Decoding the Latest Mass Notification Codes for Effective Building Communications

A White Paper by Eaton’s Cooper Notification business

Today’s facility managers are not only concerned with protecting their facilities, personnel and community from sophisticated and complex threats, but also understanding and complying with the industry’s latest codes and requirements, including the new chapter on Mass Notification Systems (MNS) in the 2010 edition of the National Fire Protection Association (NFPA) 72 National Fire Alarm and Signaling Code.

What is Mass Notification?
The role of mass notification - warning and alerting people - is not a new tactic. Consider the midnight ride of Paul Revere as a historical example of using both an audible and visual alerting method, which are both NFPA requirements. In April 1775, Revere hung two lanterns in the Boston bell-tower, indicating from pre-planned signals that the British troops would row “by sea.” He then alarmed the country-side by riding and stopping at each house.

Alerting has certainly come a long way since 1775. Today’s sophisticated Mass Notification Systems combine fire, security, and alerting systems to provide a complete integrated emergency communications solution to handle today’s threats. Although the role of MNS is not new, the term Mass Notification was only introduced within the past decade. During this time it has quickly transformed to a defined stage and is now regulated with codes and requirements.

The Department of Defense (DoD) defines Mass Notification as a means to “provide real-time information and instructions to people in a building, area, site, or installation using intelligible voice communications along with visible signals, text, and graphics, and possibly including tactile or other communication methods.” The DoD further states that Mass Notification Systems “protect life by indicating the existence of an emergency situation and instructing people of the necessary and appropriate response and action.”

The Evolution of Mass Notification
In 1996, terrorists attacked Khobar Towers, a USAF housing complex in Dhahran, Saudi Arabia, killing 19 US servicemen and wounding hundreds of others. Secretary of Defense, William Cohen, issued a post-incident report of the attack, which concluded that there was no effective notification system with which to warn personnel. The principal means for sounding an alarm at Khobar Towers consisted of having personnel go from door-to-door throughout an eight-story dormitory,
alerting residents of the danger. This primitive approach prompted the U.S. Military to develop force protection standards. Thus in 1999, the US Air Force developed the Antiterrorism Force Protection Standards. To add to the standards, in 2002 the DoD created the Unified Facilities Criteria (UFC) 4-010-01 Minimum Antiterrorism Standards for Buildings, where mass notification was first defined. Two years later, the DoD published the UFC 04-021-01 Design and O&M: Mass Notification Systems, which required the installation of intelligible voice notification systems in and around new “inhabited buildings.”

In creating the UFC, the DoD discovered that most fire alarm systems were unable to communicate with people in non-fire emergencies such as severe weather. The US Air Force petitioned NFPA to develop MNS requirements. As a result, the NFPA added Annex E Mass Notification Systems as recommended guidelines for MNS in the National Fire Alarm Code 2007 edition. This was the first time in the history of the code that a non-fire alarm system could take precedence over a fire alarm system.

In the NFPA 72 National Fire Alarm and Signaling Code 2010 edition, Annex E became Chapter 24 Emergency Communications Systems (ECS), the first mass notification code for the private sector. And, most recently Underwriters Laboratories (UL) has moved towards establishing a new standard for mass notification as well – UL 2572. It will measure how a Mass Notification System (MNS) performs against the NFPA ECS codes.

**Emergency Communications System**

The NFPA defines an Emergency Communications System as a means to “communicate information about emergencies including, but not limited to, fire, human-caused events (accidental and intentional), other dangerous situations, accidents, and natural disasters. The purpose of an ECS is “for the protection of life by indicating the existence of an emergency situation and communicating information necessary to facilitate an appropriate response and action.”

**Higher Education Emergency Notification Requirements**

Specific markets are also recognizing the need for mass notification requirements. Due to the vulnerability of college campuses, the federal government passed the Higher Education Opportunity Act (HEOA) in 2008, which requires all colleges to immediately notify the campus community in an emergency. By October 2010, colleges are required for the first time to include emergency response and evacuation procedures in their Annual Security Report.

**Implementing Mass Notification in your Facility**

Building owners may be overwhelmed by all of these new codes, however, it’s important for them to understand that they can leverage their existing life safety systems with minimal upgrades and modifications. Ensuring success doesn’t have to be a difficult endeavor and can be accomplished by starting with the below steps:

1. Begin with a vulnerability and risk assessment
2. Develop a Master Plan that integrates:
   a. Protection Systems
   b. Mass Notification Systems
   c. Emergency Action Plans
3. Implement on a phased basis
4. Leverage existing systems and equipment

Completing a vulnerability and risk assessment provides building owners a scope of their current situation and allows them to develop a master plan to address the needs of the facility. It is highly recommended that these master plans integrate protection systems, Mass Notification Systems and emergency action plans.

