**\*\*\* BOGEN NYQUIST C4000 SERIES IP-BASED COMMUNICATIONS SYSTEM \*\*\***

The Bogen Nyquist C4000 Series system is a cutting-edge, software-driven solution designed to meet the demands of modern commercial paging, audio distribution, and sound masking applications. It offers exceptional scalability and flexibility, making it a top choice for businesses seeking advanced capabilities.

At the core of the C4000 solution lies a robust and state-of-the-art System Controller, equipped with a user-friendly, web-based Graphical User Interface (GUI). Accessible from any PC, tablet, or mobile device, this interface ensures effortless control and management.

To enhance cost-effectiveness, the system maximizes the use of existing LAN, WAN, and legacy "homerun" speaker cabling infrastructure. By leveraging these resources, businesses can achieve efficient deployment without significant additional expenses.

The feature-rich appliances integrated within the system provide comprehensive functionality, including audio mixing, amplification, and distribution. Moreover, seamless integration with third-party systems like PBX, access control, and fire alarm is easily achievable, expanding the system's capabilities and compatibility.

In summary, the Bogen C4000 Series offers a modern, flexible, and scalable solution for commercial audio needs, backed by intuitive control interfaces, cost-effective infrastructure utilization, and seamless integration with other systems.

**PART 1 – GENERAL**

* 1. **GENERAL REQUIREMENTS**

1. The conditions of the General Contract (General, Supplementary, and other Conditions) and the General Requirements are hereby made a part of this Section.
2. All bids shall be based on the equipment as specified herein. The model designations are that of the Bogen Nyquist C4000 Series, a software-based solution for commercial paging, audio distribution, and (optional) sound masking system and the specifying authority must approve any alternative system.
3. Contractors who wish to submit alternative equipment shall provide the specifying authority with the appropriate documentation at least ten (10) business days prior to bid opening. The submitted documentation must provide a feature-by-feature comparison identifying how the proposed equipment meets the operation and functionality of the system described in this specification. Prior to bid date, the contractor shall provide adequate and complete submittal information, which shall include but not be limited to specification sheets, working drawings, shop drawings, and system demonstration. The alternative supplier-contractor must also provide a list of at least xx installations identical to the proposed system.
4. The contractor shall provide the FCC registration number of the proposed system, where applicable.
5. Final approval of the alternative system shall be determined at the time of job completion. Failure to provide the "precise functional equivalent" shall result in the removal of the alternative system at the contractor’s expense.
6. The contractor for this work shall have read all the bidding requirements, the general requirements of division xx, and the contract proposal forms, and shall be held to the execution of this work. The contractor shall be bound by all the conditions and requirements therein.
7. The contractor shall be responsible for providing a complete functional system, including all necessary components whether included in this specification or not.
8. 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 requested by the owner.
   1. **SCOPE OF WORK**
9. The contractor shall supply and install all equipment, accessories, and materials in accordance with these specifications and drawings to provide a complete and operating IP-Based Paging and Audio Distribution System including but not limited to:
   1. The Nyquist C4000 platform that offers a comprehensive system that incorporates cutting-edge IP Technology and as a minimum includes all the following essential functions:
      1. Web-based system setup wizard and intuitive configuration
      2. Virtually Unlimited station capacity
      3. Sound Masking (optional)
      4. Support for Microsoft Active Directory (AD) and LDAP
      5. Automatic Failover Capability (optional)
      6. Interactive Facility Maps with Map-based audio/video monitoring during emergency check-in (optional)
      7. SIP Trunk
      8. Emergency Check-in
      9. Embedded DHCP Server
      10. User-customizable Announcements with priority
      11. User-Definable Routines
      12. Routines API (optional)
      13. Amplifier Protection Mode monitoring and reporting via routines
      14. Text-to-Speech Announcements (optional)
      15. Emergency or Normal Announcements are capable of being prerecorded and activated by a speed dial on an Admin Phone or through the trunked phone system via DTMF, wireless panic button, mobile app, web browser or external IP networked system using secured HTTPS URL-based Application Programming Interface (secure API) Webhook POST via Routines
      16. Intercom Calling (Optional)
      17. Internal clock is synchronized with NTP network time server whether on the LAN, WAN or Internet keeping the Scheduled events, tones, and Announcements accurate within milliseconds.
      18. Audio distribution allows for scheduled or manually activated audio to be activated from the Admin Web UI, contact closure, Admin phone and/or by use of Routines
      19. Unlimited Schedules
      20. Unlimited Time, Paging, and Audio Zones (optional)
      21. Unlimited Page Stacking/Queueing (optional)
      22. Unlimited Scheduled events
      23. Unlimited Scheduled Audio events
