

UFC 4-021-01  
18 DECEMBER 2002

# UNIFIED FACILITIES CRITERIA (UFC)

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## DESIGN AND O&M: MASS NOTIFICATION SYSTEMS



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**UFC 4-021-01**  
**18 DECEMBER 2002**

## **UNIFIED FACILITIES CRITERIA (UFC)**

### **MASS NOTIFICATION SYSTEMS**

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AIR FORCE CIVIL ENGINEER SUPPORT AGENCY (Preparing Activity)

NAVAL FACILITIES ENGINEERING COMMAND

U.S. ARMY CORPS OF ENGINEERS

Record of Changes (changes are indicated by \1\ ... /1/)

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## FOREWORD

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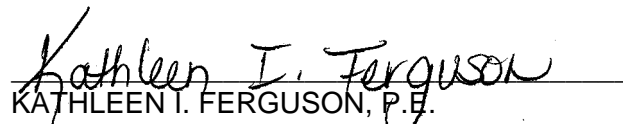
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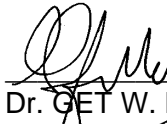
DONALD L. BASHAM, P.E.  
 Chief, Engineering and Construction  
 U.S. Army Corps of Engineers



DR. JAMES W. WRIGHT, P.E.  
 Chief Engineer  
 Naval Facilities Engineering Command



KATHLEEN I. FERGUSON, P.E.  
 The Deputy Civil Engineer  
 DCS/Installations & Logistics  
 Department of the Air Force



Dr. GET W. MOY, P.E.  
 Director, Installations Requirements and  
 Management  
 Office of the Deputy Under Secretary of Defense  
 (Installations and Environment)

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## CHAPTER 1

## INTRODUCTION

1-1 **BACKGROUND.** Mass notification is the capability to provide real-time information to all building occupants or personnel in the immediate vicinity of a building during emergency situations. All Department of Defense (DOD) components are required to provide mass notification capability.

This UFC was developed by collecting and refining criteria from DOD anti-terrorism guidance, examining previous mass notification system evaluation reports, and reviewing the capabilities of representative, commercially available mass notification products.


1-2 **PURPOSE.** To provide mass notification in compliance with the requirements of UFC 4-010-01, *DOD Minimum Antiterrorism Standards for Buildings*.

1-3 **SCOPE.** This UFC defines requirements for implementation of mass notification in DOD facilities. Do not deviate from these criteria without prior approval from the component office of responsibility:

- U.S. Air Force: Air Force Civil Engineer Support Agency, Technical Support Directorate (HQ AFCEA/CES)
- U.S. Army: U.S. Army Corps of Engineers, Directorate of Civil Works, Engineering and Construction (HQ USACE/CECW-E)
- U.S. Navy: Naval Facilities Engineering Command, Headquarters Chief Engineer Organization (NAVFACENGCOM HQ Code CHENG)
- U.S. Marine Corps (HQMC), Code LFF-1
- Defense Logistics Agency Director (HQ DLA-D) through Support Services (DLA-DSS-IP)
- National Imagery and Mapping Agency (NIMA), Mission Support
- Other DOD components: the Office of the Deputy Under Secretary of Defense (Installations & Environment) (DUSD [I&E]) via the DOD Committee on Fire Protection Engineering.

1-3.1 **Mandate.** Criteria in this UFC are mandated for use by the Office of the Secretary of Defense (OSD); the Military Departments (including National Guard and Reserve components); the Chairman, Joint Chiefs of Staff and Joint Staff; the Combatant Commands; the Office of the Inspector General of the Department of Defense; the Defense Agencies; DOD Field Activities; and all other organizational entities within DOD, hereafter referred to collectively as "DOD Components."

1-3.2 **Applicability.** Criteria in this UFC apply to most DOD facilities as specified in UFC 4-010-01. Facilities include leased, temporary, expeditionary, and permanent structures located on or outside of DOD installations. **Note:** where one or more Service's criteria varies from the other Services' criteria, it is noted in the text with the

 (Service Exception) symbol. If a Navy exception is noted, it does not apply to the Marine Corps unless specifically noted.

1-3.3 **Implementation.** Implementation of an effective mass notification system will require the coordinated efforts of engineering, communications, and security personnel. Fire protection engineering personnel are needed for the successful implementation of this UFC because they bring a special expertise in life safety evaluations, building evacuation systems, and the design of public notification systems. Coordination with communications personnel is needed because every mass notification system will require the use of base communication systems. Security personnel are ultimately responsible for the protection of building occupants, and will be the primary users of a mass notification system.

1-3.4 **Responsibilities.** This UFC does not designate which organizations are responsible for funding, operation, or maintenance of mass notification systems installed in accordance with UFC 4-010-01; each DOD component must assign those responsibilities.

1-4 **REFERENCES.** See Appendix A.

1-5 **AUTHORITY.** This UFC implements the National Technology Transfer and Advancement Act, Public Law 104-113, March 7, 1996, section 12(d)(3).

## 1-6 **GENERAL**

1-6.1 **DOD Requirements.** DOD is required to provide mass notification for new and existing buildings when required by UFC 4-010-01. Beginning with the fiscal year 2004 construction program, mass notification is required in all new inhabited buildings, including new primary gathering buildings and new billeting. Mass notification is required in existing primary gathering buildings and existing billeting when implementing a project exceeding the replacement cost threshold specified in UFC 4-010-01. Mass notification is recommended in other existing inhabited buildings when implementing a project exceeding the replacement cost threshold. Mass notification is required for leased buildings, building additions, and expeditionary and temporary structures (see UFC 4-010-01).

1-6.2 **Base Requirements.** If the base has established an implementation plan for mass notification, select a mass notification system in accordance with that plan. If the base has not established an implementation plan, use the guidance provided in Chapters 2 and 3 to select an appropriate type of mass notification system. For many buildings, this should be an individual building mass notification system that could be later connected to a base-wide control system for mass notification.

1-6.3 **Base Implementation Plan.** Each DOD base or facility should prepare an implementation plan that establishes a comprehensive approach to mass notification that is acceptable to security, communications, and engineering personnel. Elements of an implementation plan should include a needs assessment, requirements definition,



alternatives evaluation, system selection, and implementation schedule. Chapters 2, 3, and 4 provide specific information for many of these elements. The completed implementation plan will serve as a roadmap to address the specific needs and unique circumstances associated with that particular base or facility.

1-6.4 **Conflicts with Other Criteria.** Refer to the authority having jurisdiction for conflict resolution.

1-6.4.1 **Authority Having Jurisdiction.** For this UFC, the authority having jurisdiction is the component office of responsibility (see paragraph 1-3).

1-6.4.2 **Waivers.** The authority having jurisdiction may approve waivers. Requests must include justification, risk analysis, cost comparisons, criteria applied, and other pertinent data. Lack of funds or cost savings do not justify a waiver. Waivers are granted on a case-by-case basis and do not extend to cases with similar circumstances.

## 1-7 **QUALIFICATIONS OF SUPPLIERS AND CONTRACTORS**

1-7.1 **System Integrators and Contractors.** Use system integrators and contractors that are able to demonstrate a full knowledge and understanding of systems used for mass notification, and that have factory-trained personnel to perform system design, installation, testing, training, and maintenance.

1-7.2 **Mass Notification System Component Products and Manufacturers.** Only accept products from manufacturers that can meet the design criteria of this UFC and can demonstrate 5 years of experience in producing products similar to those required for mass notification.

1-7.3 **Performance and Acceptance Testing.** Upon completion of installation, the contractor must complete performance testing of the mass notification system for compliance with this UFC, as well as any additional established criteria, and document successful completion using test procedures and forms previously accepted by the authority having jurisdiction for the installation. Upon successful completion of performance testing, the contractor must complete a witnessed acceptance test of the mass notification system for compliance with this UFC, as well as any additional established criteria, and document successful completion using test procedures and forms previously accepted by the authority having jurisdiction for the installation. Performance testing will be spot-checked and acceptance testing will be witnessed by local representatives of the authority having jurisdiction and by designees of those responsible for the operation and maintenance of the system.

1-7.4 **Installation Records.** Upon the successful completion of acceptance testing and resolution of any resulting punch list items, the contractor must provide a complete set of record drawings and operations and maintenance manuals for the mass notification system. The number of electronic and paper copies of record drawings and operations and maintenance manuals provided, as well as the format and content, must be in compliance with records requirements established by the authority having

jurisdiction for the installation. As a minimum, record drawings and operations and maintenance manuals must provide information in enough detail to support the training of maintenance personnel and support troubleshooting, preventive maintenance, and corrective maintenance. Specific record requirements will depend on the specific products being used.