**Summary of the NFPA Emergency Communications Code and how it affects Facility Managers**
Chapter 24, a new chapter in NFPA 72 2010, is a complete set of requirements for indoor and outdoor Emergency Communications Systems that consist of two classifications of systems, one-way and two-way. One-Way Communication Systems include In-Building Fire Emergency Voice/Alarm Communications Systems, In-Building MNS, Wide-Area MNS, and Distributed Recipient MNS (text messages, voice calls, emails, pagers, desktop notification). For Two-Way Communication Systems, the Code recognizes two types: two-way telephones and two-way in-building radio communications.

Fire Alarm Voice Evacuation and Two-Way Communication were relocated from Chapter 6 of the 2007 edition of the Code to Chapter 24 and modified in some cases. The guidance for MNS from Annex G of 2007 was also relocated to the new chapter and reworded.

An Emergency Communications System must be installed in occupancies, where required by the Authority Having Jurisdiction (AHJ) or other applicable governing laws, codes or standards. Regardless of whether an ECS is required by the AHJ or voluntary, installing a code compliant system ensures the facility owner that the ECS system has achieved a level of performance tested to the rigorous standards of the latest codes.

**In-Building Mass Notification Systems**

As defined by NFPA, In-Building Mass Notification Systems are installed in buildings or structures for the purpose of notifying and instructing occupants of an emergency. An In-Building MNS provides information and instructions to people in a building or other space, using intelligible voice communications and visible signals, text, graphics, tactile or other communications methods.

Combining or integrating in-building fire emergency voice/alarm communications systems with other communication systems such as mass notification, public address and paging is now allowed and encouraged by Code. Using one system that meets Code is financially beneficial to owner. It reduces design, installation and on-going life cycle costs. Fire alarm or priority mass notification messages as determined by a risk analysis must take precedence over any other announcement messages such as paging or public address.

In-Building MNS Components Include:
- Primary control unit for In-Building MNS, which monitors and controls notification appliances
- Dedicated microphone for live emergency communication messages that can be distinguished from a fire microphone
- Notification Appliance Circuit (NAC)
- Interface to a FAS
- Audible and visual notification devices

Figure 1 below depicts a sample of MNS components and expansion options for an NFPA 72 Code-Compliant In-Building MNS solution.
Risk Analysis & Emergency Response Plans
Creating an Emergency Response Plan (ERP) requires a detailed risk analysis. When designing a mass notification system, one must consider the anticipated risks of each facility, probability and frequency of occurrence, and projected loss. The role of mass notification - how the facility disseminates information and specific-take action instructions needed for different types of emergencies - is an important element of risk mitigation.

A facility’s Emergency Response Plan should be developed based on the risk analysis and in accordance with NFPA 1600, *Standard on Disaster/Emergency Management and Business Continuity Programs*, and NFPA 1620, *Recommended Practice for Pre-Incident Planning*. Some elements that the ERP should include are:

- Emergency response team structure
- Emergency response procedures for building system-, human-, terrorism-, and weather-related emergencies
- Emergency response equipment and operation
- Emergency response notification (message content, approval and initiation processes
- Emergency response training and drills

Coverage of the In-Building MNS
MNS provides live voice and pre-recorded localized messaging within a protected individual building, areas surrounding the building, and other outdoor designated areas. The notification zones are based on the risk analysis. Each separate building should be provided with a separate In-Building MNS, which, must be designed with intelligible voice in accordance with NFPA 72 2010 Chapter 18, Notification Appliances.

Operation of the In-Building MNS
An effective In-Building MNS manages all audio and visual notification appliances and reports trouble and supervisory signal through the Fire Alarm System (FAS). Determined by the ERP, the In-Building MNS control unit can override the FAS with live voice from an MNS microphone or manual activation of a high-priority MNS message. After the In-Building MNS relinquishes control, the fire alarm system will automatically restore to normal operation (without an active fire alarm signal) or operate based on the Emergency Response Plan with an active fire alarm signal.
Voice Message Priority
The priority level of recorded messages are determined by the ERP and based on an evaluation of:

- Occupancy impact on individual security
- Danger to life
- Danger to community
- Danger and impact on the nation

Only recorded messages determined by the ERP to be of higher priority than fire alarm activation are permitted to override the fire alarm notification and initiate the mass notification priority message. Activation of any other recorded message shall not interfere with the operation of the fire alarm system.

Signal Priority is as follows:

- Discharge (fire suppression)
- MNS
- Fire
- Local Microphone higher priority than preprogrammed responses

Visible Notification
Where there is audible notification, the In-Building MNS must also provide visible notification to serve the hearing-impaired and for high-noise areas. Visible notification is typically accomplished using clear strobes for fire alarm and amber strobes for MNS. In addition to the strobes, textual, graphic or video displays can also be utilized. Transmission of visible notification and messages must be simultaneous to audible notification and messages.