      24. User Login Logging
      25. Integrated Internet Radio Source
      26. Integrated Subscription-based Premium Streaming Music Service (SoundMachine)
      27. Email Notifications and Alerts: the system can send an email with a system event, contact closure, or when a Routine has been activated just to name a few
      28. Supervised Station Status system can be set up to send an email when a Nyquist device goes offline
      29. Combo Clock / Messaging Display capability for improved visual communication
      30. Alert Filters – Allow facilities to monitor for such as weather events, earthquakes, tornados, tsunami, volcanoes, public health, power outages, and many other National Weather Alerts emergencies and warnings
      31. User-assignable DTMF codes for announcements
      32. Multi-Site All Call paging allows authorized users to make normal multi-facility pages
      33. Multi-Facility Emergency All-Call paging
      34. Administrative Graphical User Interface or GUI that can be used by technicians or administrative personnel: CoS and Roles define who has access to what software functions.
      35. VoIP Zone Paging Microphone Station
      36. Push-to-Talk Microphone support
      37. Ambient Noise Sensing - automatically adjusts paging levels as ambient noise levels change
      38. Tablet Based Zone Volume and Audio Distribution Control
      39. Scheduled Volume Levels
   2. The system shall have a Routines feature that allows staff to activate via Admin Web UI, dial string, panic button, Admin phone with touch interface or Secure API. A Routine can automatically launch a procedure, or sequence of actions, that the C4000 system executes because of an input trigger. Routines can support crisis plans for situations such as lockdown, weather events, or emergency evacuation. Routines can also be utilized in conjunction with the optional Secure API which provides third-party access to Routines, such as weapons detection or earthquake alert applications. The Webhook-POST action provides feedback with the remote system triggering the API.
   3. The system must be capable of being configured for a SIP Tie-Trunk (or a SIP Tie-Line) Functions like a SIP trunk but serving as an IP-based interconnection between Nyquist C4000 and a local (premises-based) or hosted IP-PBX. Systems that don’t offer a SIP Tie-Trunk shall not be considered an equivalent system.
   4. Direct Inward Station Access or DISA allows administrator or first responder or emergency personnel with proper login codes to call into the system from outside the facility into any station, zone, or entire facility with customer supplied SIP enabled Telephone Network. DISA is designed to allow remote monitoring, Facility All-Call or Zone Paging, and two-way conversation from outside the facility.
   5. Authorized staff can use the Admin Web UI to configure the Clock/Messaging Display function. They can use it to create messages that will display on monitors connected to the plenum-rated Intercom Modules with HDMI 1.3 (max. 1920 x 1080 @ 24/30 Hz) output or the NQ-GA10PV devices in a selected zone, multiple zones, or to specific stations. When creating the message, users can set several options, including when and how long the messages are displayed, priority of messages, and the appearance of the messages. The schedule programming allows the event names to be displayed analog or digital clock along with day and date on an NQ-GA10PV Display. Messages can be removed from the message queue either manually or via a Routine.
   6. The ADA requires that title II entities (State and local governments) and title III entities (businesses and nonprofit organizations that serve the public) communicate effectively with people who have communication disabilities. The goal is to ensure that communication with people with these disabilities is equally effective as communication with people without disabilities. The Bogen Nyquist C4000 helps people who have vision disabilities with clear audio paging, messaging, and hearing disabilities with visual messaging to any display to assist in communicating.
   7. Interactive Facility Maps that are intuitive to use. Simply click on an area of the GUI to initiate an intercom call, page, or drill to another map level. The system shall allow authorized staff to use the Map-based Audio/Video room monitoring during emergencies. The interactive Facility Maps can be configured to allow calling and paging to other facilities that includes remote facility paging / calling or multi-facility paging. Systems that don’t have provisions for this are not considered equal.
   8. In the event of a wide area network or WAN outage every facility must be capable of operating standalone and allow for all features listed within this specification to work. Systems that rely on the WAN to operate shall not be considered for comparison in this bid.
   9. Automatic Failover Capability - The failover process, once configured, will automatically occur if the primary server fails. The failure may be an internal error that is detected by the primary server itself, or it may be a catastrophic failure, such as a hardware failure, where the secondary server loses contact with the primary and assumes the Master role. Automatic Failover can occur for the following hardware and software reasons.

Hardware Failures:

1. Catastrophic server failure causing server to no longer power up or boot
2. Loss of power
3. Damaged Ethernet hardware (NIC)
4. Damaged RAM
5. Ethernet cable no longer supplying network connection (e.g., cable pulled out, cable

damaged, failed network switch, network switch isolated from network, etc.)

