SECTION 275123 - eSERIES END POINT INTERCOM, PAGING, AND EMERGENCY MESSAGING SYSTEM

1. GENERAL
	* + 1. RELATED DOCUMENTS
				1. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
			2. SUMMARY
				1. The system specified is based on the Telecor eSeries Supervised Network based Communications System providing at least the features and functions outlined below. The System shall be installed and programmed by a local authorized and certified Telecor dealer.
				2. Supply and install a complete supervised network-based intercom system. Field wiring shall be CAT 5E or CAT 6 cable, control wiring for power distributions and very long runs, and utilize an optional fiber backbone (when distances exceed normal Ethernet limitations). All station equipment shall utilize standard RJ-45 modular connections. All remote devices utilizing standard structured cabling shall be capable of PoE (Power over Ethernet) or power supplied within the CAT 5E or CAT 6 cable jacket. Wiring shall be capable of either being installed in conduit or cable trays, where shown on the plans.
				3. The system shall be capable of interconnecting with the building LAN (Local Area Network). This connection shall be minimal and utilize only one Ethernet 100 Mbps (or optionally 1 Gb) connection per station to accomplish all intercom operations. Ethernet ports and associated network switches that are required to connect any intercom devices will be provided by the OWNER.
				4. Provide a separate circuit for each room and administrative office so each room, speaker, amplifier, and emergency messaging display/clock can be individually addressed.
				5. Overall intercom communications network shall utilize Ethernet or VoIP communications between all major components: administrative consoles, intercom stations, amplifiers and individual paging speakers, and network switches. Systems not utilizing Ethernet or VoIP communications protocol to each end-point device will not be acceptable. Systems not capable of supervising all networked devices including network amplifiers, network speakers, notification switches, and emergency messaging display/clocks will not be acceptable.
				6. The network shall support a VLAN configuration to separate activity in the intercom system from other in building LAN traffic. In locations where the supervised network communications system will be considered as part of the facilities life safety systems, a dedicated and isolated network shall be required.
				7. The system shall interface to the facility’s IP-PBX via SIP trunk connectivity.
				8. The Communications System shall include master clock support and synchronization of digital secondary clocks, event scheduling, and messaging software allowing the facility to configure multiple schedules per school, multi zone time tone signaling for class changes, and message notification.
				9. The Communication System shall include alarm features, including a comprehensive command center and alarm-focused emergency management capabilities. In the event of an alarm condition, all nonessential system operations shall be automatically suspended. Control of the system shall be transferred to a command center console operated by the incident commander. All call-ins placed from room stations shall be re-routed automatically to the command center console.
				10. The Communications System shall include software for the management of communications during an alarm condition in the facility using a GUI located at the command center. This includes activating, clearing and providing status of all alarms in the facility, including comprehensive management of lockdown and acknowledge status of each classroom designated as a Shelter-in-Place location.
			3. DEFINITION OF TERMS
				1. Installer(s): Shall refer to the person, persons, or company who or which contracts to perform the work specified herein.
			4. SUBMITTALS
				1. Submit the shop drawings, product data, and quality control submittals specified below at the same time as a package.
				2. Shop Drawings: Composite wiring and/or schematic diagrams of the complete system as proposed to be installed. Drawing shall include relative position of all major components, typical connections, field components, accessories, and cable types.
				3. Product Data: Include catalogue data sheets, manufacturer’s default specifications, user operation guides, and bill of materials.
				4. Quality control shall include the following:

Name, address, and telephone number of the nearest fully equipped service organization.

Submit a certificate of completion of installation and service training from the system manufacturer.

Submit a list of comparable completed projects. Furnish the name, address, telephone number, and contact name of end user.

* + - * 1. Field Test Reports: Indicate and interpret test results for compliance with performance requirements. Include record of final matching transformer-tap settings and signal ground-resistance measurement certified by Installer.
				2. Maintenance Data: For equipment to be included in maintenance manuals specified in Division 1.

Record of Owners equipment-programming option decisions.

All instructions necessary for proper operation and manufacturer’s instructions.

“Proof of Performance” information.

Manufacturer’s maintenance information.

Copies of non-proprietary computer programs and system set up disks documenting all programmable features of the installed system.

* + - * 1. Record Drawings: Prior to final
				2. acceptance, provide three (3) complete sets of drawings indicating all cable numbers and construction details in accordance with the actual system installation. Revise all shop drawings to represent actual installation conditions. These Record Drawings will be used during “Final Acceptance Testing”.
				3. System Training: Submit the following information describing the training programs and system trainers as outlined in paragraph 1.6 of this specification and in accordance with Division 1 specifications.

Include with the submittal a preliminary staff development training program in outline form for review and approval by the owner’s representative.

Include with the submittal a current copy of the trainer’s certification from the manufacturer that certifies and identifies the trainer(s) who are eligible to provide training and support for the project.

Include with the submittal a current copy of trainer’s needs assessment form which will be reviewed with the owner’s designated representative for the system’s preliminary system programming and configuration.

Include with the submittal copies of all documentation used to identify for the owner those participants attending and completing the training programs.

* + - * 1. A copy of the manufacturer’s standard statement of warranty proving all equipment provided for the school communications network is covered with the required **five-year** warranty shall be included with the project submittal. This statement of warranty shall be provided on the manufacturer’s stationary.
			1. QUALITY ASSURANCE
				1. Manufactures: Firms regularly engaged in manufacture of integrated communication systems, time keeping systems, and ancillary equipment, of types and capacities required, whose products have been in satisfactory use in similar service for no less than five years.
				2. Installer's Qualifications: Firms with at least five years of successful installation experience with projects utilizing integrated communications systems and equipment similar to that required for this project.
				3. All items of equipment including wire and cable shall be designed by the manufacturer to function as a complete system and shall be accompanied by the manufacturer's complete service notes and drawings detailing all interconnections.
				4. The Contractor shall be an established communications and electronics Contractor that has had and currently maintains a locally run and operated business for at least five years. The Contractor shall be a duly authorized distributor of the equipment supplied with full manufacturer's warranty privileges.
				5. The Contractor shall show satisfactory evidence, upon request, that they maintain a fully equipped service organization capable of furnishing adequate inspection and service to the system. The Contractor shall maintain at their facility the necessary spare parts in the proper proportion as recommended by the manufacturer to maintain and service the equipment being supplied.
				6. Except where specifically noted otherwise, all equipment supplied shall be the standard product of a single manufacturer of known reputation and experience in the industry. The Contractor shall have attended the manufacturer’s installation and service school and upon request must show proof of attending such a school.
				7. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
				8. Comply with NFPA 70.
				9. Comply with NEMA Standard SB-40 for Emergency Communications in K-12 schools.
			2. IN-SERVICE TRAINING
				1. The contractor shall provide and implement a complete and comprehensive staff training program for all administrators, facility staff members, and teachers. This mandatory training program will provide school staff a complete understanding of how to utilize and properly operate all functions.
				2. The training program shall be implemented by a staff member/trainer employed by the contractor. The trainer must be factory certified to provide training on their product.
				3. All staff development training is to be coordinated through the owner’s designated representative. As training sessions are completed, the trainer will provide the school’s administrative staff and school district’s staff a document listing all the staff and faculty members who attended, received, and completed the training program.
			3. WARRANTY
				1. Provide a **manufacturer’s five-year extended limited warranty** of the school communications network equipment against defects in material and workmanship. This warranty will cover all electronic system components. Additional warranties cover clocks, speakers, and call-in switches. If any defects are found within the warranty period, the defective equipment shall be replaced at no cost (equipment only); a one-year warranty shall be provided for labor.
				2. The Contractor shall, at the Owner's request, make available a service contract offering continuing factory authorized service of this system after the initial warranty period.
				3. The system manufacturer shall maintain engineering and service departments capable of rendering advice regarding installation and final adjustment of the system.
			4. MANUFACTURERS
				1. Manufacturers: Full Network based solution Subject to compliance with requirements, provide a system by one of the following manufacturers which are currently in use by the owner:

Telecor

1. PRODUCTS
	* + 1. SYSTEM REQUIREMENTS
				1. The system shall utilize a decentralized network structure not requiring any head-end equipment, central server, or any other control hardware to maintain system operation. Systems utilizing centralized electronics and subject to a single-point-of-failure (power supply, CPU, server, power, etc.) shall not be accepted unless the system has 100% duplication of all centralized operating equipment running concurrently and can automatically take over, including up to the minute programming configuration in the event of a failure of the main system head-end electronics or any required, centralized electronics required to make the system fully operational. Systems that are not based on decentralized structure or systems that do not provide 100% duplication of head-end or systems that operate in a “down-graded” operational mode as the result of a centralized failure are not acceptable.
				2. All station devices shall receive power and data through a Power-Over-Ethernet switch. Once plugged into the LAN through a Power-over-Ethernet network switch, all networked devices shall be immediately operational and as applicable shall place or receive calls and pages from stations as well as page all devices in the network. Consoles, intercom stations, clocks, emergency displays, or speakers connected to the network shall not require any network configuration or administration to function.
				3. Each Intercom Station, Loudspeaker, clock/message display, shall be assignable to all or any combination of Unlimited Paging, Program Distribution or Time Zones in the system.
				4. Each Classroom shall be provided with two Call Stations located in separate locations in order to comply with NEMA Standard SB40 for Emergency Communications in K-12 Schools. One Call switch shall provide the ability to generate normal calls to a designated location while the other shall generate Emergency level calls.
				5. Speech shall be transmitted in the frequency range from 50 Hz to 7 kHz and shall use a maximum of 128 kbps of bandwidth during a call. In order to assure maximum intelligibility, all system audio shall be HD Audio as defined in Intel™ High Definition Audio Specifications, June 17, 2010.
				6. Intercom communications between consoles and system devices shall be non-blocking with no channel restrictions or limitations (other than network capacity) to the number of simultaneous conversations at any time between pairs of intercom stations, intercom station to console, console to console, console to speaker or zone of speakers, program source to a speaker or zone of speakers, or bell tones to a speaker or zone of speakers regardless of number of stations or consoles.
				7. Any and all devices shall have the ability to have their programming downloaded, individually or simultaneously via the network. Programming shall be downloadable in a series of human readable, industry standard comma-separated values (CSV) files that can be saved and edited using common spreadsheet applications. Consoles, intercom stations, clocks, displays, and speakers residing on a network shall have the ability to update their programming, simultaneously from a CSV file. Furthermore, all devices shall also have the capability to be configured directly, such that device numbers, names, zones, and call-in destinations can be altered in real time without the uploading or downloading of their programming. System shall be capable of uploading firmware updates to all device classes simultaneously, via the network, without the requirement of tools, by authorized technician or qualified facility technician or representatives.
				8. Audio communications between all devices shall be accomplished with latency values of a maximum of 0.1 seconds and connection times of 0.01s for 1 to 500 speakers.
				9. The system shall support a minimum of 50 channels of simultaneous duplex communication paths on the intercom system LAN, plus a minimum of 10 simultaneous duplex channels for PBX integration.
				10. The system shall be capable of routing calls from the Public Switched Telephone Network (PSTN) into any classroom, zone or the entire school via the District’s SIP enabled Telephone System. This shall allow for remote monitoring and two-way voice communications from outside the facility to classrooms as well as paging into areas of the school. Additional features shall include:

The ability to place call-ins from classroom call stations to SIP Telephones.