## 1-8 **QUALIFICATIONS OF MAINTENANCE PERSONNEL**

1-8.1 **Inspection, Testing, and Maintenance Tasks.** Only personnel trained and qualified in the maintenance and repair of mass notification systems will perform inspection, testing, and maintenance tasks. Most types of mass notification systems use technology commonly found in fire alarm systems or outdoor voice and siren warning systems (hereafter referred to as Giant Voice systems), and similar maintenance skills are needed. Unless specific manufacturer training is available for a mass notification system, personnel shall be considered qualified if they have achieved a National Institute for Certification in Engineering Technologies (NICET) Level III or Underwriters Laboratories, Inc. (UL) certification level. Tasks must be performed according to manufacturers' instructions. Certain jurisdictions may require varying levels of continuing education to maintain recognized qualifications. Oversea locations should contact their command fire protection engineering office for guidance on appropriate qualifications.

1-8.2 **Other Inspections.** This UFC lists inspection tasks that should be performed during regularly scheduled facility inspections. Fire prevention, safety, and maintenance personnel, as well as other individuals familiar with mass notification system operations, should perform these inspection tasks.

1-8.3 **Maintenance Records.** Each installation must maintain a permanent record of completed inspection, testing, and maintenance tasks in accordance with each agency's program for record keeping of recurring facility maintenance. Records may be hard copy or electronic. Where there are no agency-wide programs, records should be developed locally. Records must be maintained for every facility and include, as a minimum, each task, date scheduled, date completed, and name of the person completing the task.

## CHAPTER 2

### OVERVIEW OF MASS NOTIFICATION SYSTEMS

2-1 **SCOPE.** This chapter summarizes relevant DOD antiterrorism construction standards, includes important definitions, and provides an overview of mass notification systems. Typical implementation approaches are also described to clarify how a mass notification system could be implemented.

#### 2-2 DOD ANTITERRORISM STANDARDS

2-2.1 **Introduction.** UFC 4-010-01 specifies when mass notification capability must be provided.

2-2.2 **Definitions.** Refer to UFC 4-010-01 for the official definitions of terms used in defining mass notification requirements. Additional information is provided in this UFC on some of those terms.

2-2.2.1 **Mass Notification.** Mass notification is the capability to provide real-time information to all building occupants or personnel in the immediate vicinity of a building during emergency situations. To reduce the risk of mass casualties, there must be a timely means to notify building occupants of threats and what should be done in response to those threats. Pre-recorded and live voice emergency messages are required by this UFC to provide this capability.

2-2.2.2 **Inhabited Buildings.** Mass notification capability is required for new inhabited buildings. Most, but not all, DOD buildings will meet the criteria to be considered an inhabited building.

2-2.2.3 **Primary Gathering Buildings.** Mass notification capability is required for new primary gathering buildings, and for existing buildings with projects meeting the replacement cost threshold specified in UFC 4-010-01. Primary gathering buildings are inhabited buildings that are occupied by larger numbers of DOD personnel.

2-2.2.4 **Billeting.** Mass notification capability is required for new billeting buildings, and for existing buildings with projects meeting the replacement cost threshold specified in UFC 4-010-01. Billeting buildings are inhabited buildings that are used for sleeping by unoccupied DOD personnel.

2-2.3 **Applicability.** See paragraph 1-3.2.

#### 2-3 TYPES OF MASS NOTIFICATION SYSTEMS

##### 2-3.1 Individual Building System

2-3.1.1 **Autonomous Control Unit.** An autonomous control unit is used to monitor and control the notification appliance network and provide consoles for local operation. Using a console, personnel in the building can initiate delivery of pre-recorded voice

messages, provide live voice messages and instructions, and initiate visual strobe and (optional) textual message notification appliances. The autonomous control unit will temporarily deactivate audible fire alarm notification appliances while delivering voice messages to ensure they are intelligible.

If a base-wide control system for mass notification (optional) is provided on the base, the autonomous control unit also communicates with the central control unit of the base-wide system to provide status information and receive commands and messages.

**2-3.1.2 Notification Appliance Network.** A notification appliance network consists of a set of audio speakers located to provide intelligible instructions at all locations in and around the building. Strobes are also provided to alert hearing-impaired occupants.

**Note:** Intelligibility is defined in National Fire Protection Association (NFPA) 72, *National Fire Alarm Code*. It should be measured in accordance with International Electrochemical Commission (IEC) 60849, *Sound Systems for Emergency Purposes*, and IEC 60268, Part 16, *The Objective Rating of Speech Intelligibility by Speech Transmission Index*.

**2-3.2 Giant Voice System.** This system is also known as Big Voice. The Giant Voice system is typically installed as a base-wide system to provide a siren signal and pre-recorded and live voice messages. It is most useful for providing mass notification for personnel in outdoor areas, expeditionary structures, and temporary buildings. It is generally not suitable for mass notification to personnel in permanent structures because of the difficulty in achieving acceptable intelligibility of voice messages.

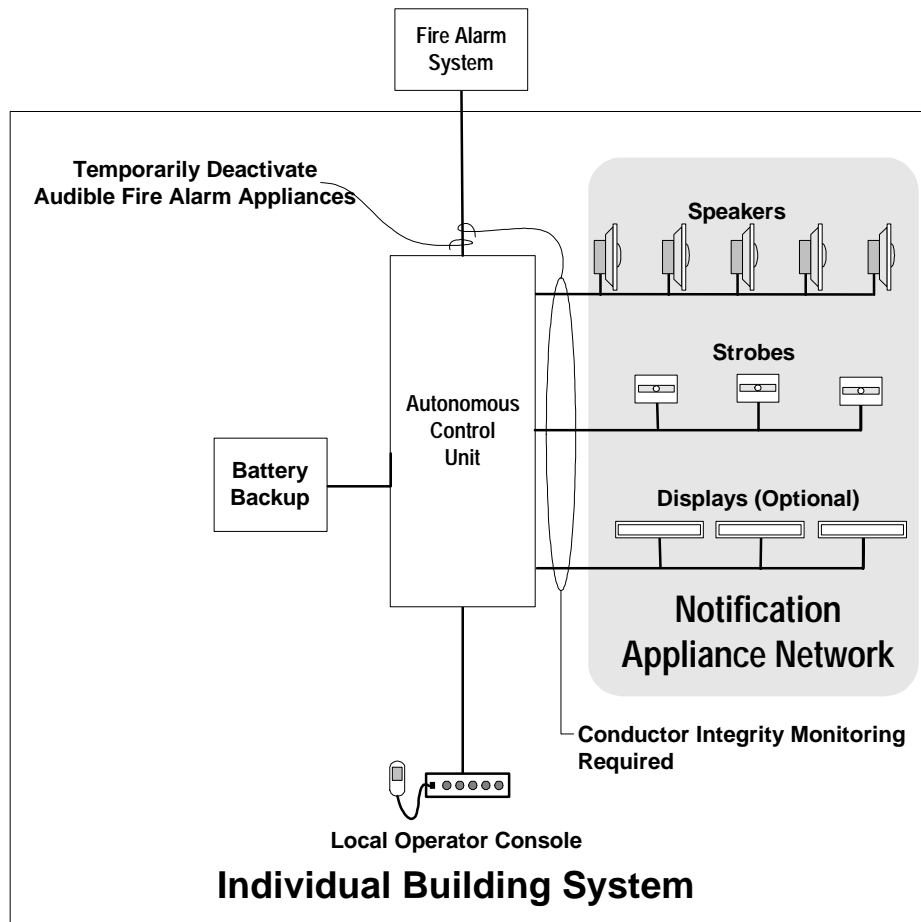
If a base-wide control system for mass notification (optional) is provided on the base, an interface to the Giant Voice system may improve the functionality of both systems.

**2-3.3 Telephone Alerting System.** Telephone alerting systems are independent systems and provide delivery of recorded messages over the telephone network.

