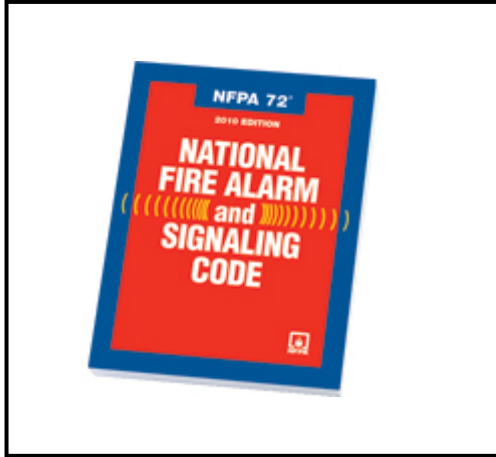# NFPA 72 – 2010:
A New Era in Emergency Communications

A White Paper by SimplexGrinnell

NFPA 72 has long been a critically important document for those involved in fire protection and life safety. Now it has taken on even more significance as a result of sweeping changes incorporated into the new 2010 edition. These changes, the most extensive code revision since 1993, extend the scope of NFPA 72 beyond the realm of fire alarm to include other life-safety systems and functions. In fact, the scope of the revisions and additions is so significant that NFPA 72 has been given a new title: *National Fire Alarm and Signaling Code.* The broader title reflects, in large part, the addition of a new chapter – Chapter 24: Emergency Communications Systems. This chapter, for the first time, lays out specific requirements to indicate the existence of an emergency situation and the need to communicate necessary information to facilitate an appropriate response and action. The chapter establishes minimum required levels of performance, reliability and quality of installation for emergency communications systems. (In the previous edition of NFPA 72, Mass Notifications was referenced as an annex, meaning the guidance was purely suggestive.) This white paper will explore Chapter 24: Emergency Communications Systems from the following perspectives:

- What are the requirements and what do they mean to life-safety designers, building owners, facility managers and AHJs (authorities having jurisdiction)?
- What benefits and value do the changes provide in terms of life safety, notification and property protection?
- What should building owners, specifying engineers and local fire officials know in order to apply the standards and prepare to comply as municipalities begin adopting the new 2010 edition of NFPA 72?

The adoption process has already begun, and is occurring at a faster pace than with any previous edition of NFPA 72. Consider the following:

- California, the most populous state in the U.S., has adopted the new 2010 edition effective January 1, 2011. The state's early adoption stems from a desire to implement the new emergency communications requirements.

- The State of New Jersey will make its adoption of the 2010 edition of NFPA 72 effective in the spring of 2011.

- The U.S. Department of Defense (DoD) and other government entities have wanted for some time now to have mass notification/emergency communications requirements written into the NFPA 72. In June 2003, the Air Force Civil Engineering Support Agency petitioned NFPA to develop a standard for mass notification.

The need for emergency mass communications
The NFPA Technical Committee that was charged with reviewing possible revisions to NFPA 72 recognized the critical role that mass communications play in fire and life-safety protection. Unquestionably, the growing importance of mass notification has been demonstrated by a plethora of tragic events in recent years – from shootings at Columbine High School, Virginia Tech University and Northern Illinois University to the recent rampage at Fort Hood, the large U.S. military base in Texas.

In the aftermath of the Fort Hood shootings, the Pentagon released a report in January 2010 entitled "Protecting the Force: Lessons from Fort Hood." The Pentagon review, conducted by Togo D. West Jr., a former secretary of the Army, and Adm. Vernon E. Clark (ret.), a former chief of naval operations, examined the circumstances that led to the November 2009 events at Fort Hood. Based on Joint Staff Integrated Vulnerability Assessments, the Department of Defense (DoD) concluded that many of its installations lacked mass notification capabilities. The report went on to make a number of policy recommendations, including a finding that the Pentagon should: "*Examine the feasibility of advancing the procurement and deployment of state-of-the-art mass warning systems and incorporate these technologies into emergency response plans.*"

This finding aligns with previous federal government efforts aimed at the use of Mass Notification Systems. Beginning in 2002, DoD published standards to improve emergency response measures. In October 2004, DoD specifically implemented its own standards for mass notification. In addition, the federal government began moving toward requiring emergency notification and life-safety measures in leased buildings.