The ability to initiate calls from SIP Telephones to eSeries Classroom Speakers.

The ability to initiate zone and all call paging announcements from SIP Telephones to eSeries Speakers throughout the facility.

The ability to make outside calls from Administrative Consoles to the PSTN via the Districts Phone System.

The ability to receive Live District Wide Paging Announcements from the District Office

* + - * 1. The System shall allow users to configure multiple schedules per school, with an unlimited number of programmable events in each schedule. Each Event shall sound a user selectable tone, play a user provided audio file or an external audio source. In addition, a textual message shall be programmed to display on associated message displays throughout the school. All scheduling assignments shall be performed via a simple to use, Graphical User Interface (GUI) from a non-dedicated PC, residing in the School. Programming shall also be accomplished from a non-dedicated PC at the District Office. The following features and functions shall be provided. Systems that cannot provide these, shall not be acceptable.

The system schedules shall facilitate the requirements of combined facilities (e.g. elementary and middle schools in a common building) where multiple schedules running concurrently would be required.

Each event shall play any of the available tones, audio files or audio sources provided. Events shall be directed to any one or more Time Zones in the systems.

Events shall include textual messages to clock/message displays. These shall be formatted as fixed, flashing or scrolling displays that can include up to 200 characters in length.

Time Tones may be manually activated from Administrative Consoles or selected SIP phones residing on the schools IP PBX.

An integral Master Clock shall provide time synchronization to all secondary, digital clock/Message Displays throughout the school. The communications shall be capable of obtaining it’s time synch signal from any NTP timeserver.

* + - * 1. The System shall be capable of automatically distribute SMS and email notifications to relevant staff members when an emergency event is occurring the facility. Notifications shall be distributed to user alert devices such as mobile phones and smart devices. Mobile phones shall receive the notifications as SMS messages while smart devices shall receive email messages. Emergency events include:

The activation of emergency-themed element icons on a PC GUI (e.g., Lockdown, Evacuate, etc.)

Emergency Calls placed from Call Stations located room locations.

* + - * 1. The system shall automatically distribute SMS and email notifications to appropriate technical support staff in the event that the system is experiencing a fault.
			1. EQUIPMENT AND MATERIAL
				1. Supervised Interactive Graphical User Interface

The system shall include an Interactive Graphical User Interface (subsequently referred to as IGUI). The software shall reside on Telecor provided PC and should have ability to interface to District Wide Emergency Communication system located in the district office.

The IGUI shall be supervised and shall utilize an easy-to-use graphical user interface for quick and easy graphically aided navigation to access functionality for all intercom stations, paging zones, and program distribution sources. Emergency operations shall be simplified through the IGUI allowing stored audio files and alphanumeric messages for message displays to be activated from the IGUI. The IGUI shall allow common operations such as daily announcements to become simplified into single touch activated icons; removing multi-step console set ups and dial strings.

The voice device used to originate voice communication for the IGUI to selected locations shall be a system console, telephone handset, or microphone independent from the computer hosting the IGUI. The voice device shall remain functional and accessible regardless of the operational state of a computer supporting the IGUI.

The IGUI shall allow the creation of a custom operating screen(s) based on the floor plans of the facilities. Icons representing intercom stations, zones used for paging, tone distribution, textual Message distribution, and audio program distribution shall be incorporated onto the floor plans. The IGUI software shall provide:

Simple routine call processing, including: hold, transfer, and forward

Activation of remote station auxiliary relays for applications such as door lock or release

Emergency functions

Paging

Audio program distribution

Customizable page elements

Customizable operating screen

Element library for emergency event icons

Initiation of emergency and non-emergency messaging, textual and audible

Remote station volume adjustment

Remote activation of do not disturb status and/or message waiting status

Remote station trouble indication

Remote station background music channel selection

Dynamic zone management for interactive on-the-fly console specific zones

Single touch emergency response (supporting both actual emergencies and drills) including but not limited to all or any combination of the following:

Live voice notification

Pre-recorded audio message

Digital plain text messaging with simultaneous numerically coded message capability

Remote system activation, i.e., access control systems, CCTV systems, door release systems, etc.

The IGUI must provide an efficient and reliable method of notifying the occupants within the facility of critical situations. A variety of emergency tone signals that reside within the intercom/paging system shall be activated by clicking on pre-programmed buttons on the IGUI screen, initiating the transmission of tone signals to speakers, and alphanumeric messages to message displays/digital clocks. A “lockdown” icon shall be designed as per Owner direction, with Owner selecting the appropriate tone. Whole building macros for emergency or off-normal response shall be built into the internal communication system as directed by the Owner. Each macro shall be capable of being activated by the console, the IGUI as indicated on plans or as directed by the Owner or AHJ. It shall be possible to activate a WAV file message or Owner selected tone coinciding with multi-language textual messages for distributions to zones as directed by the Owner, all from a single activation icon located on the IGUI. Other single action macros shall be activated in similar fashion via the IGUI and a custom-labeled icon. Plain language labeling of all icons on the IGUI shall be user changeable.

* + - * 1. Emergency Notification

The system shall be capable of providing emergency notifications by email and SMS to mobile devices and designated PCs. during an emergency utilizing a district wide communication system. This feature will notify all relevant staff members so that they are made aware of the emergency event and can respond appropriately. Up to 100 users can be supported directly. When integrated with the facility’s email server, it can effectively distribute notifications to an unlimited number of alert devices.

Alert devices may be mobile phones and smart devices. Mobile phones shall receive the notifications as SMS messages while smart devices shall receive email messages.

When deployed, the emergency notification feature shall support the fault monitoring capabilities of the Master Clock/Message Host. Trouble/fault notifications from eSeries devices shall be annunciated on the IGUI with a flashing Icon. Activation of this icon shall distribute notifications of a fault to appropriate technical support staff.

* + - * 1. Emergency Alert

The Emergency Alert platform shall consist of displays, adapters, and integrators as located on the drawings and specifications.

The platform shall allow visual displays to be integrated into Telecor’s eSeries System. These displays shall show the time, weather, information, alarms, messages, and emergency alarms. Multiple visual layouts and color schemes shall be available for use. The time shall be displayed as either an analog or digital clock. Messages and emergency alarms shall include plain text and audio. Messages shall have the ability to be scheduled to appear at certain times and days of the week. Live local weather at the facility shall also be shown on each screen.

Messages shall be configurable to appear on specific displays and zones (which shall group together multiple displays).

Severe weather notifications issued by the National Oceanic and Atmospheric Administration (NOAA) shall activate weather alerts automatically.

Emergency alarm screens shall be activated from the IGUI. This shall allow complete integration with an operational control from the facility’s Telecor communications system. Emergency Alert alarms shall activate in conjunction with the delivery of SMS text messages and email notifications.

The Emergency Alert platform shall support an unlimited number of displays. All displays shall have adjustable brightness levels. A scheduled sleep mode feature shall be available for further energy conservation. Should a display lose power, it shall automatically resume regular operation upon power and network restoration.

Displays shall connect via wired Ethernet or wireless Wi-Fi to the facility LAN which shall have access to the Emergency Alert cloud-based web portal. This portal shall be used to manage and configure the Emergency Alert platform and its features. The cloud-based nature of the Emergency Alert platform shall provide the ability to manage different sites, each with their own sets of displays, through the web portal.

The Emergency Alert display shall consist of a 22" HD screen. The display shall be equipped with both wired and wireless network adapters for connection to the facility LAN.

The display shall be wall mounted with a surface mount bracket in either a landscape or portrait orientation.

The adapter shall allow any third-party display capable of receiving HDMI input to serve as an Emergency Alert display. This shall include large-format HD resolution displays. The adapter shall include wired and wireless network adapters to allow the display to connect to the facility LAN.

The integrator provide integration between Telecor’s eSeries System and the Emergency Alert platform.

Emergency Alert platform messages and emergency alarms shall have the ability to be configured so that they can be activated from the IGUI.

* + - * 1. Supervised SIP Trunk IP/PBX Interface

The system Session Internet Protocol (SIP) Interface shall be a VoIP PBX phone interface of the same manufacturer as the supervised network intercom and paging system. Third party gateway devices shall not be accepted.

The SIP Interface shall be supervised and shall connected directly to the facilities network and the PBX’s network and shall provide the following:

Establish a barrier gateway between the intercom and paging network and the PBX and/or common computer network.

Transparent audio operation between VoIP PBX phones and any device on the supervised network intercom and paging system. Paging access from any telephone on the facility system VoIP PBX to any intercom speaker, speaker zone, intercom station, console, all speakers, or paging horns and zones throughout the facility.