1. Catastrophic SSD failure

Software Failures:

1. Catastrophic software failure that prevents system from booting
2. Operating System failure (becomes unresponsive or reboots)
3. Repeated Operating System service failures (e.g., web server, database server, DHCP
4. server, etc.)
5. Repeated Nyquist service failures (Communication service, Device Monitor, Queue
6. Manager)
7. System becomes unresponsive, due to software issue
8. Disk full, resulting in software failures
9. System Update being performed on Primary server (this is a normal cause of failover,

though it’s not really a failure.)

* 1. In the event of a Nyquist server non-Automatic Failover or network failure all amplifiers and VoIP speakers will retain a 72-Hour Backup Tone Schedule, further reinforcing redundancy in the system.
  2. The C4000 system has a Disable Audio feature that can be activated via contact closure from a fire alarm or security system, Admin Web UI, dial string, panic button, secure API or with an Admin or staff phone touch interface. When the C4000 has its Audio Disabled the follow features are disabled: programmed or manually activated audio distribution, Zone Paging, Emergency and normal announcement files, All-Call Paging, all manual tones, scheduled event audio or tones. Optionally the system can disable Emergency All-Call and Intercom calling if desired by the end-user. Systems that don’t provide these capabilities shall not be considered equivalent.
  3. Optional password protection for multi-site emergency all-call, multi-site all-call, facility page, emergency all-call page, all-call page, emergency announcement, announcement, facility announcement, facility emergency announcement, zone paging, alarm tones, and tone are used to prevent unauthorized use of the system.
  4. Text-to-Speech option allows Admin Web UI users to add custom announcements into the system by simply typing the text that you want converted to speech for this announcement. The system will then generate a .wav file that can be used by the C4000 system. Systems that don’t offer Text-to-Speech options shall not be equivalent.
  5. Installation Wizards are available for installers to reduce the setup time on major components in the system programming. Included wizards are as follows: Customer Information, Dialing Length, Station, User, Time Zone, Network Time Server, and Zones as a minimum.
  6. **SUBMITTALS**

1. Specification sheets on all items including cable types.
2. Outline drawing of system control cabinet showing relative position of all major components.
3. Shop drawings, detailing integrated electronic communications network system including, but not limited to, the following:
   1. Station wiring arrangement
   2. Equipment cabinet detail drawing
4. Wiring diagrams showing typical connections for all equipment
5. Numbered Certificate of Completion for installation, programming, and service training, which identifies the installing technician(s) as having successfully completed the Nyquist C4000 technical training course provided by the Bogen Communications LLC.
   1. **QUALITY ASSURANCE**
6. 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.
7. The contractor shall be an established communications and electronics contractor that maintains a locally run and operated business and has done so for at least xx years. The contractor shall be a duly authorized distributor of the equipment supplied with full manufacturer's warranty privileges.
8. 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. **SINGLE SOURCE RESPONSIBILITY**
9. Except where specifically noted otherwise, all equipment supplied shall be the standard product of a single manufacturer of known reputation and a minimum of 30 years of experience in the industry. The supplying contractor shall have attended the manufacturer's installation and service training classes. A certificate of this training shall be provided with the contractor's submittal.
   1. **SAFETY / COMPLIANCE TESTING**
10. The communications system and its components shall, where applicable, bear the label of a Nationally Recognized Testing Laboratory (NRTL), such as Environmental Technology Laboratory (ETL), and shall be listed by their re-examination service. All work must be completed in strict accordance with all applicable electrical codes, under the direction of a qualified and factory-approved contractor, and with the approval of the owner.
    1. **IN-SERVICE TRAINING**
11. 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 including Admin Web UI Dashboard operation, Scheduling, and Audio Distribution as a minimum. Operation manuals shall be provided at the time of this training.
    1. **WIRING**
12. System wiring and equipment installation shall be in accordance with generally accepted engineering best practices as established by the EIA and the NEC. Wiring shall meet all state and local electrical codes. All wiring shall be tested to be free from grounds and shorts.
13. All 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.
14. Wiring shall be done per manufacturer's recommendation depending on speaker type.
    1. **PROTECTION**
15. The contractor shall provide all necessary transient protection on the AC power feed and on all station lines leaving or entering the building.
16. The contractor shall note on their system drawings, the type and location of these protection devices and all wiring information. Such devices are not to be installed above the ceiling.
    1. **SERVICE AND MAINTENANCE**
17. The contractor shall, at the owner's request, make available a service contract offering continuing factory authorized service of this system after the initial hardware and software warranty periods.
18. System shall include a software maintenance period that includes bug fixes and new feature releases for a period of three years from date of system license activation. In addition, the contractor shall provide at the owner’s request additional maintenance contracts that are available as three-year extensions. The contractor shall provide a 24-hour response time to calls received by customers.
19. The system manufacturer shall maintain engineering and service departments capable of rendering advice regarding installation and final adjustment of the system.
    1. **WARRANTY**
20. The Bogen Nyquist hardware products identified in this specification shall be warranted to be free from defects in materials and workmanship for five (5) years from the date of sale to the original purchaser.
21. The Bogen Nyquist software products identified in this specification are warranted to be free from defects in material and workmanship for ninety (90) days from the date of sale to the original purchaser.