## **2-4 IMPLEMENTATION OF MASS NOTIFICATION SYSTEMS**

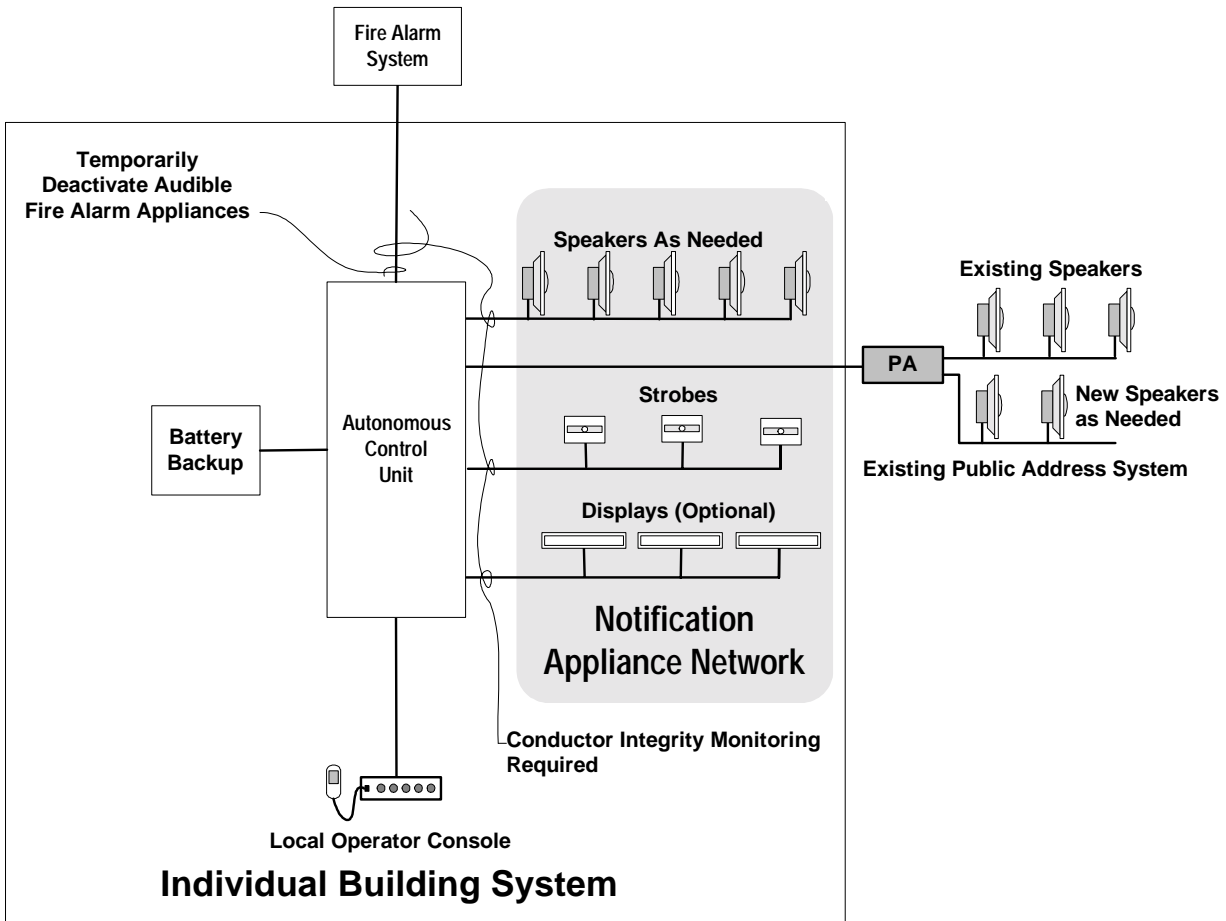
### **2-4.1 Implementation of Individual Building Mass Notification System**

**2-4.1.1 Introduction.** Installing an individual building mass notification system satisfies UFC 4-010-01 requirements for a single building or facility (either new construction or an existing building). Mass notification on a base can then be implemented incrementally as buildings or facilities are constructed, modified, or renovated. Adding a base-wide control system for mass notification (see paragraph 2-5) can be accomplished at any point in the process. Figure 2-1 shows the logical block diagram for an individual building mass notification system.

**Figure 2-1. Individual Building Mass Notification System**

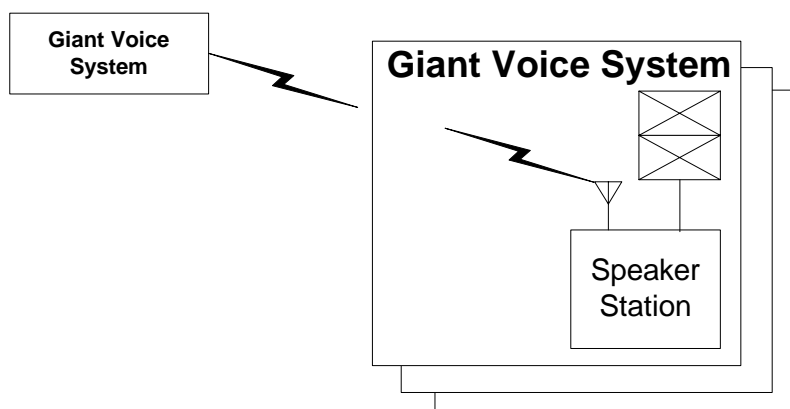
**2-4.1.2 Use of Existing Public Address or Intercommunication Systems.** Figure 2-2 provides the logical block diagram showing the use of an existing public address or intercommunication system for mass notification. (Note that the term “public address system” is subsequently used in this UFC to mean both public address and intercommunication systems.) Use of the speakers and other components in the existing public address system may be appropriate in buildings in which the installation of a new speaker system is not cost-effective. If this implementation approach is taken, an individual building mass notification system with the features described in this UFC must be interfaced with an existing public address system. The existing public address system must be tested to demonstrate acceptable intelligibility of the voice messages, and additional speakers added as necessary. Features must be provided in the public address system to ensure that emergency messages have priority over non-emergency messages.

Figure 2-2. Use of Existing Public Address System



2-4.2 **Implementation of Giant Voice System.** The Giant Voice system is typically installed as a wide-area system to provide siren signal, pre-recorded, and live voice messages. It is most useful for providing mass notification for personnel in outdoor areas, expeditionary structures, and temporary buildings. Giant Voice is not usually suitable for most permanent inhabited buildings, and must not be used in lieu of an individual building mass notification system. If an optional base-wide control system for mass notification is installed (see paragraph 2-5), it should be interfaced to a new or existing Giant Voice system. Figure 2-3 shows the logical block diagram for a Giant Voice system.