Any call-in from the supervised network intercom and paging system shall be capable of being routed directly to a VoIP PBX phone. Call-in stations can be configured and programmed to automatically dial any number on the publicly switched telephone network, landline, or cellular number through the SIP interface and via the PBX.

Ability to escalate a call-in to be redirected to a VoIP PBX connected phone via the SIP Interface. Escalation can also include the ability to dial any number on the publicly switched telephone network, landline, or cellular number through the SIP interface via the PBX.

Ability to initiate alarm and crisis response protocols from any VoIP PBX connected phone.

Ability to require security access code to utilize the intercom or paging system emergency communication features.

Minimum of 10 simultaneous telephone channels of access to/from VoIP PBX phone system. Full caller ID support from any supervised network intercom call-in device to a VoIP PBX connected phone identifying the calling station ID/Location.

Emergency level call-in to be uniquely identified as emergency on the VoIP PBX phones.

Activation of all supervised networked intercom and paging system emergency tones and pre-recorded announcements from any phone connected to the building VoIP PBX phone system.

The SIP Interface shall additionally allow for calls to be placed from a console to any phone number on the publicly switched telephone network (landline or cellular). Additionally, intercom calls at a console may be transferred to any number on the publicly switched telephone network to any landline or cellular number through the SIP interface via the PBX.

Systems that connect to a building or district phone system and are limited to a SLT or CO connection will not be accepted as a substitute for a fully operational SIP Interface.

* + - * 1. Control Interface

The Control Interface shall provide a Desktop Application for PC interaction with the Intercom and Paging system, a Command Interface Protocol for external system interaction with third party systems, Group Zone functionality, and a Scripting Engine supporting multiple sequential operations.

The system shall incorporate a Windows based Desktop application that makes use of a Command Protocol Interface, allowing external systems to interact with the Network Intercom and Paging System. Combined with the Scripting and Group Zones features, the Desktop application shall generate a preprogrammed series of operations from a single action. These features shall be used in conjunction with a graphical user interface and the Microsoft Windows desktop.

Default Scripts shall be used to generate customized shortcuts according to the needs of a facility. These shortcuts shall then be placed directly on the Windows desktop and shall activate virtually any Intercom and Paging function by clicking on the shortcut icon. These shall include activating:

Alerts, audio distributions, coded and plain text messages, intercom operations.

Pre-Recorded Evacuate, Lockdown, and All Clear audio files.

Companion text messages for audio alerts.

Coded messages on all secondary digital clocks and displays.

The Desktop Application shall also activate SMS text messages, computer pop-up notifications, and email distributions in conjunction with any script. Desktop icons such as a Panic Button shall send SMS notifications to a crisis team, advance warning to building occupants through pop-ups to heighten the level of awareness.

Any Desktop location running the Application shall have the ability to create and send an instant message using the Desktop’s keyboard and display. The textual message can be sent independently or as a companion message to an audible alert.

The Desktop Application shall be capable of utilizing Soft Call and Panic buttons. Soft Call buttons shall be created to operate as a call button on the desktop with a normal or emergency call priority. They shall also be combined with other preset or on-the-fly custom text messages. Panic buttons shall allow a user to unobtrusively activate an audio path from the panic button location to another eSeries device at a security location. This shall allow security personnel to listen to an occurring situation and provide the appropriate response.

The System shall be capable of streaming multiple audio programs over 10 available channels, simultaneously, to speaker locations in the facility. The ability to turn the broadcast on or off to a specific location shall be controlled from the Desktop Application.

A user from the Desktop Application shall enable or disable Do Not Disturb (DND) mode for a group of devices such as speakers or intercom stations.

Volume Adjustments to individual devices, devices in a zone, or all devices in the intercom and Paging System shall be made from the Desktop Application.

The Desktop Application shall be used to create a call directory to provide the user with the ability to quickly and easily place calls to a large number of prospective recipients and locations. The shortcuts shall be customized with the name of the call recipient or location. The call directory shall also contain shortcuts that activate message-waiting indications in addition to the option of placing calls.

The system shall interface with other external systems using a Command Interface Protocol. External systems include integrated security management or building management systems via devices such as computers, programmable logic controllers, or software-based annunciator panels.

The Command Interface Protocol shall be used to send real time commands and receive real time status messages between the third party system and eSeries devices. The Command Interface Protocol shall be an ASCII protocol that includes both outbound messaging, and support for inbound command via a virtual COM port and a physical USB connection.

Scripting shall allow operations to be carried out in sequence. Scripts shall be activated in various ways including: automatically based on the day of week and time of day, using a Console or a phone, by using the Desktop Application, or from other scripts.

When scripts from a Console or PBX phone (via a SIP interface), the name of the script shall be displayed on the Console or phone. Then the user shall be presented with options to enable or disable the script (depending on the current state of the script). Consoles and PBX phones that dial the script number shall hear voice prompts for enabling or disabling the script.

Scripts shall be used for scheduling time tone programs that include tones, pre-recorded messages, and textual messages displayed on Message Display/Calendar Clocks reoccurring at specific times and days.

Scripts shall perform cascading evacuation operations where evacuation audio messages are automatically first distributed to zones closest to the location of an emergency before spreading outwards to other zones according to a time schedule, thus reducing evacuation route congestion throughout the facility.

Group Zones shall allow groups of page zones or devices to be defined as a group zone with a dial number. Group Zones shall be accessed from the Desktop Application, Consoles or PBX phones.

Group zones shall be the destination for various functions including textual messages, or audio operations, such as pages or audio program distributions). Group zones shall be assigned customized names, which will appear on Console or phone displays when they are dialed.

Group Zones shall make it possible for a dial number to be forwarded to different destinations based on time and day. For example, common audio operations directed to a Group Zone dial number shall be configured to go to the usual destination during regular hours but to a different destination outside of regular hours.

Group Zone shall support designated priorities, such as emergency. Operations that are to a zone with a priority are automatically elevated to override any normal or lower priority operations the devices in that group zone are receiving.

* + - * 1. Alarm Manager

The Alarm Manager shall be a Telecor Model eAM equipped with eVCAM software or approved equal. The Alarm Manager shall manage system wide communications during an alarm condition in the facility through a GUI and associated software. The Alarm Manager and associated software shall reside on the facility-provided PC.

During an alarm condition, all non-emergency operations shall be restricted. Operations shall be transferred to an Alarm Management Console located at the Command Center location within the facility. The command Center shall be equipped with a Console, associated GUI, PC and software to manage emergency operations during an alarm condition.

Included in the GUI shall be ICONS that represent the following alarm types:

Lockdown

Lockout

Evacuation

Reverse Evacuation

Severe Weather

Tornado

Fire

CO Detection

General Emergency

All Clear

Alarms shall be activated by “Clicking” on the respective ICON on the GUI. When the corresponding alarm becomes active, the ICONS shall visually change to reflect the current condition.

Operation of the Alarm Management Console shall be consistent with NFPA72 Emergency Communication Requirements. Operations activated by an Alarm Management Console shall have the highest priority and shall not be overridden by another operator. This shall eliminate the risk of different operators issuing conflicting instructions.

The Alarm Management Console shall perform live paging announcements which shall automatically suspend a pre-recorded portion of an alarm until the conclusion of the paging announcement.

From the Command Center, it shall be possible to change the type of alarm, silence an alarm, perform live paging in the alarmed areas, covertly listen to stations, as well as clear the alarm.

Call-ins placed from stations in an alarmed area shall automatically be routed to the Alarm Management Console during an alarm condition.

Locations designated for “Shelter in Place” such as classrooms, offices, and areas of refuge shall be equipped with Alarm Acknowledgment call stations. These stations shall be used to confirm the status of the occupants in these locations during a Lockdown Alarm Condition. Call stations shall receive pre-recorded verbal instructions to be carried out to secure the “Shelter in Place” locations. Once secure, the status shall be acknowledged by pressing a touch point on the Alarm Acknowledgement Call Station.

All “Shelter in Place” locations shall be monitored on the Command Center GUI in real time using the Alarm Manager software. A graphic of the school floor plan shall display the status of the room with color-coded ICONS.

Orange shall indicate that the room has received instructions to secure the room and acknowledgement is pending.

Green shall indicate that the room has acknowledged that the room is secure.

Red shall indicate that the room status is unknown as no acknowledgement has been received from the room.

If the Alarm Acknowledgement is not received from the room location after a preset period of time, the station shall automatically place a call to the Alarm Management Console. The Console Operator shall answer the incoming calls utilizing the covert listen function, which allows the operator to aurally monitor the room without the occupant’s knowledge. During a convert listen operation, the pre-announce and supervisor tones are suspended. Once the operator determines that the conditions in the room are typical of the situation, the operator shall establish a two-way intercom conversation with the classroom to determine why people in a Shelter-in-Place location did not complete the emergency response procedure.

The Alarm Manager shall support Medical and Security Alert Calls from Alert Call stations. Calls from these stations shall be annunciated at the Alarm Management Console, identifying the origin and type of Call. In addition, a pre-recorded announcement stating the origin and type of alarm shall be broadcast over the local speaker, and a textual message shall be scrolled on the local Message display. The audio broadcast and the textual message shall also be broadcast to one of more zones of loudspeakers.

* + - * 1. Master Clock/Message Host

The Master Clock/Message Host shall be a time master device for the eSeries network which enables configuration and activation of eSeries operations from a web-based graphical user interface (GUI). An unlimited number of operations shall be managed for activation by schedules or users. The application shall be web-based and secured via HTTPS certification. It shall be preconfigured with a variety of default operations, schedules, audio, and icons for quick customization. Users shall log into the application from any desktop computer or mobile smart device using a supported web-browser. Supported web browsers shall include Microsoft Edge, Mozilla Firefox, Google Chrome, and Apple Safari.

Master Clock/Message Host functionality shall include central time keeping and synchronization of all other eSeries devices throughout the eSeries network.

The Master Clock/Message Host shall manage an unlimited number of calendar-based schedules, which are collections of operations intended to be performed frequently, periodically, or on specific dates and times. For example, a schedule may be a series of bell tones that consistently indicate class changes. Users shall set schedules so that the operations they contain will activate accordingly.

