

277000 – INTERCOM/CLOCK/PUBLIC ADDRESS SYSTEM



Record Version 20190801

PART 1 - GENERAL

1.1 SUMMARY

- A. This section includes a fully operational school internal communications and clock incorporating safety including but not limited to the following:
1. The system shall provide complete internal communications and clock control employing state of the art VoIP Technology including the minimum functions listed.
 - a. Two-way Loud Speaking Internal Intercommunications.
 - b. Event announcement
 - c. Emergency announcement that will override any pre-programmed zones assuring that all Emergency/Lockdown etc., are heard at each and every speaker location.
 - d. Capability of prerecording emergency announcements that can simply be activated by a simple Soft Key or via a dedicated call-switch.
 - e. School Safety Paging and Evacuation tones,
 - f. Distributed (MDF/IDF) Electronic Architecture. (No home run wiring for each circuit).
 - g. Atomic Time Synchronization with Class Change Tones utilizing multiple, programmable schedules for each zone,
 - h. Paging and Program Distribution.
 - i. Incorporate district-wide announcements, either live or recorded thru a direct connection to the WAN and telephone system.
 2. Synchronous analog clock and time control
 - a. Class change signaling
 - b. Atomic Clock Synchronization
 3. Emergency call-ins shall take precedence over normal calls so that they are answered first. The system shall support a minimum of 16 call level priorities which shall be user definable.
 4. Any authorized administrator shall be able to call from outside the school into any classroom, zone or entire school directly via the School District supplied Telephone Network. This shall allow remote monitoring and two-way conversation from outside the school building as well as Paging into the system. This feature shall allow the user access to all functions via a user defined PIN code. (Compliance with NEMA Standard SB-40 for emergency communications in K-12 Schools)
 5. Authorized system users shall be able to record a minimum of ten (10) automated messages with emergency instructions and replay them. Automated message strings shall be either automatically distributed as part of a dial string, manually played from a single-button access on the phone or thru the master clock as a timed event.
 6. Paging and two-way loudspeaking features shall be accessible from any telephone by authorized users with the use of a user defined PIN code.
 7. The system shall allow users to exclude their classroom from paging and tones in the event of testing or other activity that shouldn't be interrupted. This exclusion will not affect emergency paging. This "exclusion" must have the ability to "reset" at midnight.

8. The system shall synchronize its system time to the network timeserver or a web-based time server.
9. The system shall have the ability to correct and power classroom secondary Analog clocks over the same Cat5e/6 cable drop also used for Two-Loudspeaking intercom speakers, call switch and (optional) motion detector.
10. This specification establishes a minimum level of quality, features, and performance for individual components as well as the integrated system.

1.2 CONTRACTOR QUALIFICATIONS/QUALITY ASSURANCE

- A. Safety and Indemnity
 1. Contractors will submit the necessary documentation to demonstrate their compliance with Section 270000 "1.5 A. Safety & Indemnity".
- B. Contractor Qualifications
 1. Contractors will submit the necessary documentation to demonstrate their compliance with Section 270000 "1.5 B. Contractor Qualification".
- C. Quality Assurance
 1. Contractor shall comply with all requirements as specified in Section 270000 "1.5 C. Quality Assurance".
- D. Warranty
 1. Contractor shall comply with all requirements as specified in Section 270000 "1.8. Acceptance & Warranties".

1.3 SUBMITTAL DOCUMENTATION

- A. The successful contractor shall provide their submittal package in accordance with the Section 01 20 00 1.06 Submittal Schedule, and Section 270000 "1.6 Submittal Documentation".
- B. Contractor shall also include in their Submittal Package:
 1. Shop Drawings: Prior to proceeding with the work: Provide detailed equipment assemblies and indicate dimensions, weights, required clearances, method of field assembly, components, and location of each field connection, and a complete schedule of all equipment and materials with associated manufacturers cuts sheets which are to be used.
 - a. Wiring Diagrams: Detail wiring for power, signal, and control systems and differentiate between manufacturer-installed and field-installed wiring. Identify terminals to facilitate installation, operation, and maintenance. Include a single-line diagram showing cabling interconnection of components and levels throughout system and impedances.
 - b. Artwork drawings and lists indicating proposed nameplate nomenclature and arrangements for control panels and plug panels prior to fabrication reflecting equipment used.
 - c. Each drawing shall have a descriptive title and all sub-parts of each drawing shall be labeled. All drawings shall have the name and locations of the project, Systems Contractor's name in the title block.
 - d. Details and descriptions of any other aspect of the system, which must differ from the contract documents due to field conditions or equipment, furnished.