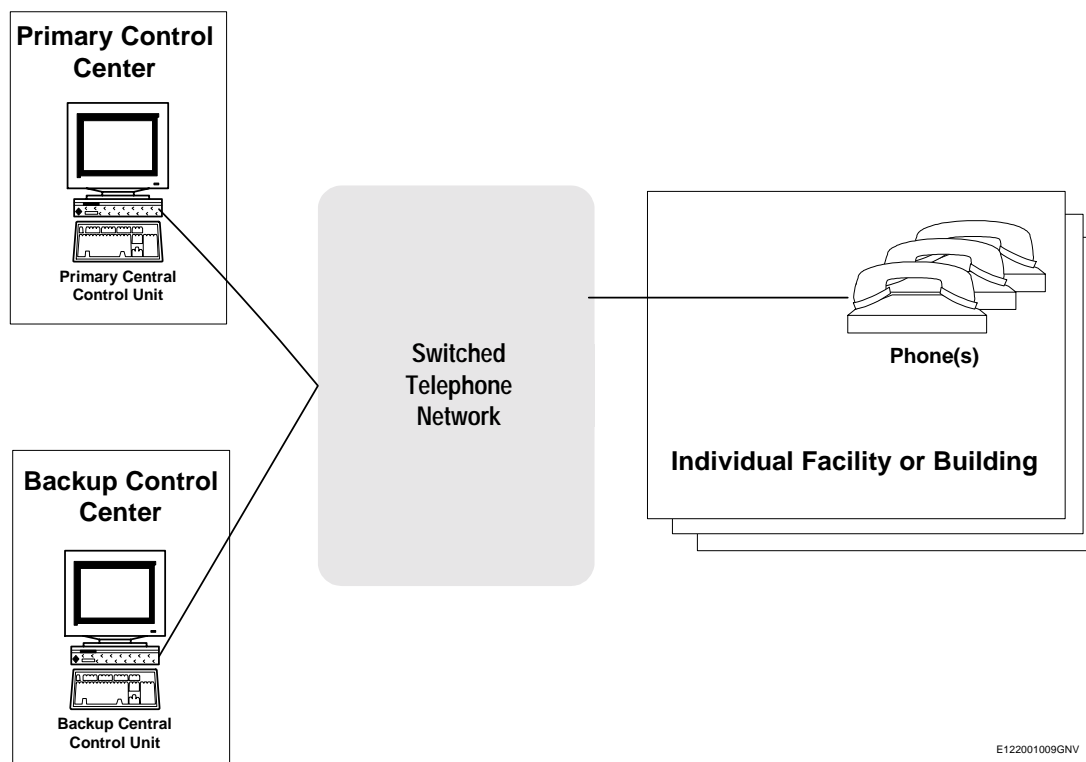
Figure 2-3. Giant Voice System



### 2-4.3 Implementation of Telephone Alerting Mass Notification System

**2-4.3.1 Introduction.** Telephone alerting systems are independent systems that may be used to provide mass notification to buildings and facilities. These systems are useful for buildings in which notification to all building occupants may not be appropriate (e.g., child development centers, hospital patient areas, brigs). They also might be appropriate for small facilities and military family housing where mass notification is not required by UFC 4-010-01. Use of telephone alerting systems, however, should be considered carefully before installing in most buildings and facilities requiring mass notification because there are many limitations in delivering notification messages by telephone. Figure 2-4 shows the logical block diagram of a telephone alerting system. Use of the base's switched telephone network is the preferred communications method to minimize concerns about the system's reliability and vulnerability.

Figure 2-4. Telephone Alerting System



2-4.3.2 **Outsourcing.** Telephone alerting system services are sometimes outsourced to reduce the operation and maintenance burden on the base; however, outsourcing increases reliance on systems not under direct control of the facility being serviced and could impact the reliability or vulnerability of the mass notification capability.

2-5 **BASE-WIDE CONTROL SYSTEMS.** A base-wide control system is not required to comply with UFC 4-010-01 requirements for mass notification but is an optional system that can enhance force protection capabilities. (Note: Base-wide control is an optional feature.) A base-wide control system includes one or more central control units and a communications network.

2-5.1 **Central Control Unit.** The central control unit monitors the individual building systems. The central control unit is capable of remotely activating all functions of the individual building systems, including delivery of pre-recorded voice messages. It is capable of activating concurrent pre-recorded voice messages to multiple individual building systems, including one message for the affected building and a separate message for nearby unaffected buildings. It is capable of delivering live and recorded voice messages originated at the central control unit. It is capable of patching through live voice to individual building systems, including those originated on radio by mobile security forces. A base-wide control system should provide redundant (primary and backup) central control units.

2-5.2 **Communications Network.** The communications network provides two-way



communications between central control units and autonomous control units (in individual building systems), and should include redundant (primary and backup) communication links.

2-6 **IMPLEMENTATION OF BASE-WIDE CONTROL SYSTEMS FOR MASS NOTIFICATION.** Implementing a base-wide mass notification system is not required but offers the advantages of central monitoring, control, and message delivery. An implementation plan should be the first step in preparing for a base-wide system. The implementation plan provides a roadmap to the final planned system, and determines base-specific criteria for evaluating and selecting contractors, manufacturers, and products. Paragraph 1-6.3 provides more information on developing an implementation plan. Figure 2-5 shows the logical block diagram for the implementation of a base-wide control system. Figure 2-6 shows the logical block diagram when Giant Voice is interfaced to a base-wide control system for mass notification.

**Figure 2-5. Base-wide Control System for Mass Notification**

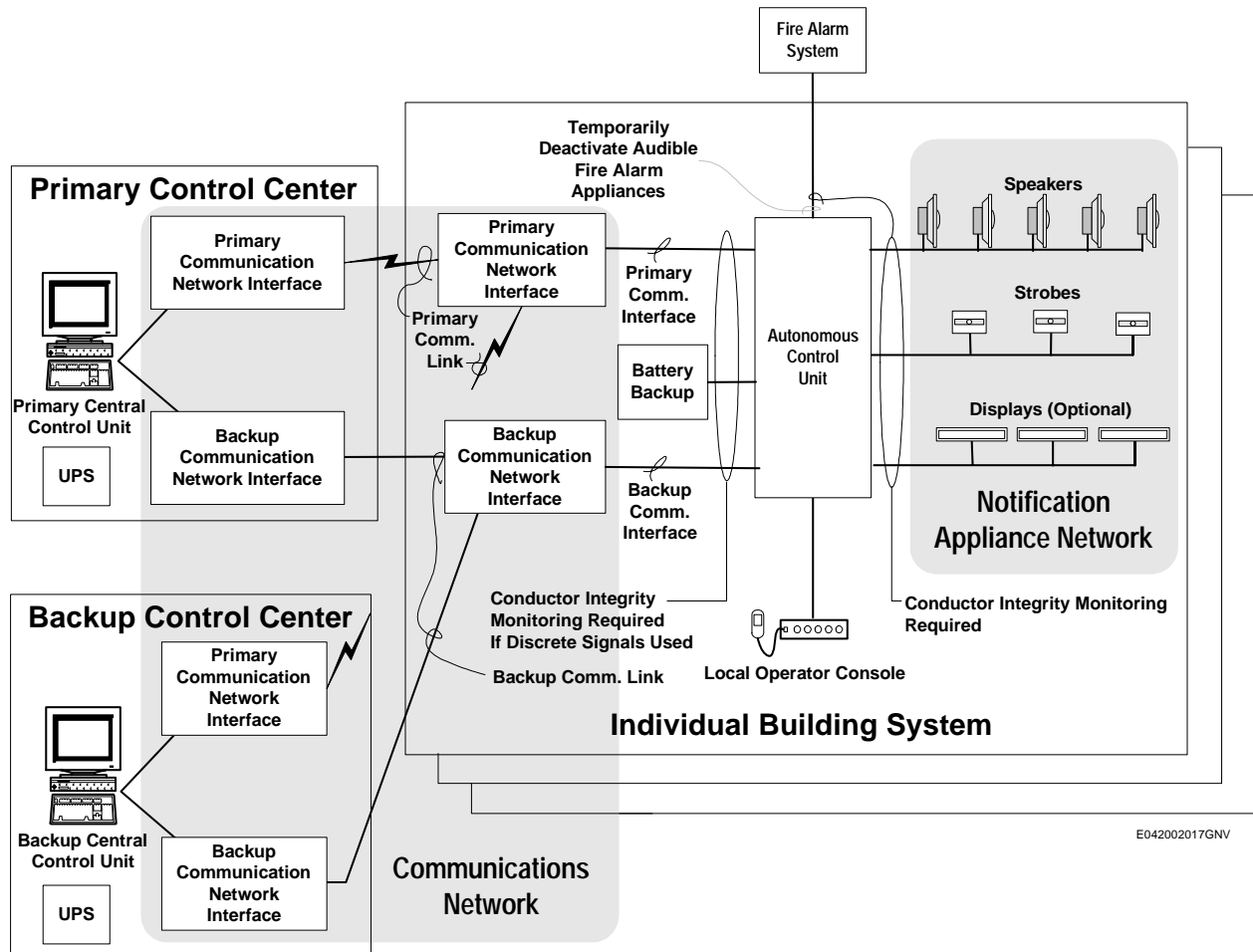
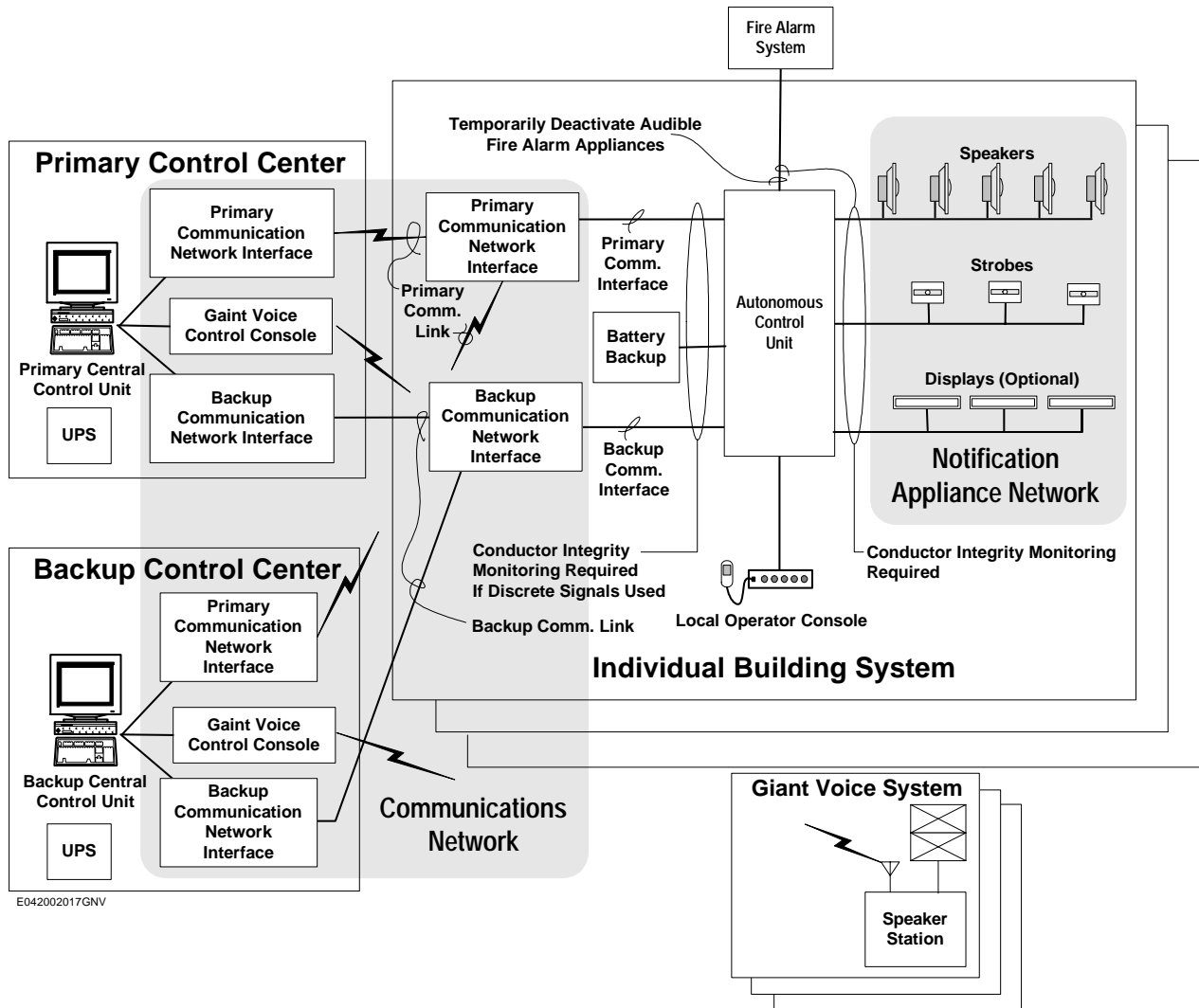