Schedules shall be viewed, enabled or disabled in a calendar. The calendar shall display schedules on a daily, weekly, monthly or yearly basis. The Master Clock shall support scheduling operations up to 10 years into the future.

An unlimited number of holidays shall be specified and marked on the calendar. This shall indicate days where disabling all schedules may be appropriate.

The Master Clock/Message Host shall obtain time from and synchronizes with Network Time Protocol (NTP) servers directly or via an NTP-enabled SIP interface present on the eSeries network.

Operations shall include several components, including: pre-announce tones, pre-recorded audio, scrolling textual messages, and coded messages. If desired, specific details of the components shall be customized. Customization shall include: the number of times the pre-announce tone plays, the message scroll speed, and the delay before pre-recorded audio repeats. Depending on the operation type, user-activated operations shall be distributed immediately or queued for later distribution.

The Home page shall provide a quick overview of Master Clock/Message Host managed operations. This shall include the next scheduled operation, the schedules that are currently active, and the next scheduled school drill. The Master Clock/Message Host shall include user specific short tutorial videos that explain various aspects of the GUI and provides built-in on demand training.

The Live page shall show currently active and upcoming operations. A history of recently performed operations shall confirm operations occurred as intended. Also, users shall easily initiate on-the-fly operations on the Live page by configuring and activating them on demand.

Routine operations shall include an unlimited number of pre-configured common audio distributions. Examples shall include announcements for special assemblies, bus arrivals, staff meetings, and festive events.

Operations shall be associated with eSeries scripts so that they shall be activated by users. The Master Clock/Message Host GUI shall indicate if the script is active even if it was activated via other means such as dial access code or IGUI. Other emergency operations (such as Lockdown) shall also be seamlessly integrated with the IGUI.

Audio files shall be used for tones or announcements while images shall be used as icons throughout the GUI to represent different operations or schedules. Audio file formats shall include (WAV and MP3) and images to support operations.

Access shall be user-account controlled. An unlimited number of users shall be supported with a high level of individual customization. Users shall be given access to only the pages and operations relevant to their intended roles. For each page, users shall be granted permissions to activate or configure operations and schedules from a desktop or, for certain users, from mobile devices. An administrator account shall have full access to view and make configuration changes on all pages, while an operator account shall be limited to activating routine or emergency operations and enabling or disabling schedules.

Users with administrative privileges shall have the ability to configure the site name, time, time zone, test zone, and import and export databases. To aid installers with initial configuration, a test mode shall be provided as well as a database import/export feature. Test mode shall redirect all activated operations to a test zone (that only the installer occupies) to prevent disrupting other people during configuration and testing. Database import/export shall allow the configuration to be exported for backup purposes or to copy to other installations.

The system shall be configured for an unlimited number of dedicated emergency response operations. A corresponding drill operation shall be automatically created for each emergency situation. Users shall activate emergency response operations from facility PCs or remote mobile devices.

The Master Clock/Message Host shall support the operation of Virtual Call Stations that reside on client PCs, including management of all network connections between Virtual Call Stations and the Network Intercom and Paging System.

The Master Clock/Message Host shall feature a Maintenance Portal. The portal shall provide trouble notifications for faults being experienced by any eSeries device on the eSeries Network.

The notification includes a details fault report that provides the device name, dial number and the nature of the fault. These shall be easily copied into other documents and emails.

The Portal shall be configured to use an email account to automatically send trouble notification emails to a list of designated addresses. These emails shall list the details of all the current faults.

A link to the Master Clock/Message Host web interface shall be provided in order for the recipient to perform trouble shooting actions such as viewing up to-do-date fault information, enabling service mode status, and making configuration changes.

The volume of station devices shall be remotely adjustable via a web browser.

* + - * 1. Mobile Quick Access

The system shall include a Mobile Quick Access feature that allows staff members to quickly activate Emergency Notifications. (e.g. Lockdown) using mobile smart devices.

Notifications shall include the broadcast of pre-recorded audio announcements over the facility’s public address speakers and textual messages to eSeries displays with a single activation.

The feature shall include emails and SMS messages that shall be delivered to custom lists of recipients.

Button options shall be customizable allowing staff a choice of notifications from their mobile device depending on the staff’s authority.

* + - * 1. Supervised Speaker Breakout Module

The Speaker Breakout Module shall provide the means of integrating traditional analog speakers and call initiating devices to the eSeries System. The Speaker Breakout Module shall also be a Single Zone Paging Adapter that can drive an amplifier to provide paging coverage in a facility. The Speaker Breakout Module shall have three relay outputs that can activate automatically during a call processing operation.

The Speaker Breakout Module shall receive power and data through a Power-Over-Ethernet switch. Once plugged into the LAN through a Power over Ethernet network switch, the Speaker Breakout Module shall place or receive calls and pages from the eSeries network. The Speaker Breakout Module shall not require any network configuration or administration to function.

Speech shall be transmitted through the Speaker Breakout Module in crystal-clear HD Audio. Audio shall be transmitted in the frequency range from 50 Hz to 7 kHz and shall use a maximum of 128 kbps of bandwidth during a call. Audio between the Speaker Breakout Module and Consoles shall be non-blocking.

The Speaker Breakout Module shall support Ceiling Inlay Speakers which shall connect to the Speaker Breakout Module via a standard CAT5 cable or conventional 8Ω/25V/70V speakers to provide paging and talkback operation from Consoles or phones via a SIP interface and an IP-PBX.

The volume of the speakers shall be adjustable individually, by zone, or across the entire eSeries network via the Management Interface or Control Interface. Volume controls incorporated into certain call station models shall also allow a user to adjust the speaker volume locally. Volume levels shall be set by specific functions: intercom, paging, emergency paging, and Public Channel operations.

Call-in capabilities shall be provided with the addition of call stations. Call stations models shall be able to initiate normal calls, emergency calls, or both. Advanced stations that provide additional features shall also be available. These features shall include Privacy mode, Do Not Disturb mode, volume control, and Public Channel select. All call stations shall also provide "message waiting" indication.

The Speaker Breakout Module shall also support placing normal and emergency priority call-ins from simple pushbutton call switches. Pressing the normal call switch shall initiate a normal call-in, and either pressing it three times quickly or pressing and holding it for three seconds to shall place an emergency call-in. Pressing the emergency switch once shall place an emergency call-in.

The Speaker Breakout Module shall have the ability to direct normal and emergency call-ins to different devices. If the device that is configured to receive the call-in loses network connectivity, the Speaker Breakout Module shall automatically search for an alternate destination. If no other suitable call-in destinations exist, the Speaker Breakout Module shall audibly and visually indicate a fault.

The Speaker Breakout Module shall have a call-in roll-over feature where if a call-in to the primary call destination is not answered after a pre-set amount of time, the call shall be automatically copied to a secondary call destination. If both the primary and secondary call destinations are unavailable, the call shall be redirected to a back-up Console.

The Speaker Breakout Module shall have the capability to be configured as a member of one or more paging zones.

The Speaker Breakout Module shall have a built-in 4-watt audio amplifier that shall drive up to 4 watts of audio to a small zone of 25/70 volt loudspeakers. The Speaker Breakout Module shall provide a line level audio output that can connect to an external power amplifier for applications where the speaker zone load exceeds 4 watts.

The Speaker Breakout Module shall be monitored for network connectivity. If the Speaker Breakout Module 's network connection is lost, targeted Consoles shall report that station as absent and display its dial number. When the Speaker Breakout Module is used with Call Stations, the Speaker Breakout Module shall also provide full supervision and monitoring for Call Station and call-in destination connectivity. If a wiring fault is detected between a Call Station and the Speaker Breakout Module, the Speaker Breakout Module shall audibly and visually indicate the error utilizing the status LEDs on the Speaker Breakout Module. The Call Stations shall pulse their status LED to indicate a trouble condition. In case of a fault, the Management Interface or Logging Interface shall log the location, time, date and type of fault. If so configured, the Management Interface, Logging Interface, and Network Amplifiers shall also generate an alarm tone.

The Speaker Breakout Module’s status LED that shall flash in different patterns to indicate normal operation, call-in assurance, message-waiting, a call or paging audio in progress, or to indicate an error.

The Speaker Breakout Module shall be equipped with three relays that can be used to operate auxiliary devices such as strobe lights, tone initiating devices and door locks.

The Speaker Breakout Module shall be wall-mounted using the attached mounting brackets.

* + - * 1. General Purpose I/O Device

The General Purpose Input/Output Device shall be a Telecor model eNODE or approved equal. It shall allow third party devices and systems to interface with Network Intercom and Paging System through contact closures.

The I/O Device shall have a minimum of 4 inputs and 4 outputs.

The inputs shall connect to dry relay contacts of third-party devices and shall activate any eSeries operations. Each input shall be configurable and shall support connection to sustained or momentary contact closures. Inputs shall differentiate between single or multiple momentary contact closures.

Outputs shall activate third party devices and systems. Outputs shall activate in response to:

Paging Audio or intercom calls

Scripts

Alarms

Events in the Master Clock / Message Host

Manual Dialing of an dial number

Analog Clock Correction

Trouble Status Indication

Service Mode

The I/O Device shall support tracking features where the output will automatically activate if the I/O Device detects the activation of paging audio, call-ins, Scripts and Alarms.

The I/O Device Output shall be capable of being manually dialed and activated from a console, or a phone on the facility’s PBX. Once dialed, the caller shall be prompted by voice commands.

The I/O Device shall be integrated with the Master Clock/Message Host, allowing outputs to be activated according to scheduled events. The outputs can also be programmed to provide correction to synchronous movement analog clocks.

All I/O Device Inputs and Outputs shall be monitored and shall detect opens, shorts and ground faults on the connection between the third-party device and the I/O device. If any of these conditions are detected, a fault condition shall be raised on the system.