1.4 Equivalent Products

- C. All Products described and Part Numbers given in this Specification are those of Telecenter manufactured by Rauland-Borg Corp unless otherwise noted.
 - D. Pre-Approved Equals:
 - 1. Valcom (Class Connection).
 - 2. Bogen Quantum MC2000
 - E. Owner will accept no substitutions from the three manufactures/products currently approved. .
 - F. In addition, Contractor shall certify that the proposed system complies with the following statements:
 - 1. Each major component of equipment shall have the manufacturers name, address and model number on a plate securely affixed in a conspicuous place. NEMA code ratings, UL Label, or other data that is die-stamped into the surface of the equipment shall be easily visible.
 - 2. Electrical Components, Devices, and Accessories: Listed and labeled as defined in NFPA 70, Article 100, by a testing agency acceptable to authorities having jurisdiction.
 - 3. Comply with NFPA 70
 - 4. Comply with NEMA Standard SB-40 for Emergency Communications in K-12 schools. .
 - 5. Comply with UL 60950.
 - G. Not Equal:
 - 1. Telecor
 - 2. Teradon Raptor
- 1.4 IN-SERVICE TRAINING
- A. 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
 - B. 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.
 - C. 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 of the staff and faculty members who attended, received, and completed the training program.

PART 2 - PRODUCTS

2.1 SYSTEM REQUIREMENTS

- A. The system shall utilize state of the art VoIP Technology, Call-in Notification, School Safety Paging and Evacuation tones, Distributed (MDF/IDF) Electronic Architecture, Atomic Time Synchronization with Class Change Tones utilizing multiple, programmable schedules for each zone, Two-way Loud Speaking Internal Intercommunications and Paging, and Program Distribution. The system shall be easy to learn and operate. All standard system programming shall be user friendly to allow the system administrator the ability to easily program system features.
- B. Provide complete and satisfactorily operating school communications and School safety as described herein, using materials and equipment of types, sizes, ratings, and performances as indicated. Use materials and equipment that comply with referenced standards and manufacturers' standard design and construction, in accordance with

published product information. Coordinate the features of all materials and equipment so they form an integrated system, with components and interconnections matched for optimum performance of specified functions.

- C. The system shall be a single electronic system consisting of amplified intercom channels depending upon the configuration of the system, (classroom) speakers, corridor speakers, inside and outside horns, call-in switches, and master clock.
 - D. Features offered by this system shall be implemented and controlled by a software program that can be changed and expanded as customer needs evolve.
 - E. The system shall lend itself to expansion by simple addition of hardware modules.
 - F. The system shall allow the implementation of bell schedules that are managed via the WAN/LAN. The system shall directly connect to the WAN/LAN without the need for a separate computer at the school location. Bell schedules can remotely be created, changed, stored and downloaded to the system by an authorized user from a browser-based interface.
 - G. The system shall provide the ability to initiate school safety paging announcements, evacuation tones and take cover tones from any telephone within the facility or outside the facility to any other location within the facility. The system must also allow the implementation of a district-wide announcement system where live messages, pre-recorded announcements and emergency tones can be triggered via a telephone or browser-based user interface.
 - H. The system shall provide the ability to selectively communicate or monitor individual classrooms in emergency situations from any telephone within the facility or outside the facility to any other location within the facility; all communication within the classroom shall be hands free and will not require any interaction by the end-user to answer.
 - I. Room speakers, call switches, shall be programmable and may be assigned any two, three, four or five digit number. Any extension may be reassigned at any time, and it shall not be dependent on wiring or circuit numbers..
 - J. Amplified two-way voice communication shall be available from any provided telephone through any speaker in the system. This shall allow hands-free communication to any classroom or any individual loudspeaker unit. A programmable pre-announce tone shall sound immediately before the intercom path is opened and a supervisory tone shall continue to sound at regular intervals when speaker monitoring is active, complying fully with all privacy legislation.
 - K. Integrated Master Clock with unlimited schedules, unlimited events, and automatic Daylight Savings time correct. Up to 5 schedules may be active on any given day. User shall be able to select from 16 tone options or user created .wav files for class change signaling. In addition the system shall allow unlimited user defined class change tones to be recorded. The system shall allow control of the bell schedules via the district WAN/LAN. The system shall directly connect to the WAN/LAN without the need for a separate computer at the school location. Bell schedules can remotely be created, changed, stored and downloaded to the system by an authorized user from a browser-based interface.
 - L. Ability to correct and power secondary clocks using the same Cat/6 cable drop (district standard) used for intercom speaker, call switch and (optional) motion detector.
- 2.2 EQUIPMENT AND MATERIAL
- A. VoIP Based Controller (Gateway) Rauland-Borg Telecenter Series – with the following features and capabilities:
 - 1. The ability to network multiple controllers via the LAN to provide a single interconnected system within the facility. The networking capability must provide for total transparency between controllers and in turn operate as a single system.