DoD outlines mass notification criteria in its Unified Facilities Criteria (UFC) 4-021-01. According to the UFC criteria, mass notification can be defined as follows: the capability to provide real-time information and instructions to people in a building, area, site or installation using intelligible voice communications, together with visible signals, text, graphics, and other communication methods. According to FEMA (Federal Emergency Management Agency) 426 – Reference Manual to Mitigate Potential Terrorist Attacks Against Buildings, mass notification is crucial because it has "the capability to provide real-time information to all building occupants or personnel in the immediate vicinity of a building during emergency situations."

All of this reinforces the underlying principle that, in times of crisis or impending crisis, emergency management personnel must be able to communicate quickly and effectively. An emergency communications system, following the requirements now outlined in NFPA 72, can help to provide this kind of real-time notification and information.

An Overview of the New 2010 Edition
Previous editions of NFPA 72 had been focused on fire alarm systems. The new edition addresses many other issues, including:

- Removing the word "FIRE" wherever it made sense throughout the document
- Many new definitions focusing on new terms for Emergency Communications Systems (ECS)
- Revised sections that deal with "qualifications" of individuals
- New section for installing detectors to protect specific objects, such as above elevator doors and FACUs (fire alarm control units), regardless of ceiling height
- Creating a new chapter and entirely rewriting the requirements for circuits and pathways
- Major rewrite of the Supervising Station Alarm Systems chapter, removing "old technologies" for communicating to supervising stations

While covering a variety of new ground, the most dramatic and significant change lies in the development of the new emergency communications chapter. It governs in-building emergency voice/alarm communications systems, including mass notification and its related components, with first-time provisions for:

- Risk analysis requirements for the design of Emergency Communications Systems/Mass Notification Systems (ECS/MNS)
- In-building Emergency Communications Systems/Mass Notification Systems
- Wide-area ECS/MNS for locations such as college campuses and military bases
- Distributed recipient ECS/MNS to communicate with targeted individuals or groups
- In-building radio enhancement systems
- Area of refuge for two-way emergency communications systems

Four Major Sections
The new NFPA 72-2010 Emergency Communications Systems (ECS) chapter is subdivided into four major sections:

One-way communication – Until now, fire alarm systems have generally been allowed to provide only occupant notification of fire events. NFPA 72 now addresses one-way emergency communications in a much broader way, including systems in buildings, wide-area notification and distributed notification.

Two-way communication – New two-way telephone requirements have been put in place and specific locations identified to coordinate with the expansion of radio communication enhancement systems. This includes firefighter and warden telephones and the elimination of common talk.

Command and control – The central control location may be a single location or multiple locations where the mass notification system is operated. Depending on the notification area, multiple central control locations may be required so that a control facility is available during events.

Performance-based design – An important section of the new ECS chapter covers performance-based design. This section provides flexibility in the design of an ECS. The section outlines the methodology for developing a performance-based design of a mass notification system. It also provides the general goals and objectives for the system.

It Begins With a Risk Analysis
According to Chapter 24, a risk analysis must be completed before beginning the design of a mass notification system. This process is used to identify and characterize the probability, and potential severity, of incidents associated with natural or man-made disasters or other events requiring emergency response. NFPA 72, 2010 edition states in section 24.4.2.2.2 "The designer shall consider both fire and non-fire emergencies when determining risk tolerances for survivability for the mass notification system." The risk analysis provides the basis for developing the emergency response plan and designing the emergency communications system. The Emergency Response Plan should then be utilized to help determine what equipment to use at a facility or campus. Existing facilities that have an emergency response plan should update it to reflect the emergency communication system and current risks.

