



USMC requirements for UFC compliant Indoor Systems and full test for verification

The Marine Corps has a requirement to meet Department of Defense (DoD) minimum antiterrorism standards as specified in the Unified Facilities Criteria (UFC) 4-010-01 for the GSA building at 2306 E. Bannister Rd, Kansas City, MO 64131. Mass notification provides real-time information and instructions to people in a building, area, site, or DoD installation using intelligible voice communications along with visible signals, text, and graphics, and possibly including tactile or other communication methods. Compliance with Uniform Federal Accessibility Standards (UFAS) for MNS is required. Visual alarm notification appliances shall be provided inside of buildings for hearing impaired persons when new MNS are installed. Providing visual alarm notification appliances is required for DoD compliance with Executive Order 13347.

SYSTEM REQUIREMENTS

An individual building MNS for renovation projects can include several subsystems:

- Autonomous Control Unit (ACU)
- Local Operating Console (LOC)
- Notification Appliance Network
 - Audible Appliance Network
 - Visual Appliance Network
- Interface with building Fire Alarm Control Panel (FACP)
- Interface with building Public Address (PA) system
- Interface with the Wide Area MNS Giant Voice on the DoD installation

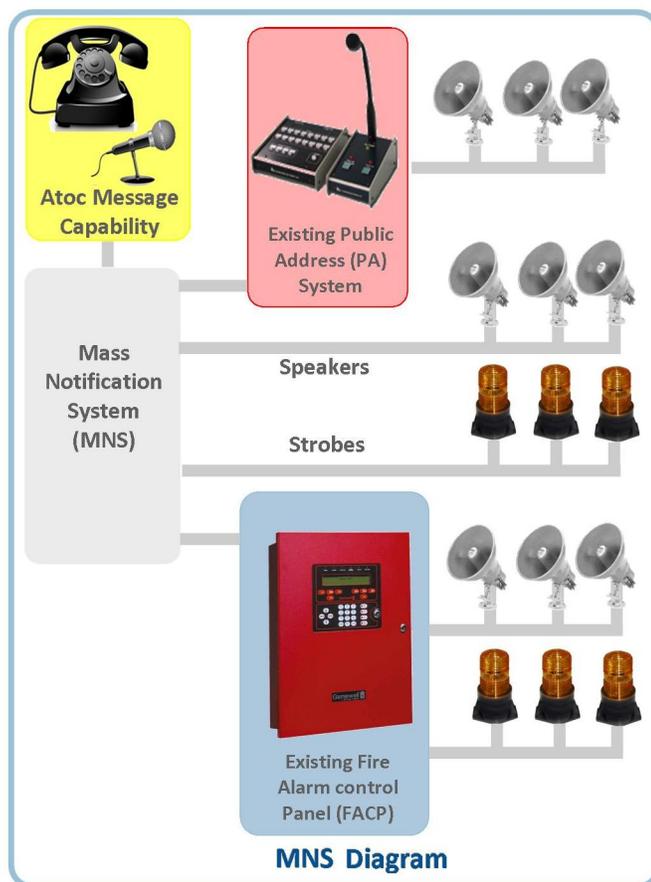
Autonomous Control Unit (ACU)

The ACU is used to monitor and control the notification appliance network. At the ACU, personnel in the building can initiate delivery of pre-recorded voice messages, provide live voice messages and instructions, initiate visual strobe and alphanumeric message notification appliances, and temporarily silence fire alarm system visual and audible notification appliances. The ACU provides the core functionality of the MNS.

The ACU meets the following requirements:

- Meets UL Standard 864 and 2017, and the MNS requirements in NFPA 72.
- Is able to activate strobes.
- Is able to interrupt PA system announcements and to silence building background music while delivering voice messages.

- Is able to accept voice messages from the telephone system.
- Has conductor integrity monitoring for strobes, speaker wiring, and power supplies.
- Has a microphone for delivering live voice messages.
- Interfaces with the FACP to override fire alarm audible and visual notification appliances.
- Provides a single switch or operating mechanism capable of shutting down all HVAC equipment in the facility.
- Provides a complete set of self-diagnostics for the controller and appliance network.
- Has a local diagnostic information display.
- Has a local system event log file.
- **Programming Codes.** All programming codes require passwords to access, update, modify, and maintain the ACU.
- Power Supply Features. The power supply meets NFPA72
- Conforms to applicable sections of NFPA 72.
- Uses only commercial off-the-shelf components.
- Provides surge protection in accordance with UFC 3-520-01.



Local Operating Console (LOC): Not required for this building MNS.

Audible Appliance Network:

Speakers are provided at all locations in the building and are provided around the building at entrances/exits and other outdoor areas (such as courtyards) commonly used by the building occupants. Important design considerations for the audio speakers include intelligibility and audio intensity.

- Intelligibility is defined in NFPA 72. Commercially available test instrumentation is used to verify intelligibility.
- Effective voice communication within buildings is achieved by using a system design with many speakers, each with low audio intensity.

Intelligibility Testing Requirements:

- The contractor shall verify intelligibility by measurement after installation.
- The contractor shall ensure that a Common Intelligibility Scale (CIS) score greater than 0.7 is provided in each area where building occupants can be normally found.