Figure 2-6. Giant Voice and Base-wide Control System for Mass Notification



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## CHAPTER 3

## IMPLEMENTATION APPROACHES BASED ON BUILDING TYPE

3-1 **INTRODUCTION.** The approach used to implement mass notification should vary with the type of building and its use. This chapter provides examples of appropriate types of mass notification systems for many buildings used by DOD components.

3-2 **CLASSIFICATION OF BUILDINGS.** Various alternatives are available for classifying buildings; e.g., the *Historical Air Force Construction Cost Handbook* identifies 123 separate facility types, and Department of the Army Pamphlet (DA Pam) 415-28, *Guide to Army Real Property Category Codes*, provides another system. UFC 4-010-01 identifies a number of building and structure types and uses, with three building types (inhabited, billeting, and primary gathering) of predominant importance. NFPA 101, *Life Safety Code*, identifies 12 basic facility classifications based on occupancy type. These NFPA occupancy types are used in this chapter to illustrate appropriate mass notification systems.

3-3 **IMPLEMENTATION EXAMPLES.** Table 3-1 provides examples of mass notification systems appropriate for implementation in buildings as classified by the NFPA 101 occupancy type. For consistency with DOD terminology, "Facility Type" is used in Table 3-1 as a heading in place of "Occupancy Type."

**Table 3-1. Mass Notification System Implementation Examples**

Facility Type	Common Building Names	Implementation Considerations
<ul style="list-style-type: none"> <li>• Assembly</li> <li>• Educational</li> <li>• Health care (except in non-ambulatory patient treatment areas)</li> <li>• Ambulatory health care</li> </ul>	<ul style="list-style-type: none"> <li>• Theaters, gymnasiums, conference centers, clubs</li> <li>• Schools, school-age facilities, youth centers</li> <li>• Hospital public areas, waiting rooms, staff offices, support areas</li> <li>• Medical and dental clinics</li> </ul>	<ul style="list-style-type: none"> <li>• Use individual building systems.</li> <li>• Providing acceptable intelligibility in all areas of the building covered by the mass notification system is a major design consideration.</li> <li>• Consider interfacing to existing building public address systems if available.</li> </ul>
<ul style="list-style-type: none"> <li>• Day care</li> <li>• Health care (non-ambulatory patient treatment areas)</li> <li>• Detention and correctional</li> </ul>	<ul style="list-style-type: none"> <li>• Child development center</li> <li>• Hospital patient rooms, surgery suites, out-patient surgery clinics</li> <li>• Brig, prison</li> </ul>	<ul style="list-style-type: none"> <li>• Consider a telephone alerting system to notify only administrators in lieu of an individual building system.</li> <li>• Use of an individual building system with limited speaker placements in the building would also be appropriate</li> </ul>

Residential occupancy	<ul style="list-style-type: none"> <li>• Dormitories</li> <li>• Bachelor or unaccompanied officer and enlisted quarters</li> <li>• Temporary lodging facilities, lodges, billeting</li> <li>• Military family housing buildings with 13 or more units, apartment buildings</li> </ul>	<ul style="list-style-type: none"> <li>• Use individual building systems.</li> <li>• Providing acceptable intelligibility everywhere in the building is a major design consideration since these types of buildings are designed to prevent entry of outside noise.</li> <li>• Installation of speakers in each room may be necessary.</li> <li>• Control of individual building systems by a base-wide control system may be necessary to achieve timely notification outside of normal working hours.</li> <li>• Telephone alerting system may be appropriate for small military family housing buildings.</li> </ul>
<ul style="list-style-type: none"> <li>• Mercantile</li> <li>• Business</li> </ul>	<ul style="list-style-type: none"> <li>• Base/post exchange</li> <li>• Commissary</li> <li>• Office buildings</li> <li>• Headquarters buildings</li> </ul>	<ul style="list-style-type: none"> <li>• Use individual building systems.</li> <li>• Providing acceptable intelligibility everywhere in the building is a major design consideration.</li> <li>• Consider interfacing to existing public address systems.</li> </ul>
<ul style="list-style-type: none"> <li>• Industrial</li> <li>• Storage</li> </ul>	<ul style="list-style-type: none"> <li>• Shops</li> <li>• Aircraft hangars (administrative areas)</li> </ul>	<ul style="list-style-type: none"> <li>• Use individual building systems.</li> <li>• Providing acceptable intelligibility everywhere in the building is a major design consideration. Portions of these facilities may be exempt if they have a population density less than that specified in UFC 4-010-01.</li> </ul>

## CHAPTER 4

## SELECTION AND CRITERIA FOR MASS NOTIFICATION SYSTEMS

4-1 **INTRODUCTION.** This chapter provides guidance for selecting a mass notification system and specific criteria for each acceptable type of system.

4-2 **SELECTING A MASS NOTIFICATION SYSTEM**

4-2.1 **Individual Building Mass Notification System.** This system is intended for mass notification in and around a single building. It may be connected into a base-wide control system for mass notification when required by installation or theater commanders. Figure 2-1 provides a block diagram to illustrate required components of an individual building mass notification system.