2. On-site or off-site diagnostics shall be capable via a standard Ethernet port for factory-trained personnel. The controllers shall tie directly into the LAN. In addition, all bell scheduling tasks must be browser based allowing authorized access from off-site district staff. On-site facility staff may also perform these tasks in the same manner as the district staff.
 3. System shall connect to the district provided Telephone Network via an analog trunk, or station port.
 4. The VX Works based Operating System and system programming database shall be stored in non-volatile flash memory. The Operating System can be easily upgraded through a configuration program without requiring replacement of any chips. The system programming database can be easily archived.
 5. Support a flexible numbering plan allowing two, three, four, or five digit extensions. The two, three, four, and/or five digit extensions can be intermixed within the same facility. Each extension can include leading or trailing alpha digits to match a facility's room numbering scheme.
 6. Multiple attendant positions via district provided Telephone Network shall be capable of answering internal intercom call-ins a minimum of one (1) Marquee Display shall be provided.
 7. Personal Identification Numbers (PIN's) shall be available for all staff. By dialing their PIN at any provided telephone, the staff member shall have access to the School Internal Intercom and Public Safety Network.
 8. Reports on feature usage, system activity, etc. shall be available upon request either on site or remotely.
 9. Direct Dialing, two-way amplified voice intercom between any provided telephone and speaker without the use of a press-to-talk or talk-listen switch.
 10. DISA: Direct Inward System Access. The system can be configured to allow access to all system features/functions (paging, intercom, evacuation tones, class tone schedule selection, etc.) from any offsite DTMF dialing telephone via the district provided Telephone Network. Only authorized individuals may use this feature by dialing into the system through a dedicated trunk number, with or without a pass code, and then dialing a system function.
 11. Ability to place two levels of call-in from any call in switch
 12. The ability to answer intercom call-ins registered at pre-selected telephones.
 13. The ability to automatically reroute incoming call-ins to an alternate telephone or group of telephones if they remain unanswered for a predetermined amount of time.
 14. Call switches and analog clocks shall be wired using a single Category 5e/6 cable. Wiring for all speaker, analog clocks, and call switch shall be with one Cat 5e/6 cable drop per location. Systems requiring a custom cable plant will not be acceptable.
 15. The ability to remotely locate VoIP Controller(s) (Gateways) among MDF and IDF equipment closets. This flexibility allows for the most economical wiring of the system based on the layout of the facility thus eliminating the need for individual home run wiring per previous standard.
 16. The ability to initiate Class of Service changes either manually or automatically on a per station basis based on time of day, day of the week, and calendar via the integrated master clock.
 17. A minimum of sixty four (64) unique Classes of Service shall be available.
 18. Ability to perform any system feature or function from any authorized telephone.
- B. Intercom/Paging/Tones/Clock Correction Module

