SECTION 275116 - PUBLIC ADDRESS SYSTEMS

PART 1 – GENERAL

1.01 GENERAL REQUIREMENTS

A. The conditions of the General Contract (General, Supplementary, and other Conditions) and the General Requirements are hereby made a part of this Section.

B. Contractor shall provide adequate and complete submittal information, which shall include but not limited to specification sheets, working drawings, and shop drawings.

C. The contractor shall be responsible for providing a complete functional system including all necessary components whether included in this specification or not.

D. In preparing the bid, the contractor should consider that no claim will be made against the owner for any costs incurred by the contractor for any equipment demonstrations which the owner requests.

1.02 SCOPE OF WORK

A. Furnish and install all equipment, accessories, and materials in accordance with these specifications and drawings to provide a complete and operating school communications system including but not limited to:

1. Administrative display phone with integrated 4x16 character display
2. Administrative VoIP Phone
3. Administrative phone
4. Handsets
5. Call Switches
6. Classroom speaker(s), ceiling- or wall-mounted
7. Call initiation switches capable of placing normal, urgent or emergency calls
8. Telemedia control of VCRs, DVDs, Video-On-Demand, and Blu-Ray
9. Built in Master Clock with 1024 events, 32 Schedules, including Daylight Savings Time, and 32 custom holiday events that can be assigned to any of the 64 multi-purpose zones
10. Wall-mounted paging horns
11. One built-in network interface port for system combining and LAN station-to-station calling and WAN access for district-wide all-calls and remote management
12. One built-in network interface port for first-time system configuration
13. Built-in Web Server for full system programming with Quantum Commander

14. Administrative Web-Browser Application for Programming and Day to Day System Operation

B. System can connect to the PSTN (Public Switched Telephone Network) by connecting it to analog CO trunks.

1. Telephone service with public utilities shall be arranged by the owner, in conjunction with the equipment supplier. Equipment supplier shall generate a one-page document that will provide the Owner with information concerning number of outside lines (minimum of 8, and a maximum of 960 per school, maximum of 99 Schools [facilities]).

1.03 SUBMITTALS

A. Specification Sheets shall be submitted on all items including cable types.

B. Submit outline drawing of system control cabinet showing relative position of all major components.

C. Shop drawings, detailing integrated electronic communications network system including, but not limited to, the following:

1. Station wiring arrangement

2. Equipment cabinet detail drawing

D. Submit wiring diagrams showing typical connections for all equipment.

1.04 QUALITY ASSURANCE

A. All items of equipment 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.

B. The contractor shall show satisfactory evidence, upon request, that he or she maintains a fully equipped service organization capable of furnishing adequate inspection and service to the system. The contractor shall maintain at his or her facility the necessary spare parts in the proper proportion as recommended by the manufacturer to maintain and service the equipment being supplied.

1.06 SAFETY / COMPLIANCE TESTING

A. The communications system shall bear the label of a Nationally Recognized Testing Laboratory (NRTL) such as ETL, and be listed by their re-examination service. All work must be completed in strict accordance with all applicable electrical codes, under direction of a qualified and factory approved distributor, to the approval of the owner.

B. The system is to be designed and configured for maximum ease of service and repair. All major components of the system shall be designed as a standard component of one type of card cage. All internal connections of the system shall be with factory-keyed plugs designed for fault-free connection.

C. The printed circuit card of the card cage shall be silk-screened to indicate the location of each connection.

1.07 IN-SERVICE TRAINING

A. The contractor shall provide a minimum of eight hours of in-service training with this system. These sessions shall be broken into segments, which will facilitate the training of individuals in the operation of this system. Operators Manuals and Users Guides shall be provided at the time of this training.

1.08 WIRING

A. System wiring and equipment installation shall be in accordance with good engineering practices as established by the EIA and the NEC. Wiring shall meet all state and local electrical codes. All wiring shall test free from all grounds and shorts.

B. All communication system wiring shall be labeled at both ends of the cable. All labeling shall be based on the room numbers as indicated in the architectural graphics package.

1.09 PROTECTION

A. The contractor shall provide all necessary transient protection on the AC power feed and on all station lines leaving or entering the building.

B. The contractor shall note in his system drawings, the type and location of these protection devices as well as all wiring information. Such devices are not to be installed above the ceiling.

1.10 SERVICE AND MAINTENANCE

A. The contractor shall provide a five year equipment warranty of the installed system against defects in material and workmanship. All materials shall be provided at no expense to the owner during normal working hours. The warranty period shall begin on the date of acceptance by the owner/engineer.

B. 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.

C. The system manufacturer shall maintain engineering and service departments capable of rendering advice regarding installation and final adjustment of the system.

PART 2 - EQUIPMENT SPECIFICATION

2.01 MANUFACTURERS

A. Manufactures: Subject to compliance with requirements specifications, provide the following system:

1. Quantum Multicom IP manufactured by Bogen Communications, Inc., Ramsey, NJ and Made in the United States of America. Or approved alternate.

B. The functions and features specified are vital to the operation of this facility; therefore, inclusion in the list of acceptable manufacturers does not release the contractor from strict compliance with the requirements of this specification.

2.02 EQUIPMENT

A. CONSOLE

1. Rack-mounted equipment shall be Bogen Model TCPER

   a. Rack size as required.