4-2.1.1 **Notification Appliance Network:**

- Use modular displays and speakers suitable for installation in commercial/industrial applications with consideration of electrically hazardous (classified) location.
- Provide display options capable of satisfying all Uniform Federal Accessibility Standards (UFAS) and Americans with Disabilities Act Accessibility Guidelines (ADAAG).
- Use displays and speakers suitable for the intended climatic and environmental conditions.
- Provide capability for interfacing with an existing public address system, if applicable, in existing buildings.
- Use strobes to alert the hearing-impaired. Care must be taken to meet strobe visibility and synchronization requirements as listed in NFPA 72.
- Use separate strobes from those used for the fire alarm system unless:
  - An existing public address system is being used to provide the mass notification capability, and
  - The mass notification capability being provided is not being installed to meet the requirements of UFC 4-010-01.
- Strobes will be marked using the following criteria:
  - For strobes shared by the mass notification system/fire alarm system, existing strobes marked "FIRE" may remain in use. New strobes are to be unmarked.
  - For strobes used only by the mass notification system, use unmarked strobes.
- Provide textual displays for notification of the emergency for hearing-impaired personnel (optional).
- Provide speakers and installation methods compliant with Director of Central Intelligence Directive (DCID) 1/21, *Manual for Physical Security Standards for Sensitive Compartmented Information Facilities*, for areas classified as sensitive compartmented information facilities (SCIF).

- Design to intelligibility requirements in accordance with NFPA 72. Verification should be accomplished in accordance with IEC 60849.
- Locate notification appliances in accordance with NFPA 72 appliance placement standards.

4-2.1.2 **Autonomous Control Unit.** Provide autonomous control units in each facility or building with the following general features:

- Able to function independently upon failure of a base-wide control system (if provided).
- Independent of fire alarm system.
- Ability to temporarily deactivate fire alarm audible notification appliances while delivering voice messages.
- Conductor integrity monitoring for strobe, display, temporary deactivation of fire alarm audible notification appliances, and speaker wiring.
- Secure local operator console for initiating recorded messages, strobes, and displays; and for delivering live voice messages.
- Capacity for at least four prerecorded messages.
- Ability to deliver messages quickly.
- Ability to automatically repeat prerecorded messages until terminated.
- Secure microphone for delivering live voice messages.
- Adequate discrete outputs to temporarily deactivate fire alarm audible notification appliances, initiate optional textual displays, and initiate/synchronize strobes.
- Complete set of self-diagnostics for the controller and appliance network.
- Local diagnostic information display.
- Local diagnostic information and system event log file.

4-2.1.3 **System-Wide Features:**

- Has power supplies capable of accepting 110 to 240 volts, alternating current (VAC), 50 to 60 hertz (Hz).
- Provides uninterruptible power supply (UPS) or secondary (standby) power for all loads.
- Provides conformance to applicable sections of NFPA 72.
- Uses only commercial off the shelf (COTS) components.
- Provides fault-tolerance with major component redundancy.

4-2.1.4 **Communication Network.** Provide autonomous control units in each facility or building with the following communications features:

- Available interface for communication with (optional) base-wide control system for mass notification.
- Ability to relay local diagnostics information to central control unit(s).
- Available backup communication link.

4-2.1.5 **Visible Notification Appliances.** The mass notification system must provide visible notification appliances in accordance with UFAS and ADAAG requirements, and comply with the requirements of NFPA 72. The visible notification appliances used for

the mass notification system must be separate from those used for fire alarm systems. Separate visible notification appliances are not required when the mass notification capability being provided is not required by UFC 4-010-01 and an existing public address system in the building is being used to provide the mass notification capability.


#### 4-2.1.6 **Deactivation of the Fire Alarm Audible Notification Appliance.**


4-2.1.6.1 **Application.** The mass notification system will provide the capability to temporarily deactivate the building fire alarm system's audible notification appliances. This is intended to allow the mass notification system to provide intelligible voice commands inside an individual building without unreasonably exposing building occupants to the risk of fire. This UFC recognizes that this requirement deviates from the requirements of NFPA 72. This UFC authorizes this deviation from the NFPA 72 requirements for alarm signal deactivation to permit an individual building mass notification system to deactivate the audible notification appliances of that building's fire alarm system for the minimum time period necessary to transmit a voice message. The NFPA 72 "5 minute" requirement before permitting the deactivation of an alarm does not apply to this temporary deactivation by the mass notification system.

#### 4-2.1.6.2 **Required Features.**

4-2.1.6.2.1 The deactivation function must be designed to function only when both the fire alarm panel is in an alarm condition and a voice message is to be transmitted by the mass notification system.

4-2.1.6.2.2 Only the fire alarm system audible notification appliances shall be deactivated. All other features of the fire alarm system, including the operation of visual notification devices and the transmission of signals to the fire department, shall remain unaffected.

4-2.1.6.2.3 Deactivation of the fire alarm audible notification appliances must cause a supervisory signal in the fire alarm system.  The Army requires that this supervisory signal be separate from other fire alarm system supervisory signals, be annunciated at the building's fire alarm control panel and any remote fire alarm annunciators, and be transmitted to the fire department. The visual annunciation of the separate supervisory signal shall be distinctly labeled or otherwise clearly identified.

4-2.1.6.2.4  The Army requires that a readily accessible means shall be provided for use by emergency response forces to manually override the deactivation function and permit the fire alarm audible notification appliances to operate independently of the mass notification system. Use of the manual override feature must cause a supervisory signal in the fire alarm system.

#### 4-2.2 **Giant Voice System**

4-2.2.1 **Application.** This system can be installed as part of a one-step base-wide

implementation or as a separate implementation that links a base-wide control system for mass notification to an existing Giant Voice system. See Figures 2-3 and 2-6 for a logical block diagram of a Giant Voice interface implementation.

#### 4-2.2.2 **Giant Voice Interface Criteria**

##### 4-2.2.2.1 **Communication Network:**

- Use existing Giant Voice backbone communication links.
- Verify that existing communications are secure.

##### 4-2.2.2.2 **System-wide Features:**

- Has power supplies capable of accepting 110 to 240 VAC, 50 to 60 Hz.
- Provides UPS or secondary (standby) power for all loads.
- Provides conformance to applicable sections of NFPA 72.
- Uses only COTS components.
- Fault-tolerant with major component redundancy.
- Easily expandable system.

#### 4-2.3 **Telephone Alerting System**

4-2.3.1 **Application.** Telephone alerting systems are particularly useful for buildings in which notification to all building occupants may not be appropriate (for example, child development centers, hospital patient areas, and brigs). They are also useful for small facilities and military family housing, where mass notification is desired by the base but is not required by UFC 4-010-01. The use of telephone alerting systems should be considered cautiously for other buildings because of the many limitations in delivering notification messages by telephone. See Figure 2-4 for a block diagram of a telephone alerting system.

#### 4-2.3.2 **Telephone Alerting System Criteria**

##### 4-2.3.2.1 **Communication Network:**

- Provide adequate capacity for delivering messages during a worst-case scenario within an acceptable time period.
- Evaluate reliability and vulnerability of portions of the network not under direct control of the base.
- Verify compatibility with the existing phone system.
- Verify that the phone system provides adequate reliability, redundancy, and security.

4-2.3.2.2 **Central Control Unit.** Provide a secure, personal-computer-based central control unit with the following features:

- Can be operated and displayed independently of the base fire alarm system.
- Capable of concurrent delivery of two recorded messages: one for the threatened facilities or buildings and one for nearby facilities or buildings.



- Means of targeting messages to specific facilities or to all facilities in specific geographic areas.
- Secure method for easily modifying recorded messages.
- Complete set of system-wide self-diagnostics.
- Easy-to-use diagnostic information displays.
- Historical diagnostic information and system event log files.
- Capable of delivering text pager messages over phone system.
- Capable of delivering faxes over phone system.
- Capable of delivering voice messages over phone system.
- Capable of delivering messages to telecommunications devices for the deaf (TDD) over phone system for hearing-impaired.
- Capable of delivering teletype messages using teletypewriter (TTY) protocol.

#### 4-2.3.2.3 **System-wide Features:**

- Has power supplies capable of accepting 110 to 240 VAC, 50 to 60 Hz.
- Provides UPS or secondary (standby) power for all loads.
- Provides conformance to applicable sections of NFPA 72.
- Uses only COTS components.
- Fault-tolerant with major component redundancy.
- Easily expandable system.
- Provides quick message delivery.

### 4-3 **BASE-WIDE CONTROL SYSTEM FOR MASS NOTIFICATION**

4-3.1 **Implementation.** This control system can be installed as part of a one-step base-wide implementation of mass notification capability or as a separate implementation that interfaces the control system to previously installed individual building mass notification systems. See Figures 2-5 and 2-6 for logical block diagrams of a base-wide control system for mass notification.