1. Provide an integrated intercom module for individual room intercommunications, all page and zone page, evacuation tones, prerecorded messages, multilevel call-in, secondary clock correction, and class change tones. The module shall be from the same manufacturer as the VoIP Controller (Gateway) to ensure compatibility. The module shall integrate directly with the VoIP Controller and will not require analog or digital tie lines to the VoIP Controller. Module shall provide the following integrated features and functions that integrate seamlessly with the VoIP Controller:
 - a. Two-way communication between any telephone and any room speaker.
 - b. Preannounce tone prior to connecting any intercom conversation to alert the user to the call and prevent unauthorized monitoring. A tone shall be automatically repeated at regular intervals for the duration of the intercom call if the voice circuit is not activated. A requirement to meet existing privacy laws.
 - c. Audio paging access from any telephone to any single intercom speaker, zone (group) of intercom/paging speakers, or all speakers/paging horns throughout the entire facility.
 - d. Single button access from any telephone on the system to distribute emergency announcements within the facility to all or select locations equipped with speakers. Emergency announcements originating from any assigned administrative telephone shall have priority over all regular system functions.
 - e. Single button access from any telephone on the system to initiate alarm signals within the facility to all or select locations equipped with speakers. Up to Sixteen (16) separate distinct alarm signals shall be provided. Alarm signals originating from any assigned administrative telephone shall have priority over all regular system functions.
 - f. The system will have the ability to utilize a web-browser and USB microphone to deliver live emergency paging, pre-recorded messages and tones from any authorized computer in the facility or the district. The system must be capable of automatically notifying district personnel via the WAN of an alarm condition.
 - g. The system can automatically broadcast page emergency instructions throughout an entire school when an alarm (e.g. lockdown, lockout, security, fire) is tripped or manually activated. The emergency instructions are preprogrammed and require no user intervention. The system provides redundant alarm annunciation over intercom/paging speakers and is not meant to replace primary fire alarm or security systems.
 - h. Multilevel call-ins can be placed from either a classroom telephone or a call-in switch. The call-ins route to select or all administrative telephones and can only be cleared from the system once answered from an administrative telephone. If a call-in is not answered within a preprogrammed time the call-in may reroute to other administrative telephone(s) announce over selected or all speakers and shall have the capability to also reroute calls to predefined Mobile telephones. Emergency Call-ins may also be programmed to send e-mail alerts to specific addresses
 - i. An option for Privacy call-in switches. When the Privacy switch is activated it prevents administrative or classroom telephones from monitoring the specific classroom/location intercom speaker.

- j. Classroom teachers shall have the capability to exclude pages and tones from their individual classroom for testing or other purposes. This exclusion cannot affect emergency pages. This exclusion will reset at midnight.
- k. An option for Call Assurance call-in switches. When the normal or emergency button is pressed, an LED lights up to visually confirm that a call-in has been placed.
- l. The system can automatically alter a call switch's class of service by time of day and date via the integrated master clock.
- m. The capability to assign speaker locations to any one or more of the sixteen (16) independent zones for zone paging, sixteen (16) independent program/music distribution zones and sixteen (16) independent class change tone reception; this assignment is a programmable function. Each location shall be programmed in software to belong to any combination of software zones. Software/hardwired zones must be configured as part of an unlimited number of district wide groups for school district emergency announcements. These district announcements must be accessed via microphone, a web-browser or telephone.
- n. Automatic class change tones sent through all or selected intercom/paging speakers and/or horns. Any combination of up to Sixteen (16) tones can be sounded to indicate different events. Up to sixteen (16) different class change schedules can be stored in the system and selected manually from an administrative telephone, web browser or selected automatically based on time, day of the week, and date. Tone type and duration are selectable for each class change event. An unlimited number of class change events can be programmed as part of the system.
- o. Programmable "Music-on-Class-Change." A program source can be automatically routed to select zones of paging speakers or all speakers within the facility during each class change period.
- p. The system shall provide facilities to distribute program material (i.e. cassette tape, CD, radio broadcasts) in the following manner:
 - 1) The user shall cue remotely located music source or select radio station.
 - 2) From an Administrative Telephone the user can select the room(s) or areas to distribute program.
 - 3) Automated distribution based on event schedule.
- q. The module provides for secondary clock correction with the following features and functions:
 - 1) User programmable Automatic Daylight Savings Time Change.
 - 2) Latched operation of zone outputs to control lighting or other devices.
 - 3) Interface with most types of secondary slave clocks whether synchronous wired, wireless or electronic.
 - 4) User-programmable custom slave clock correction. Output relays rated at 5 amperes shall be provided on all zone circuits as necessary.
 - 5) Ability to correct and power secondary clocks using same Cat5e/6 supporting intercom speakers, classroom telephone, call switch and motion detector. Secondary clocks requiring more than 15 mA shall not be acceptable.
- r. System has the ability to sync system time to the Atomic Clock Signal or to the school's or districts network time server. System has the ability to offset

system time (+) or (-) 15 minutes from true atomic time to accommodate bus schedules or other scheduling issues.