Below are the types of questions the designer should consider when designing a system:
- What type of emergency event can occur?
- What is the level of urgency for each potential event?
- What is the anticipated or expected severity?
- What is the level of certainty?
- Where is it located or from what direction is it approaching?
- What is its validity?
- What zone or areas should receive emergency message(s)?
- What instructions should we send to our personnel?
- What special procedures or tasks should we send to remind our personnel?

The NFPA risk analysis process identifies the types of expected emergency events and provides a basis for how they should be handled. This process may require a threat and vulnerability analysis/survey to understand and identify the risks. Once the risks have been identified, the urgency of the potential event must be considered. For example, a chemical release could pose an immediate threat to an identified geographic area, whereas a forecasted hurricane, moving on a specific track, would rank as a lower priority.

The analysis must identify when the system will be required to operate before, during, or after an event. The performance needs may drive certain survivability requirements. The circuits may need to utilize fire-rated cable or be installed in underground hardened ducts to survive the potential emergency conditions.

The new Chapter 12 that governs Circuits & Pathways in the 2010 edition of NFPA 72 provides survivability requirements that can be incorporated in specifications and designs. In addition to the circuit survivability, the facility that functions as the central control station and related equipment must be designed to maintain functionality as prescribed by the risk analysis. Communication to a wide range of targeted individuals or groups is mandatory. This can be achieved through mass dialing systems, reverse 911, email, SMS (Short Message Service, more commonly known as text messaging), and other directed communication methods.

Key elements to a comprehensive emergency communications/mass notification program
Once the assessment is complete, a comprehensive ECS/MNS can be developed based on the findings. Chapter 24 offers a complete set of requirements for emergency communications

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systems, including EVAC and two-way communications. It permits a mass notification control unit to take control of fire alarm notification appliances – including amplifiers, speakers and strobes – and requires a tone or voice message any time the priority is granted to the mass notification control unit. Operation of an ECS/MNS system is to be based on a comprehensive emergency response plan. Clear intelligibility of voice messages must meet specific requirements, and visual notification is to be achieved through strobes, textual, graphic or video displays.

As typically used today, there are two key elements to a comprehensive emergency communications/mass notification program. The first component of the mass notification process involves alerting people within a structure – and the immediate surrounding area – of an emergency situation. An Emergency Communications System/ Mass Notification System (ECS/MNS) can quickly notify people of threats or broadcast messages from public authorities on how to respond, helping to produce an effective response and minimize panic. The system can also be portable, capable of being moved from one location to another. Mass notification provides verbal messages, typically in a number of languages, that can be heard up to a third of a mile away. An ECS/MNS with a telephone answering/voice mail system can be useful in the event that standard communication signals and modes, such as mobile phones, pagers or personal electronic devices, become inoperable in an emergency due to jammed or overloaded networks.

The second ECS/MNS element involves electronic mass notification for public address. Using this method, word of an impending disaster can be disseminated to stakeholders through a high-tech electronic communication system that simultaneously sends programmed messages over any number of services and devices. In some cases, an electronic ECS/MNS can be interconnected with an on-site public address system. This is especially helpful when the public address system is listed by a nationally recognized testing (third-party) organization for mass notification use.

Making Use of Existing Infrastructure
At first glance, some building owners may view the development of an emergency communications system as an overwhelming task. However, it is important to keep in mind that a building's existing life-safety infrastructure – most notably its fire alarm system – can be leveraged to help meet the emergency communications requirements. This can simplify the process, perhaps meaning that only modest system adjustments or upgrade would be required, and help mitigate the cost.

It is also advisable to consider deploying multiple layers of technology to disseminate critical information to the people and audiences who need to be reached in an emergency. A multi-technology approach to emergency communications can combine voice communications, visual messaging and wireless personal notification capabilities into an integrated solution that provides the means to effectively communicate with all constituencies during an emergency.

SimplexGrinnell, a Tyco International company, has over 200 years of combined history in life safety and fire protection. For more information, visit www.simplexgrinnell.com or contact Chris Woodcock, Director of Marketing Communications at 978-731-7052 or chwoodcock@simplexgrinnell.com.