* + - * 1. Supervised Network Administrative Console

The Administrative Console shall be supervised and allow the operator to establish two-way communications with an intercom station, talkback speaker, or another Console using the handset or speakerphone. VOX functioning shall be automatically enabled when the handset is used. The Push-to-Talk button shall toggle the Console between talk and listen mode when the speakerphone is used. The Console shall provide a 2-line by 20-character LCD display. The display shall be adjusted to a range of angles for optimum viewing. When there are no active calls, the display shall show the Console name and dial number. If a time server is connected to the network, the display shall also show the time and date.

Incoming calls to a Console shall show the originating station dial number and name on the Console display. Calls shall be displayed in the order they are received. The operator shall scroll through the list of calls and answer them out of sequence. Emergency call-ins shall be distinctly annunciated both visually and audibly.

The Console shall allow call-ins to be forwarded to another Console, or for calls to be put on hold or transferred to another Console location. Additionally, call-ins or calls shall be forward/transfer-able to PBX telephone extensions via a SIP trunk interface.

The Console shall select remote audio sources connected at any location on the local area network, and distribute the audio broadcast from the source to all speakers in a facility or to selected areas such as a speaker zone or a selection of speakers. The Console shall be capable of audio source verification by attendant prior to page zone activation. In this manner, attendants shall listen to the audio source locally, including listening to pre-recorded announcements, prior to system broadcast.

The Console shall select a tone or a pre-recorded announcement and broadcast the tone or announcement to all facility speakers or to select areas, such as a speaker zone or a selection of speakers.

The Console shall be equipped with digital volume control that shall allow for the separate adjustment of the speaker listen and handset listen volumes. The levels for intercom listen, tones, and program distributions shall be independently adjusted and stored in memory.

The system shall allow user programming of alphanumeric architectural room names and numbers. The Console shall be capable of using 1 to 7 digit sequences for dial out and call-in identification, and shall display station numbering, station name, and call-in priority.

The end-user shall be allowed to choose and determine the number and location of Consoles. The end-user shall not be limited by pre-set manufacturer limitations of the number of Consoles required by this project; allowing for unrestricted future expansion. Consoles may be added at any time. Consoles added by the end-user that exceed the engineered design for this project shall be at owner’s expense. Communication between consoles or consoles and intercom stations or rooms shall not be inhibited by channel number restrictions.

The Console shall be capable of displaying room statuses such as Privacy and Do Not Disturb and shall have the ability to override any status limiting communication between the Console and a station with Privacy or Do Not Disturb status activated. Temporary override shall not interfere with continued activation of Privacy and Do Not Disturb after communication has been established and electively terminated.

* + - * 1. Supervised Network Amplifiers

The Supervised Network Amplifier (subsequently referred to as Network Amplifier) shall provide a minimum of 25 watts for paging and public address and shall be capable of utilizing analog amplifiers to increase the amount of amplified signal from the network amplifier. The Network Amplifier shall be connected directly to the network switch by an RJ45 connector and shall receive signals directly from the network.

The Network Amplifier shall be supervised and in the event that network communications is lost, an audible alert shall sound on the Amplifier. The Network Amplifier shall provide a silence feature to mute the audible alert for 24 hours.

The Network Amplifier shall also be capable of receiving local input from local devices such as tape decks, iPod docks, CD players, etc. The network amplifier shall be capable of transmitting signals received from the local input to other network locations or locally to directly connected 25/70 volt or 8-ohm analog speakers.

Each Network Amplifier shall be capable of providing two audio inputs for local devices and shall be programmable as either a microphone or line-level input.

The Network Amplifier shall be controlled remotely such that audio programs, input, tones, textual messages, or announcements may be initiated by other devices connected at different locations on the local area network.

The Network Amplifier shall have a minimum of 4 local tone/pre-recorded announcement audio message control lines which when activated will distribute tones/pre-recorded audio messages to intended network amplifiers for re-distribution, network talk-back speakers (or a zone), and/or local 25/70 volt or 8-ohm analog speakers directly connected to amplifier. Each network amplifier shall be capable of storing four (4) pre-recorded announcements in addition to a minimum of 16 tones. Tones and announcements shall be activated locally or from other network devices.

The Network Amplifier shall store and transmit companion textual messages for each stored audio announcements. Textual messages shall be automatically broadcasted to the same zones along with the audio messages such that any device programmed for that zone automatically receives both the audio and textual announcement/message and automatically reproduced each or both messages to the extent of the devices’ capabilities.

The Network Amplifier shall be capable of transmitting HD level audio as defined by Intel™ High Definition Audio specifications, June 17th, 2010 at a minimum.

The Network Amplifier shall shut down to protect itself should an output short circuit fault or overload occur that jeopardizes the integrity of the Network Amplifier.

* + - * 1. Power Amplifiers

Power Amplifiers shall be used to drive groups of speakers located in corridors and outdoor locations that are assigned to speaker zones. Amplifier Zones shall be sized at 1 watt per corridor speaker, and 3.5 watts per horn. The amplifier load shall not exceed 80% capacity.

The Power Amplifiers shall be capable of producing an audio output of 60, 125 or 250 watts RMS at less than 1% distortion with balanced output.

They shall be designed to operate on a line voltage of 115 AC.

* + - * 1. Supervised Call Stations

The Supervised Call Stations, as indicated on the drawings, shall be Telecor model eCS-1 eCS-2, eCS-3, eCS-6 or approved equal. The station shall be used to initiated calls from remote locations to eSeries Consoles.

Call Stations shall be monitored for call line failure. In the event of an open circuit, short circuit or short to ground, the System shall detect the fault and notify a designated console operator automatically. The type of fault and its identity on the system shall be displayed on a designated console screen.

Call Stations shall provide “message waiting” indications to staff members. If no one is present in a room to respond to a call, or the room is in Privacy or Do Not Disturb mode, the console operator shall have the option to leave a Message Waiting (MW) indication at the Station. If the MW option is chosen, the LED indicator on the room call switches shall begin to pulse. When a call-in is initiated from the room, the MW indication shall be automatically deactivated, and the call-in shall be automatically routed to the console that left the MW indication.

Call Stations shall utilize a momentary contact touchpoint to initiate a “Normal” priority level call. Stations equipped with an “Emergency” touchpoints shall initiate “Emergency” priority level calls. All stations shall have a Call Assurance LED. The LED shall flash when a call in initiated, confirming call placement to the user. The LED shall continue to flash until the call is answered by the console operator.

Calls Stations that are equipped with “Privacy” touchpoints shall place the room into a “Privacy” state, preventing the monitoring of audio activity in that room. When in the state privacy, the touchpoint shall illuminate indicating privacy status. When a call is initiated from the Call Station, the privacy state shall automatically be suspended for the duration of the call and automatically re-enabled when the call is complete. If a Console places a call to a location that has a Call Station that is in “Privacy”, the caller shall be given verbal instructions, automatically generated by the console, that the room has been placed in privacy and the caller’s options are to cancel the call, leave a message waiting indication or connect regardless. If they choose to connect, the audio shall be allowed to be transmitted from the console to the room, but the calling party shall not listen to the room audio unless the party in the room turns off the privacy feature.

Call stations that are equipped with “DO NOT DISTURB” (DND) touchpoints shall place the room into DND mode when pressed. When DND mode is enabled, the back lit LED on the station shall illuminate, indicating that the station is in a DND state. Schedule scheduled events, zone pages and normal priority audio programs shall be blocked from being broadcast into a room that is set into the DND state. However, Emergency pages, manual tones and high priority audio programs shall continue to be broadcast into the room. If a call-in is initiated from a room is set to DND, the DND status shall be automatically suspended for the duration of the call, and automatically re-enabled when the call is completed. If a call is placed from a Console to a location that has a Call Station set to DND, the caller shall be given verbal instructions, automatically generated by the console, that the room has been placed in DND and the callers options are to cancel the call, leave a message waiting indication or connect regardless. If they choose to connect, the intercom call shall proceed normally allowing the caller to speak to the party in the room

Call Stations denoted with a V suffix (eCS-1V, eCS-2V eCS-6V) shall have the ability to control the volume of the local eSeries room speaker. Call Stations with Volume Controls shall include volume up and volume down momentary contact touchpoints to adjust volume of audio being broadcast over the speaker. Separate user-set volume levels shall be maintained for intercom calls, normal and emergency priority paging announcements. Volume controls shall be disabled when there is no audio being broadcast to the speaker.

* + - * 1. Alarm Acknowledge and Alert Call Stations

The Alarm Acknowledge and Alert Call Stations, as indicated on the drawings, shall be Telecor model eCS-9 or eCS-10 or approved equal. The station shall have the ability to generate Emergency Priority Level call-ins, perform Alarm acknowledge operations and initiate Medical and Security Alerts. The station shall be designed to operate in conjunction with the Alarm Manager.

Call Stations shall be monitored for call line failure. In the event of an open circuit, short circuit or short to ground, the System shall detect the fault and notify a designated console operator automatically. The type of fault and its identity on the system shall be displayed on a designated console screen.

The Stations shall initiate Emergency priority level call-ins from remote locations to Consoles. Stations shall be equipped with a Call assurance LED that shall provide call confirmation whereby the LED shall flash, confirming the call-in placement. The LED shall continue to flash until the call in is answered.

Locations for “Shelter-in-Place” such as classrooms, offices and areas of refuge, as noted on the drawings, shall be equipped with Alarm Acknowledge or Alert Call Stations. During an Alarm Condition these stations shall notify the Alarm Management Console of the completion of alarm related emergency responses by the occupants of a “Shelter-in-Place” location.

The eCS-10 or approved equal stations shall have all the features the eCS-9 station, as well as additional Medical and Security Alert touchpoints. These touchpoints shall have the ability to place call-ins to Console identifying the call as a Medical or Security alert priority level.

Medical or Security level call-ins shall combine a call-in, audio announcement, and a scrolling textual message into a single emergency priority operation. The origin and priority of the call shall be displayed at the Console location. Additionally, an announcement shall be broadcast over a selected zone(s) of loudspeakers, broadcasting the location and type of alarm. A textual message identifying the origin of the alarm and alarm type shall also scroll across selected message display(s). The broadcast and messages shall continue to scroll until the call-in is answered.