- s. The module provides for classroom security and call switch supervision with the following features and functions:
 - 1) All field wiring to call switches connected to the system shall be capable of individual supervision for opens or shorts.
 - 2) System shall be capable (future) to accept multiple alarm inputs from the main security and/or fire alarm system. Emergency tones and/or announcements can therefore be triggered, via the primary security and/or fire alarm system, to provide redundant annunciation using the classroom and corridor speakers.
- t. Intercom and paging speakers/horns can be assignable to any one or more of the sixteen (16) zones for zone paging, up to sixteen (16) zones for program distribution, and sixteen (16) zones for class change tones. Any of these zones may be part of a district created emergency paging zones allowing paging groups of different facilities within the school district . All of these zones may be configured to be independent of the other zones and in any combination. Initially, paging zones shall be provided for the following:
 - 1) Grade 1
 - 2) Grade 2
 - 3) Grade 3
 - 4) Grade 4
 - 5) Grade 5
 - 6) Grade 6
 - 7) Grade 7
 - 8) Grade 8
 - 9) Teachers' lounge and workrooms.
 - 10) Common Areas
 - 11) Administrative Areas
 - 12) North Outside Speaker Area
 - 13) South Outside Speaker Area
 - 14) West Outside Speaker Area
 - 15) East Outside Speaker Area
 - 16) Gymnasium

C. Normal/Emergency Call Switch – Rauland TCDCS2 Dual Level Call In Switch w/led and Cancel

- 1. Normal/Emergency Call Switches indicated on the drawings shall provide the following functions and features:
 - a. One (1) “Normal” call switch that shall activate a distinctive “NORM” level call from a single button activation. The button shall be clearly marked “NORM” and will route the call-in to any one or more Administrative Telephones and/or Marquee Displays for quick and easy response from an Administrative Telephone. In accordance with the Americans with Disabilities Act (ADA), the “Normal” call will provide a steady call assurance LED confirming that the call has been placed in the system.
 - b. One (1) “Emergency” call switch that shall activate a distinctive “EMERGENCY” level call from a single button activation. The button shall be red in color and shall be clearly marked “EMERGENCY” and will route the call-in to any one or more Administrative Telephones and/or Displays for quick and easy response from an Administrative Telephone. In

accordance with the Americans with Disabilities Act (ADA), the "EMERGENCY" call will provide a flashing call assurance LED confirming that the call has been placed in the system.

D. Audio Paging/Program Amplifiers

1. Power amplifier(s) shall be provided to provide a minimum of ½ watt of power to all intercom speakers, 2 watts of power to all paging speakers, and 15 watts of power to all paging horns.
2. The maximum load on the paging/program amplifiers shall be 80% of the rated maximum output of the amplifiers.

E. Interior Recess-mounted Wall/Ceiling Speakers

1. Provide premium quality 8" cone transducer speaker. Transformer assembly shall be dual voltage multi-tap type suitable for 25 or 70-volt installations. The speaker shall have a frequency response of 65 Hz to 17 KHz with a power rating of 8 watts. Sensitivity shall be 93 dB, 1 watt, 1 meter. Voice coil shall be ¾" diameter with a 5 ounce magnet. When installed in ceiling, no speaker assembly weight shall be resting on any ceiling tiles.
2. The recessed back box shall be of heavy gauge cold-rolled steel, spot welded for stability with a rust-retardant gray primer finish. Acoustically treat the interior to eliminate mechanical resonance. The back box shall be 10-3/4"x10-3/4"x3-3/4" deep and shall be capable of accommodate the clock speaker baffle in locations designated.
3. The surface mount clock/speaker back box shall be of 22 gauge cold-rolled steel, with baked powdered epoxy cool gray finish. Supports either vertical or horizontal mounting. The surface mount clock/speaker back box shall be 20.18" x14.26" x2.78" deep.
4. The baffle shall be constructed of a one-piece, 22 gauge cold-rolled steel, zinc-treated to prevent corrosion. The finish shall be white baked powdered epoxy and be virtually scratch/mar proof. The baffle perforation pattern shall be designed for wide sound dispersion and screw attachment to top of the back box.

F. Exterior Recessed Wall Mounted Horns

1. Unit shall be double re-entrant type with compression driver mounted within weather-resistant housing. Audio power capability shall be 15 watts continuous. Frequency response shall be 600-14,000 Hz 700-5500 Hz (+ or – 5dB). Sound pressure level shall be 114dB (15W/1M). Sound dispersion angle shall be 95 degrees. Transformer equipped loudspeaker shall have impedance selection via seven position switch of 5000, 2500, 666, 333, 89, and 45 Ohms. Power taps shall be available .48, .94, 1.8, 7.5, and 15 watts on 25V line; 1, 2, 3.8, 7.5, and 15 watts on 70.7V line and 15 watts on 100V line. Loudspeaker mounting shall be by eight 3/16 "evenly spaced holes. Model APF-15T dimensions shall be Dia. 5 3/8" x D 5 3/16" x Dia. Of flange 6 5/16"; Finish shall be grey baked epoxy