2. MCRMP / MCMP / QRC24-48 (Compact Rack System)

   Rack Mount full, Mini-System, or Wall Mount panel. Shall include the following components:

   Quantum Processor Card QSPC1
   Analog Card
   Station Card
   Telephone Interface Card
   5 volt / 12 volt Power Supply
   26 volt Power Supply(s)
   Audio Program Module Interface Assembly

3. MCRMF / MCMF / QRC24-48

   a. MCRMF Rack mounting mainframe. Includes built-in ventilation fans and the following circuit cards:

      Quantum Processor Card
      Analog Card
      Station Card
      Telephone Interface Card
      Ribbon Cable Assembly

   b. MCMF Wall Mount mounting mainframe. Utilizes convection cooling and the following circuit cards:

      Quantum Processor Card
      Analog Card
      Station Card
      Telephone Interface Card

   c. QRC24 / QCR48 Compact Quantum Rack System Mainframe (1 per Mini-System). Includes built-in ventilation fan and the following circuit cards:

      Quantum Processor Card
      Analog Card
      Station Card
      Telephone Interface Card

4. MCRRP / MCRRC / MCRC

   1. Relay Module/Card

5. MCRCA

    a. Ribbon Cable Assemblies

6. Program Sources

    a. Tape Player & AM/FM Tuner
    b. 5-Disc CD Player
    c. AM/FM Tuner
    d. Desktop Paging Microphone

7. Power Amplifiers

    a. 60-Watt Amplifier
    b. 125-Watt Amplifier
    c. 250-Watt Amplifier

8. Station Equipment

    a. Administrative Display Phone
    b. Administrative VoIP Phone
    c. Administrative Wall-Mount Phone
    d. Administrative Desktop Phone
    e. Secure Call - Call Assurance Call-in Switch
    f. Call switch with Privacy
    g. Rocker-style Call Switch

9. Optional Equipment

    a. Telephone Access Card
    b. Telemedia Control Unit
    c. Television Control Unit
    d. Handheld Infrared Transmitter

2.03 COMPONENTS AND DESCRIPTIONS

A. The Quantum hybrid IP intercom must be capable of supporting the existing Multicom 2000 hardware and functions as well as the new features across the Quantum Processor's interfaced over the LAN. The VoIP capabilities of the QSPC1 Quantum Processor Card will enable the support of the features across the various processors' nodes. The sections below cover how the system will handle each of the existing and the new features in the QSPC1 product. Systems that do not allow the reuse of existing equipment or are not backwards compatible shall not be deemed acceptable. Systems that don't allow processors/nodes to be seamlessly integrated via the LAN are not considered equal.

B. Quantum Multicom IP

    1. The Quantum facility shall have a minimum of one node/processor and a maximum of up to 64 interconnected nodes/processors. A maximum of up to 99 facilities can be interconnected into a Quantum hybrid IP district.

    2. The station numbers, program buses, etc. shall be identified with a QSPC1#, Station card# and port# or QSPC1#, program#.

3. Audio Information will be transmitted between the processors on the LAN using VoIP technology. Quantum will utilize all of the existing Multicom 2000 hardware except the current processor card. Thus making Quantum Multicom IP backwards-compatible with existing Multicom 2000 systems.

4. The processor software shall be upgradeable via Quantum Commander. After rebooting the nodes the software upgrade will be complete. If for some reason the newly installed software will not boot properly, the system shall revert to the previous working software load.

5. It shall be possible for Quantum schools to make 'station-to-station' calls and 'inter-facility All-Call paging' to a single facility or all Quantum facilities in a district using VoIP technology. Systems that require software to be loaded onto an external server or computer to make 'station-to-station' calls and 'inter-facility All-Call paging shall not considered equivalent.

6. The primary QSPC1 shall be configured to act as a VoIP Call Manager for facility point-to-point calls. Using Quantum Commander, every facility shall be configured with the IP addresses of the primary QSPC1 systems of all the other known facilities (maximum of 98 additional), and an organizationally private multicast IP address is to use the 239.0.0.0/8 scope. Additionally, multicast best practices recommend avoiding 239.0.0.x, 239.0.1.x, and 239.128.1.x address scopes which shall be used for facility and inter-facility paging.

7. The maximum number of simultaneous inter-facility intercom calls supported is based on the actual performance of the WAN and the CPU load. The voice quality of the inter-facility calls may vary based on the WAN conditions the average network intercom call uses around 20 Kbps (uni-cast) audio distribution (i.e. mp3 player, AM/FM tuner and or CD player) uses around 250 Kbps (multi-cast).

8. The system shall facilitate the playing of audio clips repetitively played until stopped by the Quantum Commander User an administrative display phone MCDS4 or a dry contact closure.

9. A built-in Master Clock, with battery backup, shall be included to automatically control class change or other signals. The Master Program Clock shall have 1024 events that may be programmed into any of the 32 time signaling schedules, and/or 32 flexible holiday schedules. The schedules shall be nameable for easy selection when assigning schedules to days or in the event of an override. Systems that rely on external master clock shall not be considered equivalent.

10. Network Time Synchronization. The system shall be capable of periodic update/synchronization of the processor's time with a Network Time Server via the school's LAN network. The Quantum processor card checks the NTP Server time every hour. Systems that do not provide Network Time Synchronization will not be deemed equivalent.

11. Network Failure – in the event of a network failure the multi-node facilities processors will continue to work autonomously providing the facility with all scheduled events stored in each of the nodes local non-volatile memory and ability to connect an administrative phone to the local node for paging in the event of network failure. Systems that do not provide autonomous operation shall not be considered equal.

12. Multi-Node Survivability – the system shall provide Multi-Node Survivability in the event of a processor card failure. If either the primary processor or secondary processor fails the remaining processor will take over as primary. Systems that do not provide Multi-Node Survivability shall not be considered equivalent.

13. Station in a Multi-Node system shall support any or all station types specified in section 2.02 A. 8. Systems that don't support all types of station or require different head end equipment are not considered equivalent.

C. Quantum Commander

1. The processor utilizes a web-based programming tool. The Quantum Commander is built into the QSPC1 processor card and upon boot up, users can login to the Quantum Commander Web Server via their web browser. Systems that require software to be loaded onto an external server/pc for web-based programming shall not considered equivalent. Systems that require com port redirector software or serial to Ethernet adapters are not deemed equal

1. The Quantum Commander shall be divided into three access levels depending on user access credentials. Systems that do not provide at least three (3) Levels of access are not equivalent. The three levels are:

   a. User
   b. Administrator
   c. Technician

2. Only the Administrator and Technician shall have access to add/delete/modify the database objects.

3. Users shall have display only access to see the data objects that include configuration, alarms, and performance data and perform certain operations based on the user's CoS (Class of Service).

