recent years and is a viable means of sending out emergency notifications. However, this is not to be considered a stand-alone option as many potential recipients may not be watching TV or listening to the radio when trying to make them aware of a situation.

Telephone

Telephone notification is typically done by an automated system and can be used to contact people via landline or cellular phones. Considerable information can be provided to each recipient, and they frequently have the opportunity to replay the message to make sure they understood everything. In higher end systems the recipient can have the option to reply to specific questions by making selections using the phone keypad. These can be acknowledgement of the message, some indication of their intent (leaving or staying), requests for information (Amber Alert-type messages), or other queries based on the need of the agency making the notification. VoIP based phones are also being included in the mix and support will be expanded in the very near future. Potential downsides of telephone notification include network congestion on both the PSTN and the cellular providers, calls going to voice-mail, calls going to answering machines, calls forwarded to an area not affected by the emergency and related problems. The best of these solutions

Emergency Notification Systems: Technologies, Policies and Practices

have the ability to originate calls from different parts of the nation, where local congestion won't be as much of a problem for the network as trying to originate and deliver all the calls locally.

Fax

Fax notification is another automated method of emergency notification though using fax for emergency notification is considerably less reliable than telephone notification. The potential for a fax to be received with no one aware of it is far too great. While there may still be recipients who only rely on this option, it should only be used as a backup notification method with no expectation of response or reply. It is also true that an increasing quantity of fax numbers actually go to personal computers running fax software so it may be some time before the user discovers they have received one.

Electronic Signage

Electronic signage is gaining popularity for emergency notification. The most common applications to date are the highway signs used in many areas to notify drivers of construction, congestion or more recently Amber Alerts. Electronic signage also includes electronic billboards on the road side, government buildings, in malls and various other venues. They can be a good way to get notification to many people in a short timeframe, assuming the targets of the message are where they can see the sign and they happen to be looking at it. Such signs provide limited options for replying to the message, however making them primarily a backup system or a means of getting people to look at more capable communications tools.

Messaging

Short Message Service (SMS)/Text Messaging have steadily grown in popularity for several years as more and more people use it for general communication. As an increasing majority of the potential audience, especially younger citizens, are probably carrying a device capable of receiving such messages, it can be a good, low cost and fairly capable emergency notification method. This capability started with text pagers, but the devices of today are far more robust and feature rich and are now a critical aspect of emergency notification for both the public and responders, to say nothing of life in the new millennium. Applications that make use of this technology can broadcast a

System	Time to Notify 100 to 1000 People	Time to Notify 1000 + People	Delivery Reliably	Initial Cost	Maintenance Cost
Personal Notification	Long	Very Long	Average	Low	Low
Warning Sirens	Short	Short	Low	Low	Low
Radio & Television	Short	Short	Low	Low	Low
Telephone (Wireline & VoIP)	Short	Short	Medium	Medium / High	Medium / High
Telephone (Cellular)	Short	Short	Medium	Medium / High	Medium / High
FAX System	Medium	Long	Low	Low	Low
Electronic Signage	Short	Short	Medium / High	Medium	Medium / High
One-Way Paging	Short	Short	High	Low / Medium	Low
SMS/Text Messaging	Short	Short	Low / Medium	Low	Low
E-mail	Short	Short	Medium / High	Low	Low
Special Needs	Medium to Long	Long	Medium / High	Low	Low

Emergency notification system comparisons

Table courtesy of George Molzcan

message out to thousands of recipients in a short period of time and those messages can be tailored to specific groups, or geographic areas. Messages can be initiated from the affected area, or from a distant location, thus providing redundancy as well as the ability to bypass network congestion to some degree. For most SMS/Text Messaging options there are other concerns that need to be examined. Most cellular providers treat this type of message as "best effort," which means there are no guarantees that the message will be delivered in a timely manner, or ever. If a message delivery is attempted but not completed (for one of several potential reasons) the carrier will usually try again multiple times over staggered but increasingly longer delays.