Speaker shall be Atlas Sound APF-15T, **No Substitutions.**

G. Exterior Surface Wall or Ceiling Mounted Horns

2. Unit shall be double re-entrant type with compression driver mounted within weather-resistant housing. Audio power capability shall be 15 watts continuous. Frequency response shall be 600-14,000 Hz 700-5500 Hz (+ or – 5dB). Sound pressure level shall be 114dB (15W/1M). Sound dispersion angle shall be 95

degrees. Transformer equipped loudspeaker shall have impedance selection via seven position switch of 5000, 2500, 666, 333, 89, and 45 Ohms. Power taps shall be available .48, .94, 1.8, 7.5, and 15 watts on 25V line; 1, 2, 3.8, 7.5, and 15 watts on 70.7V line and 15 watts on 100V line. Loudspeaker mounting shall be by eight 3/16 "evenly spaced holes. Model APF-15T dimensions shall be Dia. 5 3/8" x D 5 3/16" x Dia. Of flange 6 5/16"; Finish shall be grey baked epoxy Speaker shall be Atlas Sound APF-15T, **No Substitutions**

H. Accessories

Recessed Mounting Back Box

1. Unit shall be a Durable Enclosure Designed to Recess Mount VP 161 Series Vandal Proof Baffles. The Unit Accommodates A Wide Variety of Loudspeaker/Transformer Configurations. The Unit Shall be Constructed of Heavy-Duty 18 Gauge Stainless Steel Including Undercoating and a Natural Finish. The Unit Shall be designed for use with Atlas Sound VP 161 Series Vandal/Weather resistant Baffles.

Back Box shall be Atlas Sound 161RES; **No Substitutions.**

Surface Mounting Back Box

1. Unit shall be designed to Surface Mount VIP161 Series Vandal Proof Baffles. The Unit shall accommodate a Wide Variety of Loudspeaker/Transformer Configurations. The Unit Shall be Constructed of 18 gauge Stainless Steel Construction Including Undercoating and a White Powder Coat Finish. The Unit Shall be Weather-Resistant and Suitable for Outdoor Use.

Back Box shall be Atlas Sound 161SES; **No Substitutions.**

Recessed Vandal-Proof Baffles

1. Unit shall offer tamperproof protection for cone loudspeakers and re-entrant horns. Unit is constructed of special aluminum alloy providing twice the strength of conventional cast aluminum baffles. Unit comes in attractive square (Our standard) or round models to meet varying applications and aesthetic requirements.

Recessed Baffle shall be Atlas Sound VP161-APF; **No Substitutions**

I. Uninterruptible Power Supplies (UPS)

5. UPS equipment provided for this system will include Power Conditioning to smooth current and voltage fluctuations.
6. UPS equipment will be sized in accordance with the system manufacturer's recommendations.
7. Provide an individual UPS for EACH SYSTEM CONTROLLER (Gateway) furnished with the system.
8. Provide additional UPS(s) for protection of all other equipment furnished with the system and housed in the equipment racks.
9. All UPS equipment shall be rack mounted and assigned an IP address for network communication. Contact Owner for assigned IP address.

- J. Equipment Racks
1. All equipment racks shall provide 44 spaces (77") minimum for mounted system equipment.
 2. All equipment racks shall be multi-rack format ("gangable") style, bolted together, and open cavity.
 3. All equipment racks will be provided with lockable rear doors.
 4. Equipment rack(s) shall be located in climate-controlled areas/rooms as shown on drawings.
 5. All head-end, distribution, and source equipment, including data and power, shall be located in racks configured as approved by the Engineer.
 6. Rack mounted equipment shall be accessible from front and rear.
 7. All unused rack spaces will be covered with appropriate blank/vent panels.
 8. The intercom p.a. source equipment will mount in these approved data racks at a good working level approximately shoulder height.
 9. The cables to/from the source equipment must be terminated on 66-M150 telephone type punch blocks and NEVER on 110 computer type punch blocks. The 66-M150 punch blocks must be snapped onto 89B brackets, and the 89B brackets must be mounted to telephone style blue boards either half or full size as necessary.
 10. The blue boards must be mounted to one of the appropriate equipment room walls at a good working height.
 11. The "house" cables for the speakers and any feeder cables must also be terminated on 66-M150 cables, NEVER on 110 type blocks.
- K. Analog Secondary Clocks
1. Analog clocks shall be designed to provide long term maintenance free timekeeping in any commercial application with a five (5) year manufacturer's warranty.
 2. Analog shall correct for time, hour, minute and second hands.
 3. The analog clock shall have an internal clock that can keep time for up to six (6) hours after a power failure without the use of batteries.
 4. Typical recovery time after power failure shall be less than 2 minutes.
 5. 12 inch analog clocks shall be supplied in all classrooms, administrative areas and common areas as indicated on the plans. 16 inch analog clocks shall be provided in auditoriums, and gymnasiums with protective cover,
 6. In areas designated a clock/speaker baffle combo unit shall be supplied either surface or wall mounted depending on site condition.
- L. Wireless Clock System
1. Provide complete and satisfactorily operating NTP Synchronized Wireless Clock System with analog clocks as described herein, using materials and equipment of types, sizes, ratings, and performances as indicated.
 2. (NTP) Network Time Protocol is a network standard protocol that assures accurate synchronization to the millisecond of computer clock times in a network of computers. Based on UTC, NTP synchronizes client workstation clocks to the U.S. Naval Observatory Master Clocks in Washington, DC and Colorado Springs, CO. Running as a continuous background client program on a computer, NTP sends periodic time requests to servers, obtaining server time stamps and using them to adjust computer clocks.