Visual Appliance Network:

Strobes are provided at all locations inside the building to meet Uniform Federal Accessibility Standards (UFAS) accessibility requirements for persons with hearing disabilities. Strobes are provided at the same locations in the building that are required for a fire alarm system notification appliance.

Interfaces with Facility FACP:

The MNS shall provide the capability (either internally as a design feature, or with an approved or listed external controller) to temporarily deactivate the facility's fire alarm system audible and visual notification appliances. This is intended to allow the MNS to provide intelligible voice commands inside an individual building during simultaneous fire and terrorist events. System features are provided to compensate for the increased risk from fire in these cases.

Interfaces with Facility Public Address (PA) System:

The use of the speakers and other components in the existing PA system may be appropriate in smaller size buildings in which the installation of a new speaker system is not cost effective and the existing PA system is new or relatively new, in excellent condition, and of relatively simple design.

ATI Solution

ATI was contracted by USMC to meet the above listed requirements. Accordingly ATI provided:

- **1 Control Station** (PC, MassAlert™ software, CCU) that functions as the “ACU”.

The Control Station is the main operator console for the entire system. It is used to manage and initiate system activations (alerts), monitor the status of all outdoor and indoor units, and control, monitor and log all system activity and communications. Each Control Station consists of a PC with advanced ATI MassAlert™ software connected to the REACT 4000 Communication Control Unit (CCU). The PC monitor will display a map of the facility, with color-coded icons to visually indicate location and status for each indoor and/or outdoor alerting unit. For reporting purposes, the operator can also run reports that describe system activity and diagnostics. The ATI system can support up to 16 Control Stations.

Control Station Features

- ◆ Windows® 7 PC, ATI advanced MassAlert™ Software, and a Communication Control Unit
- ◆ User-friendly graphical point-and-click software for control and monitoring of the entire system, with an on-screen map of the entire facility displaying complete system status for each remote alerting unit (Giant Voice siren and/or indoor building unit)
- ◆ Two ways to activate; point and click activation from PC or activation through the simple push-button front panel of the CCU in the event of PC or power failure
- ◆ Flexible automated scheduling of activations and tests
- ◆ Three levels of password protection available
- ◆ Operator can perform total, zone or single siren activations

- ◆ Automatic reporting of alerting unit status such as door intrusion, power failure, low battery, etc.
 - ◆ Handheld microphone for live public address broadcasts
 - ◆ Automatic gain (volume) control for stable and consistent audio levels
 - ◆ Encrypted and time-synchronized Frequency Shift Keying (FSK) radio communication between CCU's and indoor/outdoor alerting units provides a much higher level of data and system security than "DTMF" type communication
 - ◆ Robust digital data packet designed for wireless applications minimizes potential interference from existing and future wireless communication or SCADA devices, providing extra assurance the system will activate in RF-heavy environments
 - ◆ The CCU connects to the PC through hard-wired RS-232 serial port
 - ◆ The CCU is equipped with battery back-up (up to 8 hours) – power loss will not interfere with the ability to activate the system
- ◆ Built-in tone generator
 - ◆ Digital messaging capability
 - ◆ Very low standby power requirements
 - ◆ Data encryption and security coding on system communications
- Indoor and outdoor (building entrances) speaker and strobe devices as needed, with supervised wiring and strobe synchronization
 - (189) 2W speakers
 - (137) 2W speaker-strobes
 - (8) strobes
 - (7) 15W horns
 - ATI provided an acoustic design that exceeds adequate intelligibility required by the UFC.
 - Communication is all HARDWIRED FSK using ATI's Advanced Communication Board (ACB). Since radio communication and IP were not available or not desired.
 - One of the ISU's includes a single relay that is connected to a nearby FACP. The building's Notifier fire alarm system is programmed to monitor this contact closure from the ISU, and override the building's fire alarm system audible appliances during an MNS activation.