One-Way Paging

While SMS services may be known for their periodic delays in delivering messages, a similar service, One-Way Paging, is very reliable, fast and cost effective. For institutions that have their own paging system, as many hospitals and college campuses do, one-way paging should be considered as a supplement to other notification systems they choose to implement. Paging systems may be purchased outright or rented/leased as a service from local commercial radio system providers or in some cases the local telephone company.

E-mail

E-mail notification is a capability very similar to SMS/Text Messaging, with the only real difference being a better service level guarantee from most carriers and a more robust mechanism for the recipient to respond or reply.

Special Needs

Special needs notification impacts virtually all agencies so there is a need to incorporate TTY/TDD and specialized desktop alerting capabilities into notification schemes. How much attention is given to this capability will be determined by the number of special needs users in the area of responsibility. Anecdotal evidence suggests that the need would be higher in Florida as compared to Minnesota, though seasonal population movement can affect those numbers.

In addition to active emergency notifications for the public, Web sites can also provide a point of coordination for responders. Some examples include pop-ups to alert of a situation such as those used by WeatherBug and some of the other weather focused providers, a streaming notification, flashing notes directing the user to a different screen for information, specific “in case of ___” sites, for example. These capabilities are only limited by your imagination, budget and the skill of your Webmaster.

The Layered Solution

While a single solution may appear the best choice for a community or institution, a combination of the technologies may prove to be the right solution. For example, in areas where tornados are common, warning sirens may be the best way to notify residents and visitors of impending danger. However, telephone and cellular notification systems may be a better way to notify residents in the area of a chemical spill. Each community or institution should carefully consider the end effect they want to achieve. Do they need to notify large number of people quickly, or selected groups over a short but not immediate timeframe or both?

ENS Policies and Procedures

In every community there will be a number of questions and a variety of answers such as “When should the system be activated and who has the authority to activate the system?” The answers to these questions and many others need to be clearly defined in an ENS Policies and Procedures manual. The following areas should, at a minimum, be covered in an ENS manual.

When to Activate

Putting aside the political aspects of who controls a system and why, there are many practical reasons to activate an ENS. It is important to remember the object is to notify those who need to be notified while at the same time not to alarm those who aren't in harm's way. An ENS Policies and Procedures manual should contain a well thought out list of events that qualify for activation of the ENS. A quick list would include weather related events like tornados, hurricanes and floods, missing or abducted children, elderly residents who have wandered away from care centers, chemical spills and prison escapes.

Many emergency service areas with emergency notification systems restrict the use to situations where all impacted citizens can be notified before the emergency occurs. One way to overcome the time issue is to implement staged messages. This may work well for evacuations of coastal areas where those nearest the storm front would be notified first, followed by notification to those farther away afterwards. During evacuations, staged notifications can also help reduce congestion along evacuation routes.

Authority to Activate

Just because someone is trained and knows how to activate an ENS, does not mean they are authorized to activate the system. Every community with an ENS should have a clearly defined list, in their ENS Policies and Procedures manual, of individuals who are authorized to activate the system. To prevent rapid obsolescence an ENS manual should list titles, not names, as much as possible. For example, Mayor or Police Chief would be better than the individual's names.

Certified Users

Certified users are those who have been properly trained and certified in the use and activation of the ENS. Certified users are not necessarily authorized to activate the system. This is one instance where the ENS Policies and Procedures manual needs to have specific names and contact information for all certified users.

System Security

The ENS system administrator must develop and enforce policies and procedures to ensure the system's physical security and the confidentiality of the databases. This may include, for example unlisted phone numbers and any medical information that may have been gathered.

Confidentiality agreements are often overlooked when dealing with system security. However, it is highly recommended that emergency services managers/administrators work with their legal group to develop a confidentiality agreement for anyone that has access to the system or its databases.