* + - * 1. Virtual Call Stations

The system shall include Virtual Call Stations that shall reside on classroom PC’s as well as portable PC’s that are used in classroom locations that are equipped with network speakers. Virtual Call Stations shall mimic the look and behavior of physical Call Stations. These shall feature interactive and animated buttons which react to user inputs such as mouse clicks or finger presses on touch screen devices.

Virtual Call Stations shall include Call Assurance indication via a virtual LED representation. When a call is placed the virtual LED shall blink to indicate that the call has been placed.

Virtual Call Stations shall be customizable to have any or all of the following configurations:

Push to Call

Emergency

Privacy

Do Not Disturb

Channel Select

Volume

Alarm Acknowledgment

Medical Alert

Security Alert

Virtual Call Stations shall be configured with Volume buttons that shall adjust the volume in a room. Volume adjustments shall only affect the current active audio broadcast into the room, for example lowering the volume of paging announcements and not affecting the volume of intercom or emergency announcements.

When used with the Call Manager feature, Virtual Call Stations shall support Alarm Acknowledgement as well as Medical and Security Alert functionality. Alarm Acknowledgement functionality shall be used in conjunction with Alarm Manager operations to signal completion of emergency response instructions. Medical and Security Alert touchpoints shall activate a combined emergency response that shall initiate a priority call-in, as well as an audio broadcast and a scrolling text message on Message Displays.

When used with portable PC’s that are moved between locations, users shall be prompted to enter the room number of their current location.

The implementation of the Virtual Call Station shall be a client-server model. The server software shall reside in the Master Clock and Message host hardware. The client portion shall be installed on computers throughout the facility and connected to the facility network.

* + - * 1. SUPERVISED MESSAGE DISPLAY/CALENDAR CLOCK/SPEAKER/STROBE

The Supervised Message Display/Calendar Clock/Speaker/Strobe Assembly (subsequently referred to as MDCSS Assembly), as indicated on the drawings, hall be a Telecor model e2444-LD or approved equal

The MDCSS Assembly shall receive power and data over a RJ45 connect CAT5E/6 cable via a Power-Over-Ethernet switch port. Once plugged into the LAN through a Power over Ethernet network switch, the MDCSS shall be immediately functional and shall not require any network configuration or administration to function

The MDCSS Assembly shall be supervised and monitored for connectivity to the network. Additionally, any Call Stations connected to the MDCSS shall be monitored for call line failure. In the event of an open circuit, short circuit or short to ground, the System shall detect the fault and notify a designated console operator automatically

The MDCSS Assembly’s Speaker shall have a power rating of 10 watts of audio signal and provide a minimum of 92db @ 1 meter SPL for maximum intelligibility.

The MDCSS Speaker shall provide transmission of HD audio as generated from intercom console and/or associated push-to-talk, intelligent microphone, supervised network amplifier, or program sources connected to the network.

The MDCSS Speakers shall support talkback; to optimize intelligibility talkback capabilities shall be supported.

The MDCSS Assembly shall support the direct connection with RJ45 connectors of two supervised room Call Stations. The stations shall provide the means for: normal calls, emergency calls, privacy mode, and do not disturb mode, as well as for the adjustment of Audio Volume. Call Stations shall include a call placed assurance status LED to indicate a call has been placed. Call Stations shall be supervised and immediately indicate disconnection or a wiring fault.

Emergency Call Stations shall be separate and clearly labeled with a red button so as to impart obvious operation in the event of an emergency. Systems that only provide a single call station with dual emergency and normal operation based on a sequence of button presses shall not be acceptable.

The volume of the MDCSS Speaker shall be adjusted individually, by zone, or across the entire network. Volume controls incorporated into certain Call Station models shall allow a user to adjust the volume of a local MDCSS speaker. Volume levels can be set for specific functions: intercom, paging, emergency paging, and Public Channel operations.

Volume controls shall be capable of establishing and maintaining levels for intercom, paging, program distribution, and tones, independently for each of the above functions. Emergency announcements shall not be affected by the adjustment of other speaker volume/levels such as paging, intercom, or other lower priority audio broadcasts. Systems that utilize a manually operated transformer or resistive volume control design shall not be acceptable.

The MDCSS Speaker shall have the capability to be configured as a member of one or more paging zones.

The MDCSS Assembly shall include an integral LED Strobe that shall illuminate for the duration of an announcement being broadcast over the MDCSS speaker to alert room occupants of the announcement in progress.

The LED Strobe shall be configured to illuminate in up to 4 colors (white, red, green or blue) with various flash patterns. Patterns can be set to activate based on the priority of announcements. For example, using a distinct color and flash pattern for an Emergency Announcement while a routine announcement or intercom call can be assigned another pattern and color.

 The MDCSS Assembly shall include a Message Display/Clock that shall simultaneously display plain text emergency or routine messages and independent numerically-coded messages. When not displaying a message, it shall display the current time and date. Hours and minutes shall be displayed with large 2.25” digits. Seconds shall be slightly smaller for easy distinction. The date shall be displayed in plain text by a 10-character, dot matrix display showing the day of the week, followed by the month and date. The date shall be displayed in the English, Spanish or French language.

The Message Display/Clock shall automatically broadcast the audio announcement and a corresponding text message that is initiated on the over the communications system. These shall be enhanced by strobe illumination.

The Message Display/Clock shall also display text-only messages independent of any audio messages.

In addition to plain text messages, the Message Display/Clock shall also simultaneously display numerically-coded messages which can be activated independently to provide trained staff with additional context to the plain text messages.

The Message Display/Clock shall include elapsed timer and count-down functions. Used in conjunction with a Timer Button Panel, users shall set the Clock to count upwards from zero to 24 hours or count down from a specified value to zero. Additionally, the unit shall have a local input that will accept a relay closure to activate the elapsed or countdown timer operation. Timers embedded into pre-set plain text messages shall display messages for a pre-set period of time.

All Message Display/Clocks shall be continuously synchronized to a Time Master connected anywhere on the same network Time corrections shall be performed instantaneously so that all Clocks display the correct time. If communication is lost with the Time Master, Clocks shall maintain the time independently and stay synchronized with each other. Once communication with the Time Master is re-established, the displays shall automatically resynchronize with the Time Master.

The MDCSS Assembly shall integrate with the Classroom Sound Field System and automatically mute the System during an intercom call, paging announcement or class change tone signal. Integration shall include the ability for an Emergency level call to be initiated from the Sound Field pendant microphone to the Administrative Console.

The MCDSS Assembly shall be equipped with 3 control relays to support integration with ancillary classroom devices. The relays shall be automatically activated during an emergency call-in or when receiving a broadcast or textual emergency message.

The LED strobe shall require Class 4, PoE+ power from the Network Switch.

The MCDSS Assembly shall be flush mounted using an e2444-BBF, or approved equal enclosure. In applications where surface mounting is required, an e2444-BBS or approved equal enclosure shall be provided.

* + - * 1. Supervised Message Display/Calendar Clock/Speaker

The Supervised Message Display/Calendar Clock/Speaker Assembly as indicated on the drawings, shall be a Telecor model e2444 or approved equal.

The Assembly shall be identical to the Supervised Message Display/Calendar Clock/Speaker/Strobe Assembly as described in section 2.16 of the specifications, however it will not be equipped with the LED Strobe.

* + - * 1. Digital Message Display/Calendar Clock

The Digital Message Display/Calendar Clocks, as indicated on the drawings, shall be a Telecor model e365-TB or approved equal. The unit shall simultaneously display the current time and date. The time is displayed in hours, minutes, and seconds. Hours and minutes are displayed with large 2.25” digits. Seconds are slightly smaller for easy distinction. The date is displayed in plain text by a 10-character, dot matrix display showing the day of the week, followed by the month and date. The date shall be displayed in the English, Spanish or French language.

 The Digital Message Display/Calendar Clock shall receive power and data over a RJ45 connect CAT5E/6 cable via a Power-Over-Ethernet switch port. Once plugged into the LAN through a Power over Ethernet network switch, the Display shall be immediately functional and shall not require any network configuration or administration to function.

The Digital Message Display/Calendar Clock shall be supervised and monitored for connectivity to the network. Additionally, any Call Stations connected to the Display shall be monitored for call line failure. In the event of an open circuit, short circuit or short to ground, the System shall detect the fault and notify a designated console operator automatically

These Displays shall be designed for use in conjunction with the Master Clock/Message Host. All secondary clocks shall be synchronized with the Master Clock. Corrections shall be done instantaneously and all clocks shall display the identical time and date. In the event of a power failure, the System shall maintain accurate timekeeping during the outage. Once power is restored, all clocks shall be immediately updated with the correct time and date.

In addition to displaying the time, the Unit shall display textual messages in the dot matrix section of the display to the audio announcement that is being broadcast over the communication system speakers. These messages shall be used to alert personnel of an emergency or a situation of concern.

The Unit shall also display text-only messages independent of any audio messages.

In addition to plain text messages, the Digital Message Display/Calendar Clock shall also simultaneously display numerically-coded messages which can be activated independently to provide trained staff with additional context to the plain text messages.

The Digital Message Display/Calendar Clock shall include elapsed timer and count-down functions. Used in conjunction with a Timer Button Panel, users shall set the Clock to count upwards from zero to 24 hours or count down from a specified value to zero. Additionally, the unit shall have a local input that shall accept a relay closure to activate the elapsed or countdown timer operation. Timers embedded into pre-set plain text messages shall display messages for a pre-set period of time.

Messages shall be programmed using the Editor software or from a web based Graphical User Interface (GUI). Messages can be activated by the Master Clock/Message Host, allowing text to be displayed at specific times and days of the week. Messages shall be displayed using a variety of visual effects including scrolling or flashing single lines of text, as well as alternating between different lines of text. The dot matrix display shall default back to the date when not displaying messages.

The Digital Message Display/Calendar Clock shall be suitable for surface or recessed installations using the appropriate enclosure. For surface installations, the 2431-BBS enclosure is required. For recessed installations, the 2431-BBF enclosure is used. Two surface-mount enclosures shall be mounted back-to-back with a 2423 Dual Mounting Kit, creating a double-faced version.