3. The system shall be easy to learn and operate. All standard system programming shall be user friendly to allow the system administrator the ability to easily program system features.
4. Use materials and equipment that comply with referenced standards and manufacturers' standard design and construction, in accordance with published product information.
5. Coordinate the features of all materials and equipment so they form an integrated system, with components and interconnections matched for optimum performance of specified functions.
6. The NTP Synchronized Wireless System consists of a master transmitter located on the inside of the building, and a NTP receiver connected to a time server. An unlimited number of wireless analog clocks are synchronized to the NTP time. System shall synchronize all clocks to each other. System shall utilize NTP technology to provide atomic time to components.
7. System shall not require hard wiring for its components except for AC Power. Analog Clocks may be battery operated for full portability if required.
8. Analog Clocks shall synchronize to +/- 1 second of the transmitter displayed time.
9. Clocks shall automatically adjust for Daylight Saving per settings on the transmitter
10. The system shall have an internal clock that is continually updated by the NTP receiver. If a NTP failure were to occur, the clocks would continue to be synchronized to the internal clock and would not deviate from each other. Once NTP time is restored, all clocks would once again be synchronized to the NTP time.
11. The system must have a failsafe design so that if a power interruption were to occur, the clocks will continue to operate. If a synch signal is not received by the analog clocks for 48 hours, the second hand will double pulse to indicate this condition. Upon restoration of power, the transmitter will once again communicate with the clocks and normal operation will resume.
12. Battery Powered Analog Clocks shall require 2 "D" cell batteries.
13. System shall be 100% programmable from the front operational panel with lights that indicate power status and NTP reception. Panel programming will also include Time Zone, Frequency, 12 or 24 hour operation and DST on/off.
14. The wireless backbone must support expansion of the system to include wireless alphanumeric displays for emergency crisis communications for district-wide communications.
15. The system may be modified to use GPS instead of NTP as the time source without the need to replace the transmitter. A GPS receiver would need to be added with access to the outside of the building.
16. The system shall lend itself to expansion by simple addition of wireless secondary clocks and their required power source.
17. EQUIPMENT AND MATERIALS
 - a. WIRELESS TRANSMITTER
 - 1) FCC Part 90 Approved, 467.2125-467.4375 MHz frequency range
 - 2) Radio Technology (Narrowband FM, 12.5 KHz bandwidth)
 - 3) 10 selectively available channels
 - 4) 5 watt transmitter
 - 5) Daylight Savings Time pre-programmed
 - 6) Time Zone Pre-set
 - 7) Non-Volatile Memory