4. The following Menu Items must be available on the Multicom IP Quantum Commander:

   A. File - Open Database, New System, Save, Delete, Report and Exit, Upload Database, Download Database, Download Software, Diagnostics, Tones and Announcements, Relay Configuration, Program Distribution, Media Assignment, List Passwords, Add Password, and Change Password.

D. Administrative Display Phone

1. Administrative Display Phones shall be Bogen Model MCDS4. The administrative telephone display panel shows the time of day and day of week, the current time signaling schedule, and the station numbers and call-in priority of staff stations that have called that particular station. A 3-key response is used to scroll the display, and answer or erase normal, urgent, and security calls. Depending upon the system programming, an administrative station can use display menus to activate zone pages, alarm signals and external functions, as well as select program sources and distribute or cancel a program to any or all speakers or zones.

2. Administrative Display Phones shall have the ability to dial and have the option of dialing either the loudspeaker or phone at each station location. The system shall automatically switch from phone-to-intercom communication to phone-to-phone communication when the staff handset or enhanced staff phone on the receiving end of the call is lifted.

3. The Administrative Display Phone shall display the classroom number of any station that calls 911. This feature will notify the main office when a classroom has dialed 911 emergency centers so that administrators can direct emergency personnel to the correct physical location in the building when they arrive. Systems that do not provide this feature will not be deemed equal.

4. Administrative Display Phones shall have the ability to manually override the active schedule in the facility. Systems that do not have the ability to override the schedule via the administrative phone are not equal.

E. Administrative Wall Display

1. Administrative wall display shall be a Bogen Model MCWD. The wall display shows the time of day, current time signaling schedule that is running, and the station numbers and call-in priority of call switches, and emergencies from Administrative VoIP Phone and Administrative Phones.

2. The Administrative Wall Display shall display the classroom number of any station that calls 911. This feature will notify the main office when a classroom has dialed the 911 emergency centers so that administrators can direct emergency personnel to the correct physical location in the building when they arrive. Systems that do not provide this feature will not be deemed equal.

F. Administrative Phone

1. Admin phones shall be one of the following Bogen Model(s)

   a. MCDS4 – Administrative Display Phone

2. When a station goes off-hook and dials the 3- to 6-digit (preceded by an * if calling a telephone instead of loudspeaker) number of the desired station. The call is routed to any station (admin/staff).The Admin phone shall be capable of the following features depending on how the station CoS is configured:

   a. Emergency Call involves going off hook and flash hook the switch at least four times. The Call is then switched to the assigned Admin Phone. This requires the display of the architectural number on the Administrative Display phone and or Wall Display. Systems that do not provide this feature are not equivalent.

   b. Alarm Distribution

   c. Audio Program toggle On/Off

   d. Call Forward activation for All-Calls/Busy/No Answer/Busy or No Answer

   e. Cancel Call Forward

   f. Conference Calling

   g. Transfer Call

   h. Dial administrative display phone, dial the station number to call to the speaker or dial the station number preceded with * to call the phone. The call shall be routed to the administrative display phone and/or administrative wall display showing the architectural number that is calling.

   i. Emergency All-Call shall be broadcasted to all the stations in the facility.

   j. Place Outside Call

   k. Remote Answer

   l. Single-Zone/All-Station Page

   m. Call Waiting Tone for Outside Calls, and it shall be possible to feed the call waiting tone to the Administrative Phone during a conversation.

G. VoIP Display Phone

1. The Station goes Off-Hook and dials the 3- to 6-digit (preceded by an * if calling a telephone instead of loudspeaker) number of the desired station. The call is routed to any station (admin/staff).The classroom VoIP Display phone shall be capable of the following features:

    a. Speed dials

    b. Missed call logging

    c. Ethernet pass through jack

    d. Alarm Distribution

    e. Audio Program On/Off

    f. Call Forward activation for All-Calls/Busy/No Answer/Busy or No Answer

    g. Cancel Call Forward

    h. Dial administrative phone, dial the station number to call to the speaker or dial the station number preceded with * to call the phone. The call shall be routed to the administrative display phone and/or administrative wall display showing the architectural number that is calling.

    i. Emergency All-Call shall be broadcasted to all the stations in the facility.

    j. Place Outside Call

    k. Single-Zone/All-Station Page

H. Classroom Call Staff Stations

a. Staff Stations shall be Bogen Model:

    1. CA21B – Call Switch with Privacy

b. Shall be capable of Normal/Urgent/Emergency Calls

c. Normal/Urgent Call involves pressing the Call Switch once.

d. Emergency Call involves pressing the emergency call switch; flash hook the switch at least 4 times in a non-dial analog handset with Call Level Normal or Urgent; pressing the call switch or hook switch one time in a non-dial analog handset with Call Level Emergency only. The Call is then switched to the Administrative Display Phone. This requires the display of the architectural number on the Administrative Display Phone and/or Wall Display.

e. Emergency Link Transfer - If the emergency call is unanswered by the Administrative Display Phone and the emergency link transfer is provisioned and programmed; the emergency call will be forwarded to the loudspeaker associated with that station. Any station/admin phone with speaker can be programmed for the Emergency Link Transfer except the Administrative VoIP Phone. Systems that do not provide Emergency Link Transfer will not be considered equal.

f. In addition the SC1 is a Call Assurance Call-In Switch provides a visual confirmation that a call-in request has been logged with the Quantum system. Pushing the SC1's momentary rocker switch initiates a request for service to the Quantum system. The Quantum system then acknowledges this request by signaling back to the initiating SC1, which then illuminates its LED annunciator. The LED will remain lit until the call-in is serviced. At the end of the call, the LED will extinguish. The LED will also extinguish if the Quantum system's call queue containing the station's call request is cleared, or if the station's call request is individually cleared by the administrative station without responding.