#### 4-3.2 **Base-wide System Criteria**

##### 4-3.2.1 **Communication Network:**

- Has a primary (wireless preferred) communication backbone that provides secure voice and data communications.
- Has independent backup communication links (required if primary link is not wireless).
- Uses outdoor components suitable for the intended environment.

4-3.2.2 **Central Control Unit.** Provide a secure, personal-computer-based central control unit with the following features:

- Can be operated and displayed independently of the base fire alarm system.
- Capable of selecting and initiating recorded messages stored in autonomous control units (in individual building systems).

- Capable of concurrent delivery of two recorded messages: one for the threatened facilities or buildings and one for nearby facilities or buildings.
- A means of targeting messages to specific facilities or to all facilities in specific geographic areas.
- Capable of providing live voice messaging to any facility or building.
- Capable of interfacing to a Giant Voice system.
- Secure method for easily modifying recorded messages.
- An available backup central control unit.
- Provides roving security forces and incident commander with direct access to base-wide control system central operators, and patching into individual building mass notification systems.
- Complete set of system-wide self-diagnostics.
- Easy-to-use diagnostic information displays.
- Historical diagnostic information and system event log files.

#### 4-3.2.3 **System-wide Features:**

- Has power supplies capable of accepting 110 to 240 VAC, 50 to 60 Hz.
- Provides UPS or secondary (standby) power for all loads.
- Provides conformance to applicable sections of NFPA 72.
- Uses only COTS components.
- Fault-tolerant with major component redundancy.
- Easily expandable system.

## CHAPTER 5

## MAINTENANCE CRITERIA

5-1 **INTRODUCTION.** This chapter was developed on the basis of recommendations from manufacturers of mass notification systems, as well as experience with similar computer-based systems.

Maintenance requirements established for each mass notification system must consider the manufacturers' maintenance recommendations and applicable DOD maintenance requirements.

5-2 **INDIVIDUAL BUILDING MASS NOTIFICATION SYSTEM.** See UFC 3-600-02, *Operations and Maintenance: Inspection, Testing, and Maintenance of Fire Protection Systems*, Paragraph 2-2.2, "Fire Detection and Alarm Systems," for applicable guidance on inspection, testing, and maintenance of engineered protection features in DOD facilities.

5-3 **GIANT VOICE MASS NOTIFICATION SYSTEM.** Table 5-1 provides maintenance information for the Giant Voice system when interfaced or used as a mass notification system.

**Table 5-1. Giant Voice System Maintenance**

Frequency	Component	Tasks
Weekly	Central control console	Verify no diagnostic failures indicated.
Monthly	Wireless transceivers	Perform silent activation of entire system.
	Total system functionality	<ul style="list-style-type: none"> <li>• Perform a test system activation for a particular zone.</li> <li>• Verify field components perform as expected.</li> </ul>
Quarterly	Central control unit, UPS	<ul style="list-style-type: none"> <li>• Verify that system will operate in the absence of line power; discontinue line power to system and verify functionality.</li> <li>• Test UPS. See AFPAM 32-1186, <i>Valve-Regulated Lead-Acid Batteries for Stationary Applications</i>, and NFPA 70B, <i>Recommended Practice for Electrical Equipment Maintenance</i>.</li> </ul>

Every 6 months	Field components	<ul style="list-style-type: none"> <li>• Perform a visual inspection of all components. Verify enclosure integrity not compromised.</li> <li>• Perform a visual inspection of antenna. Verify solid connection and no corrosion.</li> <li>• Perform a visual inspection of transceivers. Verify proper operation.</li> <li>• Generate a conductor integrity monitor alarm. Verify alarm status on central console.</li> <li>• Disconnect AC power. Verify AC power failure alarm status on central console.</li> <li>• Disconnect AC power. Verify battery voltage under load.</li> </ul>
Yearly	Wireless signals	Check forward/reflected radio power.

5-4 **TELEPHONE ALERTING SYSTEM.** Table 5-2 provides maintenance information for the telephone alerting system when used for mass notification.

**Table 5-2. Telephone Alerting System Maintenance**

Frequency	Component	Tasks
Weekly	Central control unit, diagnostic log files	<ul style="list-style-type: none"> <li>• Review event log file; verify correct events logged.</li> <li>• Review system diagnostic log file; correct deficiencies noted in log file.</li> </ul>
	Central control unit, hard drive	<ul style="list-style-type: none"> <li>• Delete unneeded log files.</li> <li>• Delete unneeded error files.</li> <li>• Verify sufficient free disk space available.</li> </ul>
	System – Functional test	Send out an alert to a small set of pre-designated receiving devices and confirm receipt.
	System – Security	If remote control software is loaded onto system, verify that it is disabled to prevent unauthorized system access.

Monthly	System – Functional test	Send out an alert to a diverse set of pre-designated receiving devices and confirm receipt. Include at least one of each type of receiving device.
	Central control unit, reset	Power down the central control unit computer and restart.
Quarterly	System – Software backups	Make a full system software backup. Rotate backups based on accepted practice at site.
	Central control unit, computer	<ul style="list-style-type: none"> <li>• Verify proper operation of computer.</li> <li>• Defragment hard drive.</li> <li>• Verify unobstructed flow of cooling air. Clean filters, remove dust buildup on cooling fans, cooling fins, and air intake vents.</li> </ul>
	Central control unit, UPS	<ul style="list-style-type: none"> <li>• Verify that system will operate in the absence of line power; discontinue line power to system and verify functionality.</li> <li>• Test UPS. See AFPAM 32-1186 and NFPA 70B.</li> </ul>
Yearly	System – Software backups	Test the current software backup system by installing the system backup.
	Central control unit, operation	<ul style="list-style-type: none"> <li>• Verify content of pre-recorded messages.</li> <li>• Verify activation of correct pre-recorded message on the basis of selected event.</li> <li>• Verify activation of correct pre-recorded message on the basis of targeted area.</li> <li>• Verify central control unit security mechanism is functional.</li> </ul>

5-5 **BASE-WIDE CONTROL SYSTEM.** Tables 5-3 and 5-4 provide maintenance information for the central control unit and communications network when an optional base-wide control system for mass notification is installed.

**Table 5-3. Central Control Unit Maintenance**

Frequency	Component	Tasks
Weekly	Central control unit, diagnostic log files	<ul style="list-style-type: none"> <li>• Review event log file; verify correct events logged.</li> <li>• Review system diagnostic log file; correct deficiencies noted in log file.</li> </ul>
	Central control unit, hard drive	<ul style="list-style-type: none"> <li>• Delete unneeded log files.</li> <li>• Delete unneeded error files.</li> <li>• Verify sufficient free disk space available.</li> </ul>
	System – Functional test	Send out an alert to a small set of pre-designated receiving devices and confirm receipt.
	System – Security	If remote control software is loaded onto system, verify that it is disabled to prevent unauthorized system access.
Monthly	System – Functional test	Send out an alert to a diverse set of pre-designated receiving devices and confirm receipt. Include at least one of each type of receiving device.
	Central control unit, reset	Power down the central control unit computer and restart.
Quarterly	System – Software backups	Make a full system software backup. Rotate backups based on accepted practice at site.
	Central control unit, computer	<ul style="list-style-type: none"> <li>• Verify proper operation of computer.</li> <li>• Defragment hard drive.</li> <li>• Verify unobstructed flow of cooling air. Clean filters, remove dust buildup on cooling fans, cooling fins, and air intake vents.</li> </ul>
	Central control unit, UPS	<ul style="list-style-type: none"> <li>• Verify that system will operate in the absence of line power; discontinue line power to system and verify functionality.</li> <li>• Test UPS. See AFPAM 32-1186 and NFPA 70B.</li> </ul>

Yearly	System – Software backups	Test the current software backup system by installing the system backup.
	Central control unit, operation	<ul style="list-style-type: none"><li>• Verify content of pre-recorded messages.</li><li>• Verify activation of correct pre-recorded message base on selected event.</li><li>• Verify activation of correct pre-recorded message on the basis of targeted area.</li><li>• Verify central control unit security mechanism functional.</li></ul>

**Table 5-4. Communications Network Maintenance**

Frequency	Component	Tasks
Weekly	Central control console	Verify no diagnostic failures indicated.
Monthly	Wireless transceivers	Perform silent activation of entire system.
	Total system functionality	<ul style="list-style-type: none"> <li>• Perform test system activation for a particular zone.</li> <li>• Verify field components perform as expected.</li> </ul>
Quarterly	Central control unit, UPS	<ul style="list-style-type: none"> <li>• Verify that system will operate in the absence of line power; discontinue line power to system and verify functionality.</li> <li>• Test UPS. See AFPAM 32-1186 and NFPA 70B.</li> </ul>
Every 6 months	Field components	<ul style="list-style-type: none"> <li>• Perform a visual inspection of all components. Verify enclosure integrity not compromised.</li> <li>• Perform a visual inspection of antenna. Verify solid connection and no corrosion.</li> <li>• Perform a visual inspection of transceivers. Verify proper operation.</li> <li>• Generate a conductor integrity monitor alarm. Verify alarm status on central console.</li> <li>• Disconnect AC power. Verify AC power failure alarm status on central console.</li> <li>• Disconnect AC power. Verify battery voltage under load.</li> </ul>
Yearly	Wireless signals	Check forward /reflected radio power.