System Maintenance

The ENS Policies and Procedures manual must include a well defined list of technical support personnel and their contact information. This should include in-house technical and programming staff as well as vendor contacts. In regards to the vendor contacts, it is important to know if the coverage is “normal business hours” (in what time zone) or 24/7, and whether the vendor support is chargeable. If so, they may request a purchase order number prior to offering support. The manual should also include information for users to report troubles and provide input as to system operation.

Training

Training for an ENS system covers a number of areas, including operation of computer systems, telephone equipment and any backup equipment, including generators, the use of support applications such as mapping programs and their databases, the implementation of disaster activations plans and disaster

Emergency Notification Systems: Technologies, Policies and Practices

recovery programs, and the reporting of system errors and abnormal events as well as unauthorized access or access attempts. Training should also include routine periodic test activations of the system and post activation analysis of the exercises.

System Logs

Many state-of-the-art ENS include logging functions that keep track of each system activation including date, a copy of the message or messages, telephone numbers called, messages delivered, time the message delivery started and the time the last message was delivered. Some systems can provide information about the number of retries to busy numbers, etc. All of this information should be kept and its retention covered in the data retention policy. The system log information is extremely useful in doing post event reviews. The log will tell the review team a lot about the event and point to areas where improvements may be necessary.

Data Retention

The ENS Policy and Procedures manual should include appropriate data retention practices. The manual should include detailed specifications as to what data/information is to be kept, how it is to be stored (paper, magnetic tape, CD ROM, etc), where it is to be kept and when it should be destroyed.

In addition to the security of the databases an ENS Policies and Procedures manual should define schedules for database backups, as well as where the backups are to be stored and how long they are to be retained.

Emergency Message Composition

The composition of an emergency message is something that is often overlooked. However it is critical that certain information be included with every message. The following is a list of the minimum information required in any emergency message.

- Who is calling—name and title (“This is Mayor John Smith ...”)
- From where are they calling (“We are calling from the Mosyberg public safety ...”)
- Explain the reason for the call (“Due to storm activity, flooding of ...”)
- Include the date, time and duration of the emergency. This is important for text messages as they are sometimes delayed in delivery.
- Clearly state if a response/action is required (Evacuate East Medial Center via the Main Street exit)
- Specify how to receive further information (Access a web page, TV or Radio)

Annual Review

Last but certainly not least, an ENS policies and Procedures manual should have a mandatory annual review to insure it is current. When you need technical support is not the time to find out the vendor changed and you can't find that letter that you received months ago. In all cases it is important to keep your legal group involved in the development of the ENS Policies and Procedures manual as there are many issues that are affected by local, state and federal laws. Remember, if something goes wrong, they are the ones that will be defending the public safety organizations.

An excellent source of information in developing an ENS Policies and Procedures manual is a NENA (National Emergency Number Association) document titled *NENA Standards for Emergency telephone Notification Systems*. It is document NENA 56-003 and is available on the NENA Web site at www.nena.org.

George Molczan, contributor to the Training Institute for Public Safety (www.911tips.org), is a hands-on telephony expert and author specializing in the technical and regulatory aspects of E9-1-1 and CALEA. His practical experience includes communications network operations, project management, and technical course design and instruction. As a public safety and law enforcement liaison, George is responsible for the regulatory, technical and operational issues of wireless and wireline E9-1-1 implementations. George is also the author of “A Legal and Law Enforcement Guide to Telephony.” George is a NENA member and can be reached by e-mail at george@gmolczan.com or via his Web site at www.gmolczan.com.

Rick Cox, contributor to Training Institute for Public Safety (www.911tips.org) has been focused on voice, video and data communications for the Public Sector in any location, any situation and for any application. His customer base has long included Public Sector agencies at the Federal, State, County and Local levels with an emphasis on their communications in both normal and crisis situations. This includes their typical fixed communications environments as well as alternative/mobile communications. Rick is also a member of CERT. Rick can be reached by e-mail at rick_cox59@hotmail.com.