**PART 2 - SYSTEM SPECIFICATION**

* 1. **MANUFACTURERS**

1. Manufacturers, subject to compliance with requirements specifications, provide the following system:
   1. Bogen C4000 Series is a software-based solution for commercial paging and audio distribution applications manufactured by Bogen Communications LLC.
2. The specifying authority must approve any alternative system ten (10) days prior to bid day.
3. The intent is to establish a standard of quality, function, and features. It is the responsibility of the contractor to ensure that the proposed product meets or exceeds every standard set forth in these specifications.
4. 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.
   1. **EQUIPMENT**
5. Nyquist NQ-SYSCTRL System Controller.
   1. Configuration and management via a Web-based Graphical User Interface (GUI)
   2. Wizard-based setup for quick system configuration
   3. Remote access from any PC/MAC, tablet, or mobile device
   4. Continuous monitoring of stations and appliances to ensure system operation
   5. Dual network adapters to allow the System Controller to operate on two separate networks
   6. Embedded DHCP Server Option
   7. Automatic Failover option
   8. Music automatically added to music library and playlist from USB port
   9. Network-based audio that can be sourced (input) from any number of Nyquist appliances (NQ-P0100, NQ-A2xxx-G2, NQ-A4xxx-G2, NQ-PAxxx, NQ-GA400P, etc.)
   10. Ample storage for music files, recorded announcements, and call recordings
   11. G722 and OPUS audio codec support to deliver superior HD audio quality
   12. Convection air-cooled, fan-less design for quiet, maintenance-free operation
   13. Wall and shelf mounting hardware included, and rack mount brackets sold separately
6. Nyquist NQ-P0100 Matrix Mixer Pre-Amplifier (MMPA).
   1. No less than four Mic/Line inputs used for analog audio input like AM/FM Tuner or CD Player or microphone
   2. Channel 4 configurable for Push-to-Talk MIC application
   3. Line Level output to drive external amplifier
   4. Software programmable configuration and operation
      1. Push-to-Talk Channel
      2. Push-to-Talk Type
      3. Push-to-Talk Zone
      4. Mixer Channels
   5. Configurable built-in DSP; Amplifier Mute, Compressor, Delay, Graphic EQ, High/Low Pass, Limiter, Noise Gate, Parametric EQ, Peak Limiter, Speaker Presets, RMS Limiter, Router, Settings, Signal Present, Standby, and Status. CH1 can be configured as a digital AES/EBU (AES3) input
   6. USB 2.0 host port, Type-A connector (future use)
   7. Powered by 100V – 240V Universal AC Mains
   8. Wall and shelf mounting hardware included, and rack mount brackets sold separately
7. The Nyquist Power Amplifiers are available in the following number of channels and watts.
   1. NQ-A2060-G2 two-channels with 60 watts per channel when using 25V speakers or bridged to one channel with 120 watts per channel when using 70V speakers.
   2. NQ-A2120-G2 two-channels with 120 watts per channel when using 25V speakers or bridged to one channel with 240 watts per channel when using 70V speakers.
   3. NQ-A2300-G2 two-channels with 300 watts per channel when using 25v speakers or bridged to one channel with 600 watts per channel when using 70V speakers.
   4. NQ-A4060-G2 four-channels with 60 watts per channel when using 25V speakers or bridged to two channels with 120 watts per channel when using 70V speakers.
   5. NQ-A4120-G2 four-channels with 120 watts per channel when using 25V speakers or bridged to two channels with 120 watts per channel when using 70V speakers.
   6. NQ-A4300-G2 four-channels with 300 watts per channel when using 25V speakers or bridged to two channels with 300 watts per channel when using 70V speakers.
   7. These amplifiers shall include GUI based DSP controls; Amplifier Mute, Compressor, Delay, Graphic EQ, High/Low Pass, Limiter, Noise Gate, Parametric EQ, Peak Limiter, Speaker Presets, RMS Limiter, Router, Settings, Signal Present, Standby, and Status. Outputs shall be provided for 4-, 8-ohm, 25V, and 70V distributed systems.