I. Intercom System Speakers

1. Classroom Speakers shall be Bogen:

   a. Ceiling Speakers: CSD2X2 Drop-In Ceiling Speakers, or
   b. Wall Speakers: MB8TSQ/SL Metal Box Speakers

2. Hallway Speakers shall be Bogen:

   a. Ceiling Speakers: CSD2X2 Drop-In Ceiling Speakers, or
   b. Wall Speakers: MB8TSQ/SL Metal Box Speakers

3. Outdoor / Gym / Locker Room Speakers shall be Bogen:

   a. FMH15T mounted in BBSM6 surface-mounted vandal-resistant enclosure/BBFM6 flush-mounted vandal-resistant enclosure with FMHAR8 adapter ring and SGHD8 heavy duty grille
   b. KFLDS30T Wide Dispersion Reentrant Horn Loudspeakers

4. Common Area Speakers shall be Bogen:

   a. HFCS1 High-Fidelity Ceiling Speakers
   b. OCS1 NEAR Orbit Ceiling Speakers
   c. OPS1 NEAR Orbit Pendent Speakers

2.04 SYSTEM PARAMETERS

A. The communication system shall be a Bogen Quantum Multicom IP hybrid IP, and shall provide a comprehensive communication network between administrative areas and staff locations throughout the facility. Non-volatile memory shall store permanent memory and field-programmable memory. A system, which uses a battery to maintain system configuration information, shall not be acceptable.

The system shall provide no less than the following features and functions:

1. Telephonic communication (complete with DTMF signaling, dial tone, ringing and busy signals, and data display) on administrative stations shall use two wires. Systems that use more than two wires for communication, tones and data display shall not be acceptable.

2. Amplified-voice communication with loudspeakers shall use a shielded audio pair (shield can be used as one of the two required conductors for administrative phone or call-in switch).

3. The system shall be available in the following configurations:

   a. MC2K Wall-mounted in a custom enclosure Quantum. Station capacity shall be from 24 to 130 stations each Node. All stations shall have the ability to support displays.

b. MC2KR Rack-mounted Quantum. Station capacity shall be from 24 to 250 stations each Node. All telephone stations shall have the ability to support displays.

c. QRC24 & QRC48 Compact Quantum Rack System. Station capacity shall be from 24 to 48 stations per node. All stations shall have the ability to support displays, with an option to add up to 8 Central Office phone lines.

d. 2223/2233 MC2KR Rack-mounted and integrated with Bogen Multi-Graphic Series 2223 or Series 2233 equipment. In this configuration, Quantum Multicom IP system station capacity shall be expandable up to 240 stations in increments of 24 per node. All telephone stations shall have the ability to support displays. The Multi-Graphic system equipment provides the following: backup fail safe intercom and paging functions (Note: the systems operate independently; if one were to fail, the other provides intercom for student safety), plus two additional program channels, and additional Multi-Graphic functions. It shall be possible, by use of a separate call-in switch, to annunciate only to the Multi-Graphic portion of the system without using additional station ports within the Quantum Multicom IP system. For switch banks to work effectively the equipment must be centrally located for switch-bank operation.

   The above system configurations represent a single processor in the Quantum Multicom IP. Each processor can be combined with up to 63 additional systems (nodes) for a total single facility capacity of up to 16,000 stations.

4. The system shall consist of any combination of the following: Administrative Display Phones, Administrative VoIP Phones, and Administrative Phones.

   a. Staff Classroom Stations shall consist of wall- or ceiling-mounted loudspeakers with call-in switches or handsets.

   b. Administrative phone stations shall consist of VoIP phones, display phones, or DTMF dialing 2500 analog-style telephone sets.

   c. Administrative Display Phones shall be DTMF-dialing digital telephone sets with a 4x16 character LCD display panel. They shall be equipped with a standard 12-key push-button dialing keypad. Phones requiring external LCD displays shall not be accepted as an equal. Optionally, a loudspeaker may be connected at each administrative station location.

      1. Up to 5 Administrative Wall Displays may be added to the Administrative Station for large office areas.

   d. Administrative Display Phones, Administrative VoIP Phones, and Administrative Phones shall have the option of including a loudspeaker.

   e. All types of stations except administrative VoIP phones shall utilize the same type of field wiring. Future station alterations shall only require the station type to be changed and the proper software designation to be selected. Alterations shall not require field wiring or system head-end alterations. All field wiring and system head-end equipment shall support any type of station, at the time of installation. All contractor proposals shall reflect this capacity. Failure to submit and bid this project in this manner will be deemed as being in direct conflict of these specifications and will be rejected.

   f. There shall be no limit to the number of administrative display stations within the total capacity of the system including nodes. Systems that require different head-end equipment to make admin phone work shall not be acceptable.

g. It shall be possible at any time to change the type of station at any location without equipment or wiring changes except for administrative VoIP phones that utilize existing LAN connections. Systems that limit the quantity of each station type or require future additional equipment and/or system expansion to provide additional administrative telephones shall not be accepted as an equal.

5. The system shall be a global switching system, providing up to 512 unrestricted simultaneous private telephone paths per facility. The system shall also be capable of providing up to 512 amplified intercom paths per facility. One amplified intercom path shall automatically be provided with each increment of 24 stations of system capacity. All hardware, etc., required to achieve the necessary number of amplified-voice intercom channels for this system shall be included in this submittal. Amplified-voice intercom channels shall provide voice-activated switching. Systems requiring the use of a push-to-talk switch on administrative telephones shall not be acceptable. There shall be an automatic level control for return speech during amplified-voice communications. The intercom amplifier shall also provide control over the switch sensitivity and delay times of the VOX circuitry.

6. The system shall provide 911 Dial-Through with specific outside line(s) dedicated only for this function to ensure that the line is available all the time for 911 calls. The 911 Dial-Through is available to any station that can dial.

   a. The 911 CO lines will be pre-configured and reserved. If the 911 reserved lines are busy, the normal CO lines will be connected to route the 911 calls. If all the normal CO lines are busy, the ongoing call shall be disconnected and the 911 call shall be placed.

   b. When 911 is dialed from a Administrative VoIP Phone or Administrative Phone its Administrative Display Phone or Wall Display will receive a message that that room dialed 911.