* + - * 1. Supervised Network Intercom Talk Back Speaker

The Supervised Network Intercom Talk-Back Speaker (subsequently referred to as Network Speaker) shall be a Telecor model eS8-TB. The Network Speaker shall be supervised and capable of up to 10 watts of audio signal and provide a minimum of 92db @ 1 meter SPL for maximum intelligibility. Speaker spacing shall be as defined by manufacturer to provide maximum intelligibility.

The Network Speaker shall provide transmission of HD audio as generated from intercom console and/or associated push-to-talk, intelligent microphone, supervised network amplifier, or program sources connected to the network.

The Network Speaker shall provide a dry contact output that can be activated remotely from a station or from a console, such as may be required in a door release application.

The Network Speaker shall receive power and data over a RJ45 connect CAT5E/6 cable via a Power-Over-Ethernet switch port. Once plugged into the LAN through a Power over Ethernet network switch, the Network Speaker shall be immediately functional and receive calls and pages from consoles on the network. The Network Speaker shall not require any network configuration or administration to function.

The Network Speakers shall support talkback; to optimize intelligibility talkback capabilities shall be supported via a microphone conditioned for low noise, HD audio, and with compression and noise gate capability. Stations that use the speaker instead of a separate microphone for talkback capability shall not be accepted.

The Network Speaker shall have a call-in roll-over feature where if it places a call-in to a primary call destination which is not answered after a preset amount of time, the call-in shall be automatically escalated to a secondary call-in destination. If both the primary and secondary call-in destinations are unavailable, the call-in shall be redirected to a back-up Station, Console, or telephone device.

The Network Speaker shall have the capability to be configured as a member of one or more paging zones.

The Network Speaker shall support the direct connection with RJ45 connectors of two, supervised room notification stations. The stations shall provide the means for: normal calls, emergency calls, privacy mode, and do not disturb mode. Notification stations shall include a call placed assurance status LED to indicate a call has been placed. Notification stations shall be supervised and immediately indicate disconnection or a wiring fault.

In addition to the visual call-in assurance status indicators on the notification stations, call-in assurance status indication must also be provided on the associated speaker. Also, in addition to visual call-in assurance, audible call-in assurance shall also be provided in support of persons with visual disabilities.

Under blackout conditions, the notification station shall be illuminated such that it can be located in the dark.

Normal call stations must support the ability to activate emergency call-in signals via multiple button presses and press and hold operations. Emergency call stations shall be separate and clearly labeled with a red button so as to impart obvious operation in the event of an emergency. Systems that only provide a single call station with dual emergency and normal operation shall not be acceptable.

The Network Speaker shall provide local, visual indication of operation or failed-communication and shall immediately annunciate a loss of communication at the main console location.

Network Speaker volume must be capable of individual level settings through the network. Settings must not be adjustable without authorization. Volume controls located in rooms must be centrally lockable via the network. Systems that allow a volume adjustment without authorization shall not be acceptable. Systems that utilize a manually operated transformer or resistive volume control design shall not be acceptable. Volume controls shall be capable of establishing and maintaining levels for intercom, paging, program distribution, and tones, independently for each of the above functions. Emergency announcements shall be sent at a volume/level as required by the AHJ and shall not be affected by the adjustment of other speaker volume/levels for the purposes of paging, intercom, or other lower priority audio events.

* + - * 1. Supervised Network Master/Satellite Talkback Speaker

The Supervised Network Master/Satellite Talkback Speaker (subsequently referred to as the Master Talkback Speaker) shall be a Telecor model eS8-TB4 or approved equal. The Master Talkback Speaker shall support all functionality of the Telecor model eS8-TB (specified above).

The Master Talkback Speaker shall be supervised and shall support the connection of Satellite Speakers, and support up to four watts of additional 25V Satellite Speaker load. Satellite Speakers shall be Telecor model S8T2570 or approved equal.

The Satellite speakers shall not support talkback; to optimize intelligibility talkback capabilities shall be supported from a single point via a microphone conditioned for low noise, HD audio, and with compression and noise gate capability. Stations that use the speaker instead of a separate microphone for talkback capability shall not be accepted.

The Satellite Speaker shall receive power over a RJ45 connect CAT5E/6 cable via the Supervised Network Master/Satellite Talkback Speaker. Both the Supervised Network Master/Satellite Talkback Speaker and the Satellite Speaker shall receive all power through a single Power-Over-Ethernet switch port. Systems that require auxiliary power or additional external or supplementary audio power amplification are not acceptable.

* + - * 1. Security Intercom Stations

The Security Intercom Stations as indicated on the drawings, shall be a Telecor model eSTN-1 or approved equal. The Station shall provide for two-way communications as well as call-in capabilities.

The Station shall receive power and data through a Power-Over-Ethernet switch. Once plugged into the LAN through a Power over Ethernet network switch, the Station shall receive calls and pages from the eSeries network. The Station shall not require any network configuration or administration to function.

The Station shall have a call-in roll-over feature whereby if a call-in to the primary call destination is not answered after a preset amount of time, the call shall be automatically copied to a secondary call destination. If both the primary and secondary call destinations are unavailable, the call shall be redirected to a back-up Station or Console.

The Station shall have the capability to be configured as a member of one or more paging zones

The Station shall be tamper-proof in design and construction and shall provide for two-way communications as well as call-in capabilities. The faceplate shall be fabricated from 11-gauge stainless steel with a brushed, mar-resistant finish. The speaker shall be protected against tampering by three barriers located between the faceplate and the speaker cone. A Mylar speaker cone shall be used in order to prevent damage to the speaker from liquids.

The Security Intercom Stations shall mount onto standard, three-gang electrical boxes, of a depth of no less than 2.875". Mounting hardware shall be tamper-proof. The switch actuator shall be fabricated from solid metal, and connected to the faceplate by a pair of welded studs. It shall be no less than 1/2" in diameter and shall be situated flush to the front of the faceplate. The actuator shall activate a momentary contact switch whose movement shall be limited by a mechanical stop to prevent damage caused by heavy impact.

* + - * 1. LED Strobes

The LED Strobes, as indicated on the drawings, shall be a Telecor model eLD1 or approved equal. The LED strobes shall illuminate for the duration of an announcement being broadcast over local speaker or horn to alert room occupants of the announcement in progress

The LED Strobe shall receive power and data through a Power-Over-Ethernet switch. Once plugged into the LAN through a Power over Ethernet network switch. When the LED strobe is installed in locations with an associated Talkback Speaker, Breakout Module or Message Display Calendar Clock, the Strobe and the associated device shall only require a single Ethernet drop.

The LED Strobe shall be configured to illuminate in up to 4 colors (white, red, green or blue) with various flash patterns. Patterns can be set to activate based on the priority of announcements. For example, using a distinct color and flash pattern for an Emergency Announcement while a routine announcement or intercom call can be assigned another pattern and color.

The LED Strobe shall be assigned to an associated speaker, an individual speaker zone, multiple zones or all zones. The Strobe shall be activated by placing an intercom call to the room speaker associated with the Strobe, broadcasting an announcement to that speaker, or by an activation of an alarm event such as a Lockdown. The Strobe shall illuminate for the duration of the announcement or event

The LED strobe shall require Class 4, PoE+ power provided from the Network Switch

The LED Strobe shall be flush mounted using a standard 4, 11/16” square x 2” deep backbox.

* + - * 1. Vandal Resistant Horn/Loudspeaker

The Vandal Resistant Horn/Loudspeakers, as indicated on the drawings, shall be a vandal-resistant loudspeaker assembly that utilizes a double re-entrant horn compression type loudspeaker. It shall be used in locations as indicated on the drawings.

These are weatherproof units that are designed for outdoor installation. They are capable of delivering 16 watts of continuous power and include an integral 25/70 volt line-matching transformer. The transformer features color-coded primary taps at 16, 8, 4, 2, and 1 watts. The nominal frequency range is 350 Hz to 10 kHz, with a sensitivity of 96 dB SPL (1 watt/1 meter).

The Vandal Resistant Horn/Loudspeaker shall be assembled onto a 16-gauge steel baffle that incorporates a unique interwoven steel security screen for maximum speaker protection while remaining acoustically transparent. This shall prevent any object from penetrating the loudspeaker. The baffle shall be finished in a powder epoxy coating that provides a resilient surface suitable for harsh environments.

The Vandal Resistant Horn/Loudspeakers shall be secured to the backbox with “pin-in-torx” tamper-proof screws, which are included with the unit. The Vandal Resistant Horn/Loudspeakers shall be suitable for flush mounting using the H16 Recessed Back Box. Alternatively, surface installations shall be accommodated using the SH-16 Surface Enclosure.

* + - * 1. Loudspeakers

The Speakers, as indicated on the drawings, shall be 24” x 24 Lay-in Tile Speaker Assemblies, 12” x 24” Lay-in Tile Speaker Assemblies, and Pre-assembled 8” Packaged Ceiling Speakers or approved equals.

The 24” x 24” Lay-in Tile Speaker Assembly shall incorporate an 8" cone loudspeaker, equipped with a dual 25/70 volt line-matching transformer, pre-assembled into a 24" x 24" square perforated steel baffle and combination backbox, designed to be installed flush in a suspended ceiling

The loudspeaker shall have a wide frequency response for general-purpose voice and music reproduction. The line-matching transformer shall have primary taps at 5, 2.5, 1.25, 0.63, and 0.32 watts. The baffle is finished in a mar-resistant, white epoxy coating. The baffle is finished in a mar-resistant, white epoxy coating.

The speaker assembly shall be designed to be installed in a suspended ceiling. Installation is quick and simple as the 24" x 24" is designed to fit into a common 2-foot square ceiling grid. Tie off tabs allow the assembly to be secured to the building structure or ceiling grid to address any safety concerns.

The 12” x 24” Lay-in Tile Speaker Assembly shall incorporate an 8" cone loudspeaker, equipped with a dual 25/70 volt line-matching transformer, pre-assembled into a 12" x 24" square perforated steel baffle and combination backbox, designed to be installed flush in a suspended ceiling.