Wide-Area MNS
The Wide-Area MNS broadcasts real-time intelligible voice messages, tones, and sirens, covering large outdoor areas. Wide-Area MNS can be used for applications such as campus or facility Giant Voice systems, public warning systems, and military base outdoor notification systems. System components include the Central Control Station and the High Power Speaker Array (HPSA). The Wide-Area MNS must be designed so that each notification zone can be individually controlled by the Central Control Station, intelligibility is in accordance with Chapter 18, and minimum mounting heights are based on the output of the speaker array to prevent hearing damage. The HPSA must have the capability to operate for a minimum of seven days in standby, followed by 60 minutes of operation at full load.

Distributed Recipient Mass Notification System
Although Distributed Recipient Mass Notification Systems (DRMNS) cannot be used in place of the required audible and visible alerting systems, DRMNS can be added and integrated with these systems whenever possible for a multi-tiered communications system. The DRMNS must be able to communicate to hundreds or thousands of individuals through multiple delivery methods, including mass dialing systems, emails, SMS/text messages, paging, and desktop pop-up notifications. Whether mobilizing first responders, informing residents of evacuation procedures or notifying employees of an emergency, DRMNS are capable of sending one- or two-way communications to a wide-range of targeted individuals or groups. These web-based communication systems must be installed behind appropriate internet system firewalls to protect the network and designed with a backup configuration to facilitate distribution of messages.

Code-Compliant MNS Solutions
It’s important for building owners and facility managers not to become inundated with these codes. They need to understand how they can utilize solutions that enable them to
leverage existing infrastructure, systems and equipment with minimal upgrades and modifications and still meet codes.

To help building owners and managers meet the latest requirements and simplify their retrofit, Cooper Notification designed the SAFEPATH MNS (SPMNS) to integrate with a facility’s addressable fire alarm system (FAS) for a complete In-Building MNS solution that performs both fire alarm and emergency communications functions. Compliant with UL 2572 and NFPA 72 2010 codes, the SPMNS provides personnel and building occupants with intelligible live and pre-recorded voice messages that communicate what to do in response to an emergency. The SPMNS manages all audible and visual notification and features a modular and flexible design to meet the functional requirements of Emergency Response Plans as well as the complexities of the new codes.

Key SAFEPATH MNS Features and Benefits
- Performs both fire alarm and emergency communications functions
- Interfaces with any addressable Fire Alarm System (FAS)
- Makes FAS UL 2572 for MNS Compliant
- Manages all audible and visual notification devices for both fire and MNS
- Features a modular and flexible design to meet functional requirements of Emergency Response Plans (ERP) and MNS codes
- Voice message prioritization according to the ERP
- Flexible, field-programmable messaging capabilities
- NFPA 72 2010 and UL 2572 code compliant

Retrofit Solution
A sample retrofit solution to meet new codes is depicted in the diagram below and described in the following paragraph.
Example of Retrofit Design
To make a facility’s existing FACP compliant with NFPA-72 2010 and UL 2572, the system integrator would add the SAFEPATH MNS that interfaces with the FACP, POWERPATH power supply and MNS microphone. Next integrators would remove the fire horn strobe circuit from FACP and reconnect to the MNS power supply. Then they would add fire and amber strobes and also connect the amber strobe circuit to the MNS power supply.

Finally, the horn/strobe notification appliance would be replaced with a voice speaker and a new speaker circuit would be connected to the SAFEPATH MNS control unit. Speaker placement must comply with NFPA 72 2010. Intelligibility criteria will likely require different spacing requirements than the former horn locations.

System-of-Systems
With a variety of different MNS solutions available, one of the latest trends that security professionals are recognizing is the need for a System-of-Systems approach to emergency communications. Instead of relying on just one technology to do the job, multiple communication systems ensure that information will successfully reach the affected audience. System of Systems approach to MNS include sending text messages and emails, distributing automated voice calls,
broadcasting alerts over indoor or outdoor mass notification systems, utilizing display signs, desktop alerts and social media. However, businesses are realizing that launching alerts from multiple communication systems can greatly increase the time it takes to send and receive messages.

With limited staff and multiple communication systems to launch, businesses need an integrated emergency notification system with a simplified, single interface to launch all of the different applications. It allows facility managers and emergency response personnel to focus on the emergency at hand without being slowed down, trying to activate multiple systems.

Today’s fire codes apply to more than fire situations and affect a range of departments in an organization. The key is looking for a solution provider that has already decoded the latest Mass Notification Codes and can help you put an effective building communications plan in place.

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Eaton provides integrated, advanced technology and code-compliant solutions for life safety and mass notification, providing critical, emergency communications for higher education, industrial, commercial, government and military markets. To learn more about these solutions or other life safety and mass notification solutions, visit www.coopernotification.com.

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