7. It is of utmost importance that emergency calls from staff stations receive prompt attention. Therefore, it is important that there be an alternate destination in case the emergency call does not get answered at the primary location. To this end:

   a. Staff-generated Emergency calls shall be treated as the second highest system priority. Therefore, all Emergency calls shall annunciate at the top of the call queue of their respective administrative display phone. Should that emergency call go unanswered for 15 seconds, the call shall be re-routed to an alternate speaker station then a tone prompts the caller to make a verbal call for help. During the transfer, the original administrative telephone shall continue to ring the distinctive Emergency Ring. Should the Emergency Transfer to Station have an associated administrative telephone, it too shall ring the distinctive Emergency ring.

   b. The Emergency Transfer to Station shall be field programmable.

   c. Should the original administrative display phone be engaged in a non-emergency conversation, its conversation shall be automatically terminated, indicated with an alert tone, and then reconnected to the station that generated the Emergency Call.

   d. Should the administrative display phone be engaged in an emergency conversation, successive emergency calls shall log into the call queue as well as transfer to the Emergency Transfer Station for their verbal call for help. Upon termination of the initial emergency conversation, the next one shall immediately ring the administrative telephone.

   e. Systems failing to transfer unanswered Emergency calls or failing to immediately connect to the administrative display phone shall not be deemed as equal.

8. There shall be a System-Wide Facility Emergency All-Call feature. The Emergency All-Call shall be accessed from designated administrative phones or by the activation of an external contact closure which shall give the third audio program input emergency status. The Emergency All-Call function shall have the highest system priority and shall override all other loudspeaker-related functions including Time Tones, Normal All-Call or Zone Pages or Audio Distribution.

    a. Considering that emergencies calls are to be treated with the highest level of concern. Systems which do not regard Emergency-All-Call page from an administrative station with the highest priority shall not be deemed as equal.

    b. Upon picking up the receiver and dialing "9", a menu shall appear on the display prompting the user to enter each subsequent digit. In this way, the user shall not be required to memorize complicated key sequences in order to access emergency functions.

    c. The Emergency All-Call shall capture complete system priority, and shall be transmitted over all speakers in the facility. It shall also activate an external relay, which can be used to automatically override volume controls and other systems.

    d. Systems without Emergency All-Call, or systems with All-Call that cannot be activated by external means, or which do not capture complete system priority or activate an external relay, shall not be acceptable.

9. There shall be at least four Dedicated Emergency Alarm Tones. Each may be accessed by dialing a three-digit number from designated administrative display phone. These emergency tones should be separate from the time tones. Systems using external alarm generators, or having less than four emergency alarm tones shall not be acceptable.

    a. Upon picking up the receiver and dialing "9", a menu shall appear on the display prompting the user to enter each subsequent digit. In this way, the user shall not be required to memorize complicated key sequences in order to access Emergency Alarm Tones.

10. There shall be four (4) External-Function Relay Driver Outputs, accessible from designated Quantum Commander User or Administrative Display Telephones by dialing a four-digit number. These outputs remain set until accessed and reset at a later time. The user shall have the ability to review the status of each relay driver. A plain English menu, prompting the user through the fields without requiring the user to remember any dialing sequences shall support this feature. Systems that require the user to remember complicated dialing schemes or prompt the user via cryptic commands shall not be deemed equal.

    a. The stations shall be capable of being programmed for security contact relays for use with magnetic locks, motion detectors, cameras or any low-voltage, dry contact creating device. System using security stations for control of external functions shall not be acceptable.

    b. Upon picking up the receiver and dialing "9", a menu shall appear on the display prompting the user to enter each subsequent digit. In this way, the user shall not be required to memorize complicated key sequences in order to access external relay functions.

11. There shall be a program-material interface included with each node, which shall accept up to four (4) program input modules. Systems requiring an external program source interface shall not be acceptable.

12. There shall be an outside line feature. The circuitry shall interface with the station ports of an external telephone system, and shall provide facilities for up to 960 incoming lines per facility which shall be designated by the user to ring "day" and "night" administrative display stations or administrative

stations. Where an administrative display station is designated to receive outside line calls, the phone shall ring with a unique tone and the outside line number shall appear on the display panel. The option shall also provide the ability to make outside line calls from Administrative Display Stations or Administrative Stations. This ability shall be programmable for each phone and there shall be thirty-two Classes of Service available to any station. This feature shall be capable of supporting DID, DISA, and a Security DISA function.

a. Cellular system access for Security is of the utmost concern. Wireless security page offers a password-protected Security DISA feature that shall be accessible only from authorized Police, Fire, Emergency personal or an off-premise security office, which monitors the facility's security system. It shall function as follows: upon confirmation of the password DISA number, the system shall allow security personnel to dial access any station and monitor the activity without pre-announce tone or the privacy tone. This will then allow the security office to determine exactly what the conditions are in the station and the actions need to be taken.

13. The system shall provide for field-programmable three-, four-, five-, or six-digit architectural station numbers.

14. There shall be an automatic level control for return speech during amplified-voice communications.

15. Each station loudspeaker shall be assignable to any one, any combination, or all of 64 Multi-purpose zones or any of the 16,000 hard-wired zones per facility.

    a. Each station loudspeaker shall be assignable to any one, any combination, or all of 64 Multi-purpose zones. Systems with less than 64 Multi-purpose zones shall not be acceptable.

16. There shall be thirty-two (32) Flexible Time-Signaling Schedules with a total of 1024 user-programmed events per facility. Each event shall sound one of user-selected tones or external audio. It shall be possible to assign each schedule to a day of the week, or manually change schedules from an authorized Quantum Commander User via Web browser or MCDS4 phone. Systems, which do not provide a minimum of thirty-two (32) flexible time-signaling schedules or a choice of eight (8) time tones plus external audio, shall not be acceptable.