## **GLOSSARY**

### **Acronyms and Abbreviations**

**AC**—alternating current

**ADAAG**—Americans with Disabilities Act Accessibility Guidelines

**AFPAM**—Air Force Pamphlet

**ANSI**—American National Standards Institute

**APCO**—Association of Public Safety Communications Officials

**COTS**—commercial off-the-shelf

**DCID**—Director of Central Intelligence Directive Directorate

**DOD**—Department of Defense

**FSK**—frequency-shift keying

**GIS**—Geographic Information System

**HQ AFCESA/CES**—Air Force Civil Engineer Support Agency, Technical Support Directorate

**HQ DLA-D**—Defense Logistics Agency Director

**HQ DLA-DSS-IP**—Defense Logistics Agency, Support Services

**HQ USACE/CECW-E**—US Army Corps of Engineers, Directorate of Civil Works, Engineering and Construction

**Hz**—Hertz

**IEC**—International Electrotechnical Commission

**IP**—Internet Protocol

**NAVFACENGCOM HQ CODE CHENG**—Naval Facilities Engineering Command, Headquarters Chief Engineer Division

**NFPA**—National Fire Protection Association

**NICET**—National Institute for Certification in Engineering Technologies

**NIMA**—National Imagery and Mapping Agency

**OSD**—Office of the Secretary of Defense

**PA**—public address

**SCIF**—Sensitive, Compartmented Information Facilities

**TDD**—telecommunications device for the deaf

**TTY**—teletypewriter

**UFAS**—Uniform Federal Accessibility Standards

**UFC**—Unified Facilities Criteria

**UL**—Underwriters Laboratories, Inc.

**UPS**—uninterruptible power supply

**VAC**—volts, alternating current

**WAN**—wide area network

## **Terms**

**Contractor**—An entity that executes work in accordance with a contract.

**Giant Voice**—A nickname for the wide-area outdoor siren and voice signaling system often found on military bases. Sometimes this system is called the “Big Voice.”

**Mass Notification System**—A system that provides real-time information to all building occupants or personnel in the immediate vicinity of the building during emergency situations.

**System Integrator**—A contractor that designs, fabricates, installs, starts up, tests, and documents electrical and electronic systems using COTS components manufactured by others. Qualified manufacturers can act as system integrators.

## **APPENDIX A**

### **REFERENCES**

#### **GOVERNMENT PUBLICATIONS:**

1. Federal Government  
<http://www.access-board.gov/adaag/html/adaag.htm> Americans with Disabilities Act Accessibility Guidelines (ADAAG)  
<http://www.access-board.gov/ufas/ufas-html/ufas.htm> Uniform Federal Accessibility Standards (UFAS)  
[http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=104\\_cong\\_public\\_laws&docid=f:publ113.104.pdf](http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=104_cong_public_laws&docid=f:publ113.104.pdf) National Technology Transfer and Advancement Act of 1995 (PL 104-113)
2. Department of Defense  
[http://65.204.17.188//report/doc\\_ufc.html](http://65.204.17.188//report/doc_ufc.html) UFC 3-600-02, Operations and Maintenance: Inspecting, Testing, and Maintenance of Fire Protection Systems  
UFC 3-520-01, Interior Electrical Systems  
UFC 4-010-01, DOD Minimum Antiterrorism Standards for Buildings
3. U.S. Air Force  
<http://www.e-publishing.af.mil/> AFPAM 32-1186, Valve-Regulated Lead-Acid Batteries for Stationary Applications  
HQ AFCESA/CES  
<http://www.afcesa.af.mil/directorate/ces/civil/costengr/Histbook.pdf> Historical Air Force Construction Cost Handbook
4. U.S. Army  
[http://www.army.mil/usapa/epubs/pdf/p415\\_28.pdf](http://www.army.mil/usapa/epubs/pdf/p415_28.pdf) DA Pam 415-28, Guide to Army Real Property Category Codes
5. Central Intelligence Agency  
DCID 1/21, Manual for Physical Security Standards for Sensitive Compartmented Information Facilities  
Available at the CIA Electronic Reading Room:  
[http://www.foia.ucia.gov/search\\_options.asp](http://www.foia.ucia.gov/search_options.asp)

6. Occupational Safety and Health  
Administration (OSHA)  
<http://www.access.gpo.gov/nara/cfr/index.html>

29 CFR 1910.165, Employee Alarm  
Systems

**NON-GOVERNMENT PUBLICATIONS:**

7. National Fire Protection Association  
1 Batterymarch Park  
P.O. 9101  
Quincy, MA 02269-9101

NFPA 70, National Electrical Code

NFPA 70B, Recommended Practice for  
Electrical Equipment Maintenance

NFPA 72, National Fire Alarm Code

NFPA 101, Life Safety Code

8. International Electrotechnical  
Commission (IEC)  
3, rue de Varembe  
P.O. Box 131  
CH-1211 Geneva 20 Switzerland

IEC 60849\*- Sound Systems for  
Emergency Purposes

IEC 60268\*, Part 16- The Objective Rating  
of Speech Intelligibility by Speech  
Transmission Index

\* Note: Use the prefix for "CELELEC EN" or "EN"  
instead of "IEC" to obtain the English language  
versions of these documents.

9. American National Standards Institute  
(ANSI)  
1819 L Street NW  
Washington, DC 20036

ANSI S3.2-1989 - Method for Measuring  
the Intelligibility of Speech Over  
Communications Systems

## APPENDIX B

## IMPACT OF TECHNOLOGICAL ADVANCES

## Expected Near-term Mass Notification System Improvements

Recent technological advancements are likely to be adopted by mass notification system manufacturers, thereby increasing functionality, reliability, and security. Table B-1 summarizes the current capabilities and likely improvements.

**Table B-1. Impact of Recent Technological Advancements on Mass Notification Systems**

Function	Current Capability	Expected Improvement
Wireless communications	Many of the mass notification system radios available today are transmitting analog voice and frequency-shift keying (FSK) telemetry. Manufacturers have developed mechanisms for adding security that significantly reduces the chance of unauthorized commands being accepted. However, a person with a receiver tuned to the correct frequency can listen to the analog voice transmissions, and once voice communications are enabled, nearby unauthorized transmitters could be used to distort or override messages.	Adoption of the encrypted Association of Public Safety Communications Officials (APCO) Project 25 Protocol (when fully deployed and more broadly available) will further reduce the chances of unauthorized commands being accepted and will make interception of messages and commands very difficult.
Network communications protocols	Most mass notification system network communications are a combination of analog voice and asynchronous serial data. Backup communications links often are unavailable.	As bases install fiber optic data networks, adoption of isolated fiber optic Ethernet mass notification system networks using Internet Protocol (IP) will significantly improve overall mass notification system security, reliability (redundant links or loops), and functionality. Presently, it is very important that the networks remain completely isolated. Also, current wireless wide area networks (WAN) generally provide inadequate security for mass notification system use.
Unauthorized access security	Most mass notification system products available today depend on locked cabinets and access restrictions to the control center to prevent unauthorized access.	Adoption of strong authentication using available technologies like biometric sensors will ease access for authorized users while making access more difficult for unauthorized personnel.

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User interface	Most mass notification system products use proprietary applications developed specifically for mass notification systems. These applications are expensive to maintain and slow to evolve.	The adoption of browser technology and COTS applications, such as Geographic Information System (GIS), will improve the user interface, reduce development and support costs, and improve system reliability.
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