- 8) LCD Display for time, date, year, power, time zone and signal reception
 - 9) Operating Range (32 degrees F to 158 degrees F)
 - 10) Rack or Shelf Mount
 - 11) Power Supply Input: 120-volt AC, Output: 12-volt DC, 3 Amps
 - 12) 7" Rear Mounted Antenna
 - 13) Dimensions: 12"L x 6"W x 1.75"H Weight: 2 lbs
 - 14) NTP Receiver
 - 15) Optional External Antenna for use in large campus applications. Up to 2 miles radius
- b. SECONDARY 13" ANALOG CLOCK
- 1) 13" Analog Clock (Battery Powered using 2"D" Cell batteries).
 - 2) Maintenance Free.
 - 3) Five year manufacturer's warranty.
 - 4) Microprocessor based with built-in wireless receiver
 - 5) Heavy Duty Construction
 - 6) Durable ABS Casing
 - 7) Clock numbering graphics shall be Standard Arabic Format (12HR-60 Minute)
 - 8) Face of clock is white
 - 9) Hour and Minute hands shall be black, second hand is red
 - 10) The clock lens shall use a shatterproof polycarbonate material with no visible molding marks. Glass and/or visible molding marks are unacceptable.
 - 11) The clock shall have a low-profile, semi-flush design
 - 12) Wire Guard Model in areas where protection is required as indicated on drawings or by owner.
- c. SECONDARY DUAL FACE 13" ANALOG CLOCK
- 1) 13" Analog Clock (Battery Powered using 2"D" Cell batteries per face)
 - 2) Wall or Ceiling Mount shall be determined by drawings or owner
 - 3) Maintenance Free.
 - 4) Five year manufacturer's warranty
 - 5) Microprocessor based with built-in wireless receiver
 - 6) Heavy Duty Construction
 - 7) Durable ABS Casing
 - 8) Clock numbering graphics shall be Standard Arabic Format (12HR-60 Minute)
 - 9) Face of clock is white
 - 10) Hour and Minute hands shall be black, second hand is red
 - 11) The clock lens shall use a shatterproof polycarbonate material with no visible molding marks. Glass and/or visible molding marks are unacceptable.
- d. SECONDARY 16" ANALOG CLOCK
- 1) 16" Analog Clock (Battery Powered using 2"D" Cell batteries).
 - 2) Maintenance Free.
 - 3) Five year manufacturer's warranty.
 - 4) Microprocessor based with built-in wireless receiver
 - 5) Heavy Duty Construction
 - 6) Durable ABS Casing

- 7) Clock numbering graphics shall be Standard Arabic Format (12HR-60 Minute)
- 8) Face of clock is white
- 9) Hour and Minute hands shall be black, second hand is red
- 10) The clock lens shall use a shatterproof polycarbonate material with no visible molding marks. Glass and/or visible molding marks are unacceptable.
- 11) Wire Guard in areas where protection is required as indicated on drawings or by owner.
- 12) The clock shall have a low-profile, semi-flush design

PART 3 - EXECUTION

3.1 EXAMINATION

- A. Examine conditions, with the Installer present, for compliance with requirements and other conditions affecting the performance of the School Communications and School Safety Network.
- B. Do not proceed until unsatisfactory conditions have been corrected.

3.2 INSTALLATION

- A. General: Install system in accordance with NFPA 70 and other applicable codes. Install equipment in accordance with manufacturer's written instructions.
- B. Furnish and install all material, devices, components and equipment for a complete operational system.
- C. Impedance and Level Matching: Carefully match input and output impedance's and signal levels at signal interfaces. Provide matching networks where required.
- D. 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.
- E. All housings are to be located as indicated.
- F. 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.
- G. 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.
- H. 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.
- I. 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.
- J. Weatherproofing: Provide weatherproof enclosures for items to be mounted outdoors or exposed to weather.

3.3 GROUNDING

- A. 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.
- B. 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.

- C. 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.
- 3.4 FIELD QUALITY CONTROL
- A. 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.
 - B. 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.
 - C. 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.
- 3.5 FINAL ACCEPTANCE TESTING
- A. The Final Acceptance Testing shall be provided to the Owner or the Owners 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.
 - B. 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. This document MUST list either the extension number, port number, or some other means so the owner will be able to look at the location of a speaker and cross reference it's number/port on this list as to be able to make programming bell/zone type changes.
 - C. 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.
 - D. Record Drawings: Prior to final 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". Again, these drawings MUST show the extension/port number of every speaker in the system.
 - E. System Training: Submit the following information describing the training programs and system trainers in accordance with the specifications.
 - a. Include with the submittal a preliminary staff development training program in outline form for review and approval by the owner's representative.
 - b. 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.
 - c. Include with the submittal a current copy of trainer's need's assessment form which will be reviewed with the owner's designated representative for the system's preliminary system programming and configuration.
 - d. Include with the submittal copies of all documentation used to identify for the owner those participants attending and completing the training programs.
- 3.6 COMMISSIONING
- A. 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, paragraphs 3, 5 & 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.

- B. Schedule training with Owner through the owners representative, with at least seven days advance notice.

3.7 OCCUPANCY ADJUSTMENTS

- A. The contractor shall provide Occupancy Adjustments in accordance with Section 1.6, paragraph 9 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.

3.8 CLEANING AND PROTECTION

- A. 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