17. An internal program clock (with battery backup) shall be included, allowing a total of 1024 user-programmed events per facility. It shall be possible to synchronize the internal program clock with an external master clock. Systems, which do not provide an internal program clock and/or can not synchronize with an external master clock to meet these specifications, are not equal.

    a. There shall be thirty-two (32) flexible time-signaling schedules. It shall be possible to assign each schedule to a day of the week, or manually change schedules from an authorized Quantum Commander User via Web browser on the LAN or WAN. Systems that require external equipment or server to perform these functions are not considered equivalent.

    b. The built-in Master Clock corrects time by accessing the LAN NTP time server.

    c. The Quantum Processor is capable of adjusting the Daylight Savings Time automatically.

    d. Each event shall be able to be directed to any one or more of the sixty-four (64) Multi-purpose time-signaling zones.

    e. Each of the 64 Multi-purpose zones shall have a programmable "tone duration" unique unto itself. For example: the gymnasium can receive a time tone for ten (10) seconds while the rest of the facility receives a tone for five (5) seconds.

f. Each event shall sound one of eight (8) user-selected tones or external audio. Each event may utilize a different custom tone. It shall be utilized to send the gymnasium, shop classes, and pool (if necessary), a separate time tone to indicate "clean up." Minutes later the entire facility can then receive the same time tone to indicate class change.

g. Each of the eight (8) Distinct Time Tone Signals may be manually activated by selected Administrative Display Phones or an authorized Quantum Commander User via web-browser. These tone signals shall remain active as long as the telephone remains off-hook, or until canceled from the keypad or Quantum Commander.

1. Upon picking up the receiver and dialing "9", a menu shall appear on the display prompting the user to enter the next digit. In this way, the user shall not be required to memorize complicated key sequences in order to access manual time-tone functions.

2. Systems that do not provide at least thirty-two (32) flexible time signaling schedules or do not provide automatic activation of schedules shall not be acceptable.

18. There shall be a zone-page/all-page feature that is accessible by selected administrative VoIP phones and administrative phones.

a. There shall be automatic muting of the loudspeaker in the area where a page is originating.

b. There shall be a pre-announce tone signal at any loudspeaker selected for voice paging.

19. There shall be a voice-intercom feature that is accessible by selected administrative phones, administrative VoIP phones and all administrative display phones.

a. There shall be a privacy tone every 16 seconds to signal at any loudspeaker selected for amplified-voice communication is in progress.

b. There shall be a pre-announce tone signal at any loudspeaker selected for voice-intercom communication.

c. Privacy and pre-announce tone signals shall be capable of being disabled during system initialization.

d. There shall be an automatic switchover to private telephone communication should the person at the loudspeaker pick up his handset.

e. By picking up the receiver and dialing the first digit of the number of the station to be called, that number shall appear on the display along with a loudspeaker symbol, prompting the user to enter the next digits. There should be no confusion as to type of conversation, whether speaker/intercom or telephonic to be established.

20. There shall be a telephonic communication feature, which is accessible by all Administrative VoIP Phones, Administrative Phones, and Administrative Display Phones.

a. There shall be an audible ring signal announcing that a call has been placed to that station.

b. Upon picking up the receiver and dialing * (star), a telephone symbol shall appear on the display, prompting the user to enter the number of the station to be called. There should be no confusion as to type of conversation, whether speaker/intercom or telephonic to be established.

c. There shall be an automatic disconnect of Staff Handsets left off-hook to prevent them from tying up communications channels. The station shall receive a busy signal and shall automatically disconnect after 45 seconds. Systems shall also be capable of doing off hook emergency call-in.

d. There shall be an automatic disconnect of Administrative Display Phones and Administrative Phones to prevent them from tying up communications channels. When a phone goes off-hook and does not initiate a call within ten seconds, the station shall receive a busy signal and shall automatically disconnect after 45 more seconds.

e. Staff and Administrative Phone Stations may be programmed to ring an Administrative Display Phone during day hours and another Administrative Display Phone during night hours. Day and Night Hours shall be user-programmable. Assignment of Staff Stations shall not be restricted to any particular Administrative Station. Systems that limit the number and assignment of staff call-in to particular Administrative Display Station of Administrative Stations shall not be acceptable.

21. Each staff call station shall be programmable for one of three call-in types, as follows:

Normal / Emergency
Urgent / Emergency
Emergency

a. Staff Call Stations programmed for access Normal / Emergency or Urgent / Emergency shall be able to initiate an emergency call by repeated flashing of the hook switch or repeated pressing of the call-in switch. Systems, which require additional switches and/or conductors to initiate an emergency call, shall not be acceptable.

b. Emergency Calls from Administrative VoIP Phones, Administrative Phones or Staff Call Switch Stations shall interrupt a non-emergency call in progress at the designated Administrative Display Phone. The administrator shall receive a warning tone and be connected to the emergency caller. The disconnected party shall receive a busy signal. Systems which do not provide emergency call interrupt shall not be acceptable.

c. It shall be possible to connect a single push emergency call-in switch to any Administrative Phone, without effecting normal station operation. This feature is not available with the Administrative VoIP Phone.

d. Normal and Urgent calls shall be logged into queue for the designated administrative display phones.

e. Administrative Display Phones shall ring for a period of 45 seconds when they receive a call, and then stop ringing.

f. Each queue shall first be sorted according to call priority (emergency calls, then urgent calls, and then normal calls). Calls are sorted within each priority level on a first-in, first-out basis. When a call is answered, it shall automatically be removed from the queue. Systems, which do not sort calls according to priority and order received, shall not be acceptable. 1) The display shall simultaneously show up to four (4) Staff Call Switch Station Calls pending. Additional calls, beyond four (4), shall be indicated by an arrow pointing down thus prompting the user that additional calls are waiting.

g. It shall be possible to answer any incoming call simply by picking up the handset while it is ringing. It shall not be necessary to hit any buttons to answer a call unless the call has dropped into the queue.