The loudspeaker shall have a wide frequency response for general-purpose voice and music reproduction. The line-matching transformer shall have primary taps at 5, 2.5, 1.25, 0.63, and 0.32 watts. The baffle is finished in a mar-resistant, white epoxy coating. The baffle is finished in a mar-resistant, white epoxy coating.

The speaker assembly shall be designed to be installed in a suspended ceiling. Installation is quick and simple as the 12" x 24" is designed to fit into a common 2-foot square ceiling grid. Tie off tabs allow the assembly to be secured to the building structure or ceiling grid to address any safety concerns.

The Pre-assembled 8” Packaged Ceiling Speaker shall include the loudspeaker/transformer/baffle assembly.

The loudspeaker size shall be 8 inches in diameter and have a power handling capacity of 15 watts. The voice coil shall be of high-temperature bonded construction, be one inch in diameter and have an impedance of 8 ohms. The speaker shall have a frequency range of at least 65 Hz to 17,000 Hz and an axial sensitivity of 92dB at 1 m, with a 1 watt input signal @ 1000 Hz. The loudspeaker shall be equipped with a factory wired 25/70 volt line-matching transformer. The transformer shall have the primary taps at 5/16, 5/8, 1-1/4, 2-1/2, and 5 watts. The insertion loss shall be no greater than 1.0 dB. The transformer shall be mounted to the speaker with the secondary leads soldered to the speaker terminals.

The assembly shall include a baffle constructed of 22 gauge, cold-rolled steel finished with a mar-resistant white, semi-gloss, epoxy coating. The baffle shall have a diameter of 13".

The Pre-assembled 8” Packaged Ceiling Loudspeaker shall mount to a T7 support bridge, used to attach the assembly to suspended ceilings. The support bridge shall accept an enclosure, model H7, for applications where a protective enclosure is required. The H7 enclosure shall attach to the support bridge with appropriate mounting screws. The enclosure shall be a Telecor H7 or approved equal. A circular molded polystyrene damping pad shall be fitted to the inside top of the enclosure to prevent acoustical and mechanical resonances. The pad’s surface shall be molded with a triangular pattern for enhancing low frequencies and shall optimize the audio response of the enclosure.

* + - * 1. Re-entrant Horn/Loudspeakers

The Re-Entrant Horn/Loudspeakers, as indicated on the drawings, shall be a double re-entrant type, with a flared bell and an integral compression driver rated for 15 watts of continues audio power. The frequency response shall be 375 -14,000Hz. Nominal sensitivity shall be such that a sound pressure level of 110 dB at 1000 Hz. (on axis) at distance of one meter is produced with an input of one watt. Sound dispersion shall be no less than 100 degrees, regardless of the mounting position. The horn shall contain a weatherproof, built-in, 25/70 volt line-matching transformer. Power taps shall be at 0.48, 0.94, 1.8, 7.5 or 15 watts for a 25V line and 1, 2, 3.8, 7.5 or 15 watts for a 70 V line. The power taps shall be screwdriver adjustable. Impedance selection shall be 5,000, 2500, 1300, 666, 333, 87, or 45 ohms.

The unit shall include a die-cast universal mounting bracket, allowing the horn to be positioned both in the vertical and horizontal planes with a single adjustment. The wiring terminals and the screwdriver power tap shall be enclosed by a clear plastic cover for security and weather protection. The horn shall be finished in a grey epoxy. Dimensions shall be 9 1/4" deep with a diameter of 8".

* + - * 1. Digital Clocks

The Digital Clocks shall be Telecor model eCLK-2.5 / eCLK-4 or approved equal.

 The eCLK-2.5 shall incorporate a 2.5" display and located as indicated on the drawings. It shall be suitable for surface or recessed installations using the appropriate enclosure. For surface installations, the 2421-BBS or approved equal Enclosure shall be used. For recessed installations, the 2421-BBF or approved equal Enclosure shall be used.

The eCLK-4 shall incorporate a 4" display and located as indicated on the drawings. It shall be suitable for surface or recessed installations using the appropriate enclosure. For surface installations, the 2431-BBS or approved equal Enclosure shall be used. For recessed installations, the 2431-BBF or approved equal Enclosure shall be used

The Digital Clocks shall utilize seven-segment, AlGaAs “Supper Bright” LED displays which provide exceptional visibility. The Clocks shall incorporate a single piece front cover that is free of grooves and gaps. This shall keep infectious contaminants out of the eClock. The cover's non-porous surface shall allow for easy, comprehensive, hygienic cleaning with anti-bacterial agents.

The Digital Clocks shall receive power and data through a Power-Over-Ethernet switch. The Digital Clocks shall not require any network configuration or administration to function. Once plugged into the LAN through a Power over Ethernet network switch, the Digital Clocks shall be functional.

These Displays shall be designed for use in conjunction with the Master Clock/Message Host. All secondary clocks shall be synchronized with the Master Clock. Corrections shall be done instantaneously and all clocks shall display the identical time and date. In the event of a power failure, the System shall maintain accurate timekeeping during the outage. Once power is restored, all clocks shall be immediately updated with the correct time and date.

Two surface-mount enclosures shall be mounted back-to-back with a 2423 Dual Mounting Kit, creating a double-faced version.

1. EXECUTION
	* + 1. EXAMINATION
				1. Examine conditions, with the Installer present, for compliance with requirements and other conditions affecting the performance of the School Communications and School Safety Network.
				2. Do not proceed until unsatisfactory conditions have been corrected.
			2. INSTALLATION
				1. General: Install system in accordance with NFPA 70 and other applicable codes. Install equipment in accordance with manufacturer's written instructions.
				2. Furnish and install all material, devices, components, and equipment for a complete operational system.
				3. Impedance and Level Matching: Carefully match input and output impedances and signal levels at signal interfaces. Provide matching networks where required.
				4. Control Circuit Wiring: Install control circuits in accordance with NFPA 70 and as indicated. Provide number of conductors as recommended by system manufacturer to provide control functions indicated or specified.
				5. All housings are to be located as indicated.
				6. The contractor shall provide necessary transient protection on the AC power feed, all copper station lines leaving or entering the building, and all central office trunks. All protection shall be as recommended by the equipment supplier and referenced to earth ground.
				7. Wiring within Enclosures: Provide adequate length of conductors. Bundle, lace, and train the conductors to terminal points with no excess. Provide and use lacing bars.
				8. Provide physical isolation from speaker‑microphone, telephone, line‑level wiring, and power wiring. Run in separate raceways, or where exposed or in same enclosure, provide 12-inch minimum separation between conductors to speaker‑microphones, telephone wiring and adjacent parallel power. Provide physical separation as recommended by equipment manufacturer for other system conductors.
				9. Identification of Conductors and Cables: Use color coding of conductors and apply wire and cable marking tape to designate wires and cables so all media are identified in coordination with system wiring diagrams.
				10. Weatherproofing: Provide weatherproof enclosures for items to be mounted outdoors or exposed to weather.
			3. GROUNDING
				1. Provide equipment grounding connections for Integrated Electronic Communications Network systems as indicated. Tighten connections to comply with tightening torques specified in UL Standard 486A to assure permanent and effective grounds.
				2. Ground equipment, conductor, and cable shields to eliminate shock hazard and to minimize to the greatest extent possible, ground loops, common mode returns, noise pickup, cross talk, and other impairments. Provide 5‑ohm ground at main equipment location. Measure, record, and report ground resistance.
				3. Provide all necessary transient protection on the AC power feed and on all copper station lines leaving or entering the building. Note in system drawings, the type and location of these protection devices as well as all wiring information.
			4. FIELD QUALITY CONTROL
				1. Manufacturer's Field Services: Provide services of a duly factory authorized service representative for this project location to supervise the field assembly and connection of components and the pre-testing, testing, and adjustment of the system.
				2. Inspection: Make observations to verify that units and controls are properly labeled, and interconnecting wires and terminals are identified. Provide a list of final tap settings of paging speaker line matching transformers.
				3. Testing: Rectify deficiencies indicated by tests and completely re-test work affected by such deficiencies at Contractor's expense. Verify by the system test that the total system meets the Specifications and complies with applicable standards.
			5. FINAL ACCEPTANCE TEST
				1. The Final Acceptance Testing shall be provided to the Owner or the Owner’s designated representative only. Final acceptance testing to any other trade or service provider for the project will not comply with the requirements of this section.
				2. The contractor will provide a Final Acceptance Test record document signed by both the contractor and the Owner or designated Owner’s Representative establishing the “In Warranty” date. The warranty period will not commence until the Final Acceptance Test is completed.
				3. Be prepared to verify the performance of any portion of the installation by demonstration, listening and viewing test, and instrumented measurements. Make additional adjustments within the scope of work and which are deemed necessary by the Owner because of the acceptance test.
			6. COMISSIONING
				1. The contractor shall train the Owner's maintenance personnel in the procedures and schedules involved in operating, troubleshooting, servicing, and preventative maintenance of the system. This training will be in accordance with the training as outlined in Section 1.6 of these specifications. In addition to the Training Materials provided, the contractor will also furnish Operators Manuals and Users Guides at the time of this training.
				2. Schedule training with Owner through the owner’s representative, with at least seven days advance notice.
			7. OCCUPANCY ADJUSTMENTS
				1. The contractor shall provide Occupancy Adjustments in accordance with Section 1.6 of these specifications. A response scenario amenable to both the owner and the contractor will be established and followed for the first year of service.
			8. CLEANING AND PROTECTION
				1. Prior to final acceptance, the contractor shall vacuum and clean all system components and protect them from damage and deterioration. All blank spaces in equipment cabinets will be covered with blank panels. Top and side panels, and all cabinet doors will be installed. All general areas within and around all equipment rack/cabinets in the facility will be swept, vacuumed, and cleaned up. No cabinets will be left unlocked and all cabinet keys will be turned over to the owner or designated owner’s representative.

END OF SECTION