• **5 Indoor Speaker Units (ISU)**

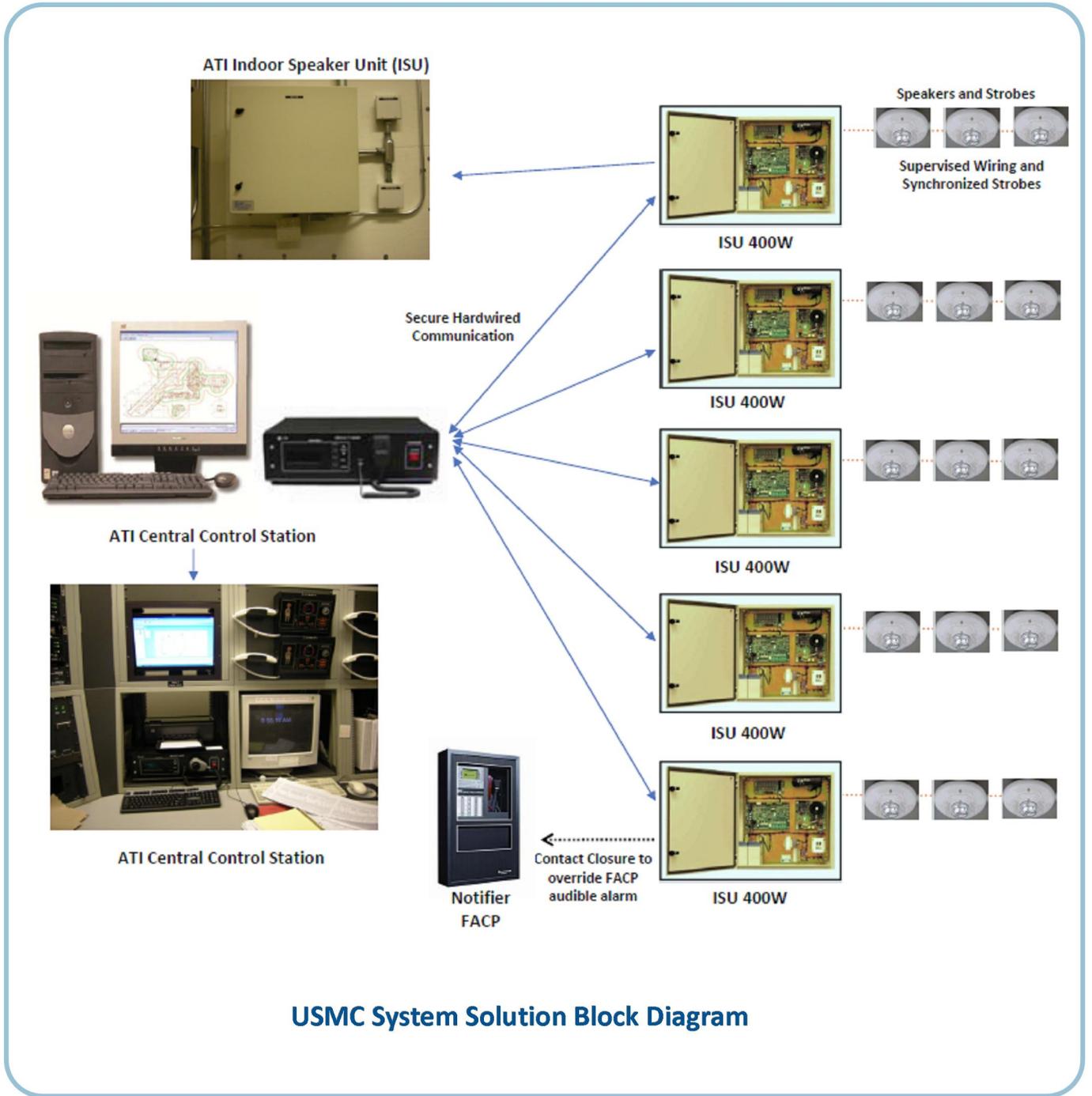
The ISU provides up to 400 Watts of continuous audio output power for reliable alert tone notification, voice instructions and public address, and can also be configured to provide activation of visual alerting devices such as strobes and message signs. The ISU is monitored, controlled and activated by the ATI Control Station, and can be configured as a standalone voice evacuation system to operate independently using a local control panel.

ISU Features

- ◆ NEMA 3R enclosure
- ◆ Built-in battery backup
- ◆ Built-in temperature-compensated battery charger
- ◆ Intrusion detection and reporting
- ◆ 400 watt Class-D amplifier with 70V and 25V/8 ohm speaker outputs
- ◆ Universal radio interface to support all types of LMR radios
- ◆ Simple and compact design

GAT (Government Acceptance Test) of intelligibility and visibility coverage was conducted by the USMC contracted Basic Commerce & Industries, Inc. The GAT testing methodology was to divide rooms in "zones" of 20' x 20' and take two intelligibility recordings per zone at a height of 3 ft (3 ft is a MCEITS System specification requirement), which was chosen because it is roughly the ear height of an individual sitting in a chair. The Common Intelligibility Score (CIS) and the Speech Transmission Index (STI) to determine intelligibility of a zone were used. The UFC requires the intelligibility to be 0.5 or 0.7 on the CIS or STI respectively. Per the United Facilities Criteria (UFC), a zone can be below the specified criteria as long as the human can hear the message and walk to an area that meets the intelligibility standards. To measure intelligibility, we used the Norsonic's Nor140. The instrumentation was preloaded with the ability to calculate both the CIS and STI. The instrumentation was calibrated by the Scantex, Inc. **The results confirmed that ATI's conceptual acoustic design met both the UFC and NFPA 72, 2010.**

Systems That Save®



USMC System Solution Block Diagram

ABOUT ATI SYSTEMS:

Acoustic Technology, Inc. (ATI Systems) designs, manufactures, and installs reliable emergency warning and notification systems for the Campus, Community, Industrial, and Military markets. Incorporated in Massachusetts in 1981, ATI Systems developed an innovative wireless system that provides audible and visual warnings via a simple and compact hardware design, user-friendly software, and the latest advances in communication methods, including radio frequency, IP Ethernet, and satellite technology. Through acoustic design and modeling, ATI Systems ensures proper sound coverage and superior voice intelligibility in both outdoor and indoor areas to assure the safety of communities worldwide.