22. Administrative VoIP Phones shall receive dial tone upon going off-hook. Outgoing calls are made by dialing the desired station. Incoming calls can be directed to the telephone or to the associated loudspeaker for a hands-free reply. There shall be a switchover from loudspeaker to private telephone communication when a person picks up the handset and dials #### and enter (check mark).

    a. Administrative VoIP Phones shall be able to make a normal call to any Administrative Display Phone by dialing the number. They shall also be able to initiate an Emergency Call by dialing ****. Emergency Calls shall ring the Designated Day/Night Administrative Display Phone. The system shall provide for each station to have a PIN Numbers. By dialing the PIN at any system telephone, the administrator shall have access to emergency paging regardless of the restrictions on the particular phone being used.

23. Administrative Phones MCESS or MCWESS shall receive dial tone upon going off-hook. Outgoing calls are made by dialing the desired station. Incoming calls can be directed to the telephone or to the associated loudspeaker for a hands-free reply. There shall be an automatic switchover from loudspeaker to private telephone communication should the person pick up the handset.

    a. Administrative Phones shall be able to make a normal call to any Administrative Phone by dialing the number. They shall also be able to initiate an Emergency Call by flashing the hook switch four times. Emergency Calls shall ring the Designated Day/Night Administrative Display Phone and then their speaker will be connected to the emergency link station if not answered within a predetermined time period. The system shall provide for each station to have a PIN Numbers. By dialing the PIN at any system telephone, the administrator shall have access to emergency paging regardless of the restrictions on the particular phone being used.

24. Student Phone

    a. Student Phone shall be supported. The Student Phone can only make 10-digit (7 digit or less than or equal to 10 digit), 0 local and 911 calls. The call duration shall be set to 5 minutes. The dial tone shall be fed momentarily at 00:04:30, 00:04:40, 00:04:50, then at five minutes, calls are disconnected. The student phone can not receive any incoming calls.

    b. The Station is not allowed to dial the same number within 30 minutes and a busy signal shall be fed to the Station if the number is dialed.

25. Administrative Display Phones shall be equipped with a 4x16 character alphanumeric display panel.

    a. Administrative Display Phones shall receive dial tone upon going off-hook. Outgoing calls are made by dialing the desired stations. Incoming calls can be directed to the telephone or to the associated loudspeaker for a hands-free reply. There shall be an automatic switchover from loudspeaker to private telephone communication should the person pick up his handset.

    b. The display shall normally show the time of day and day of week, the current time signaling schedule, and the numbers of up to four stations calling in along with the call-in status of each station (normal, urgent, emergency). When dialing from the Administrative Display Phone, the display shall indicate the station number and type of station (loudspeaker or handset) being dialed.

    c. The display shall also provide user-friendly menu selections to assist the operator when paging and distributing program material. Displays shall be in English with internationally recognized symbols for maximum ease of use. Systems, which require the operator to memorize long lists of operating symbols or control codes, shall not be acceptable.

d. Administrative Display Phones shall be programmable for one of 3 station types for system access, as follows:

1. Shall permit dialing any station in the system; turn program material on/off at their location; scroll, erase and auto-dial call-waiting queue; make conference calls and transfer calls; call forward to other administrative stations; make all-zone pages and emergency all-zone pages; have access to outside lines and be designated to receive outside line calls.

2. Select and distribute or cancel program material to any combination of stations, paging zones, or all zones; set/reset alarm/external functions and zone paging.

3. Bump or join a conversation in progress, manually initiate time tones.

e. Program selection, and its distribution or cancellation shall be accomplished from a designated administrative display telephone, with the assistance of the menu display system. Distribution and cancellation shall be to any one, or combination of speakers, or any zone(s), or all zones. It shall be possible to provide three program channels at the same time.

f. It shall be possible, via an Administrative Display telephone, to manually initiate any of eight (8) tones or any of the emergency tones. The tones shall be separate and distinctly different from the emergency tones. The tone selected shall continue to sound until it is canceled, or until the administrative display phone is placed back on-hook.

g. Each Administrative Display Phone shall maintain a unique queue of all stations calling that particular phone.

26. System programming shall be from an authorized Quantum Commander User via Web browser. All system programming data shall be stored in nonvolatile memory. A valid username and password shall be required to gain access to the following programmable functions:

a. Station Initialization shall be accomplished from an authorized Quantum Commander User via web browser. All station initialization data shall be stored in nonvolatile memory. A password (separate from the password necessary for system programming) shall be required to gain access to the following station initialization parameters:

1. Programming and diagnostics shall be built into the Quantum Commander web server browser and be accessible only by authorized personnel. Diagnostics shall indicate passes and failures of system memory, system clock, all audio busses, tone generators, DTMF generators and decoders and the integrity of the field wiring.

2. Systems not capable of supporting web-based diagnostics and any computer interface for programming and diagnostics or supportive of built-in diagnostics for the end user shall not be deemed as equal.

3. Systems that require a serial to Ethernet converter requiring additional software on pc for programming are not deemed as equal.

27. Rollover EOL (End-Of-Line Device)

a. This feature shall be supported for all the Stations (Admin Display phone, analog phone or handset) configured with a loudspeaker. Based on the dialed sequence, intercom or telephonic call will be connected to the corresponding telephone/handset or speaker.

b. If a handset station, configured with this feature, is busy when an Admin User calls the station, the call shall be rolled over to the associated speaker. If the speaker is also busy in this case, then the Admin can bump the conversation if enabled in CoS for the admin calling.

c. Rollover End-of-Line features is only available for the following station types

Admin Phone and Speaker
Analog Phone and Speaker
Handset and Speaker

d. For calls initiated by a call switch or a non-dial handset, rollover to the admin speaker shall not happen.

28. Admin AAA Group (Always An Answer)

a. This is an Administrative Display Phone feature. This feature shall be programmed from the Commander software. A maximum of 10 Administrative Display Phones will be supported in an Admin Group and there shall be a maximum of 32 Admin Groups per facility.

b. Once the Admin Group is set:

1. For normal calls, if the primary Day/Night Admin Phone is busy/no answer, all the phones in the Admin Group shall ring.

2. For emergency calls, if the primary day/night phone does not answer, all the phones in the Admin Group shall ring.

3. On no answer from any of the admin phones and if the emergency announce link is configured, the call shall be transferred to the emergency announce link as per the existing procedures. Administrative VoIP Phones do not have the emergency announce link functionality.

4. On answer from any of the Admin Group Phones, all the other phones shall stop ringing.

2.05 SPEAKERS

A. Classroom speakers and grilles (ceiling-mounted, flush) shall be Bogen CSD2X2 Drop-In Ceiling Speakers.

B. Classroom speakers (wall-mounted) shall be Bogen Model MB8TSQ or MB8TSL.

C. Wiring shall be done per manufacturer's recommendation, West Penn #357. All terminal connections to be on barrier strips. All cables to be labeled by room.

D. Outdoor horns shall be Bogen FMH15T .

PART 3 - EXECUTION

3.01 EXAMINATION

A. Examine conditions, with the installer present, for compliance with requirements and other conditions affecting the performance of the Integrated Telecommunications/Time/Audio/Media System.

B. Do not proceed until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

A. The installation, adjustment, testing and final connection of all conduit, wiring, boxes, cabinets, etc., shall conform to local electrical requirements and shall be sized and installed in accordance with manufacturer's approved shop drawings.

B. Low-voltage wiring may be run exposed above ceiling areas where they are easily accessible.

C. Contractor shall install new rack console at location shown on plans.

1. Solder each speaker line splice and tape each individual wire.
2. Connect remote slave clocks to master clock in console.

D. All Administrative Phones shall be desk- or counter-mounted.

1. Provide standard wall 120V AC receptacle 16" AFF
2. Verify exact location with Architect

E. Speaker and telephone lines run above ceiling and not in conduit shall be tie-wrapped to ceiling joist with a maximum spacing of 8' between supports. No wires shall be laid on top of ceiling tile.

F. Connect field cable to each speaker transformer using UL butt splices for 22 AWG wire.

G. Terminate field wiring on wall adjacent to rack using Telco 66 type blocks. Provide neat cross connect system for wiring. Wiring to be labeled to indicate final architectural room number that it services on the Telco block.

H. Rack shall be labeled in numerical order with speaker/phone combinations first, speaker/outside horn combinations last. Labeling and order shall reflect final Architectural room numbers posted outside the rooms. Use three- (3), four- (4), five- (5), or six- (6) digit dialing extensions.

I. Contractor shall provide a minimum of eight (8) hours of operational and programming instruction to school personnel.

J. On the first school day following installation of Multicom System, the Contractor shall provide a technician to standby and assist in system operation.

K. Mark and label all telephone outlets and/or sets with the graphic room numbers. Label all demarks IDF and MDF points with destination point numbers. Rooms with more than one outlet shall be marked XXX-1, XXX-2, XXX-3, etc. where XXX is the room number.

L. No graphic room number shall exceed the sequence from 000001 through 899999.

1. All outside speakers shall be on a separate page zone and time zone.
2. All zones shall be laid out not to exceed 10 watts maximum audio power zone.
3. All hallway speakers shall be tapped at 1 watt maximum.
4. All outside horns shall be tapped at 7.5 watts maximum.
5. All classroom speakers shall be tapped at ½ watt maximum.
6. Large rooms, such as cafeterias, shall be tapped at 2 watts maximum.

3.03 GROUNDING

A. Provide equipment grounding connections for Integrated Telecommunications/Time/Audio/Media System 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 the greatest extent possible, ground loops, common mode returns, noise pickup, cross talk, and other impairments.

C. The contractor shall provide all necessary transient protection on the AC power feed and on all station lines leaving or entering the building.

D. The contractor shall note in his drawing, the type and locations of these protection devices as well as all wiring information.

E. The contractor shall furnish and install a dedicated, isolated earth ground from the central equipment rack and bond to the incoming electrical service ground buss bar.

PART 4 - EXECUTION

4.01 DIVISION OF WORK

A. While all work included under this specification is the complete responsibility of the contractor, the following division of actual work listed shall occur.

1. The conduit, outlets, terminal cabinets, etc., which form part of the rough-in work shall be furnished and installed completely by the electrical contractor. The balance of the system, including installation of speakers and equipment, making all connections, etc., shall be performed by the manufacturer's authorized representative. The entire responsibility of the system, its operation, function, testing and complete maintenance for one (1) year after final acceptance of the project by the owner, shall also be the responsibility of the manufacturer's authorized representative.

4.02 EQUIPMENT MANUFACTURER'S REPRESENTATIVE

A. All work described herein to be done by the manufacturer's authorized representative shall be provided by a documented factory authorized representative of the basic line of equipment to be utilized.

4.03 INSTALLATION

A. Plug disconnect: All major equipment components shall be fully pluggable by means of multi-pin receptacles and matching plugs to provide for ease of maintenance and service.

B. Protection of cables: Cables within terminal cabinets, equipment racks, etc., shall be grouped and bundled (harnessed) as to type and laced with No. 12 cord waxed linen lacing twine or T & B "Ty-Rap" cable. Edge protection material shall be installed on edges of holes, lips of ducts or any other point where cables or harnesses cross metallic edge.

C. Cable identification: Cable conductors shall be color-coded and individual cables shall be individually identified. Each cable identification shall have a unique number located approximately 1-1/2" from cable

connection at both ends of cable. Numbers shall be approximately 1/4" in height. These unique numbers shall appear on the As-Built Drawings.

D. Shielding: Cable shielding shall be capable of being connected to common ground at point of lowest audio level and shall be free from ground at any other point. Cable shields shall be terminated in same manner as conductors.

E. Provide complete "in service" instructions of system operation to school personnel. Assist in programming of telephone system.

4.04 DOCUMENTATION

Provide the following directly to the Supervisor of Technology Service.

A. Provide a printed copy of all field programming for all components in system.

B. Provide one copy of all diagnostic software with copy of field program for each unit.

C. Provide one copy of all service manuals, parts list, and internal wiring diagrams of each component of system.

D. Provide one copy of all field wiring runs, location and end designation of system.

END OF SECTION