   8. Switch-selectable 4-Channel (4-ohm/25V), 3-Channel (4-ohm/25V, 8-ohm//70V), or 2-Channel bridged (8-ohm/70V) operation.
   9. Two Line-Level Inputs on two-channel amplifiers each input routable to any output or routable over the local area network
   10. Four Line-Level Inputs on the four-channel amplifiers each input routable to any output or routable over the local area network
   11. 100/1000 GB ethernet connection
   12. USB 2.0 host port, Type-A connector (future use)
   13. 100V – 240V Universal AC Mains
   14. 1/2 Rack Width - Wall, Rack, or Shelf mountable – 2RU packages, 19” Rack Mount Kit (NQ-RMK03; sold separately)
   15. The amplifiers shall carry the necessary safety agency listings for both the US and Canada Safety: CAN/CSA 62368-1:2014; EN62368-1:2014 and EMC: FCC Part 15 & ICES-003 Class B, EN 55032 Class B. The amplifier shall employ convection air-cooling. Amplifiers that require fans for cooling shall not be considered equal.
8. Nyquist Public Address Amplifiers.
   1. All Nyquist NQ-PAxxx Public Address Amplifiers have 4 mic/line switchable inputs.
   2. NQ-PA120, NQ-PA240, and NQ-PA600 are 120, 240, and 600 Watts respectively, single channel, 70V mixer amplifiers
   3. Inputs 1 and 2 are XLR or phoenix station connector
   4. Inputs 3 and 4 are phoenix station connector
   5. Software programmable configuration and operation
9. Push-to-Talk Channel
10. Push-to-Talk Type
11. Push-to-Talk Zone
12. Mixer Channels
    1. Configurable built-in DSP; Amplifier Mute, Compressor, Delay, Graphic EQ, High/Low Pass, Limiter, Noise Gate, Parametric EQ, Peak Limiter, Speaker Presets, RMS Limiter, Router, Settings, Signal Present, Standby, and Status.
    2. 100/1000 GB Ethernet connection
    3. 100V – 240V Universal AC Mains
    4. Wall and shelf mounting hardware included, and rack mount brackets sold separately
13. Nyquist NQ-E7010 Input/Output Controller.
    1. PoE IEEE 802.3af Compliant
    2. 8 x Dry Contact Closure Inputs
    3. 8 x Relay Driver Outputs (Open-Collector)
    4. USB 2.0 host port, Type-A connector (future use)
    5. Software programmable configuration and operation including Contact Type, Extension, Name, Close Interval, Actions (911, Audio, Alarm, Announcement, All-Call, Multi-Site-Emergency-All-Call, Emergency-Call, Emergency-All-Call, Hourly, Audio-Disabled, No Action, Page, Tone, Enable-Audio and Manual), Action ID, Zones, Close Extension, Dashboard Type, Dashboard Title, Dashboard Scope, Dashboard Text, Dashboard Style, Email and Routines
    6. Wall and shelf mounting hardware included, and rack mount brackets sold separately
14. The NQ-EDP01 is a convenient remote, weather-resistant, hands-free, half-duplex intercom station with a call button. The NQ-EDP01 is a solution for applications such as security checkpoints at outside doors and entryways, or indoor check-in for secure spaces.
    1. It features easy wiring using standard Cat5 Ethernet cable and power via standard PoE switches Plus:
       1. Two-way half-duplex intercom device for use with Bogen Nyquist systems.
       2. New Nyquist IP intercom door phone for doors and entryways.
       3. Weather-resistant, hands-free operation.
       4. Indoor and outdoor applications.
       5. PoE: Can be powered via standard PoE IP switches and Cat5 or better wiring.
       6. Vandal-resistant brushed stainless-steel faceplate with mounting gasket and heavy-duty call button.
15. Nyquist NQ-GA10P Plenum-Rated VoIP Intercom Module.
    1. PoE IEEE 802.3af Compliant
    2. Low-impedance (8-ohm) speaker output. Designed for use with Drop-In Ceiling Speaker CSD2X2U-V2 and other Bogen 8-ohm speaker models
    3. Network-based audio output (paging, intercom, audio distribution)
    4. Talkback support
    5. Alternate configurations include:
       1. Push-to-Talk Microphone that can be routed anywhere over Bogen’s Nyquist network
       2. Ambient Noise Sensor connection for Amplifier volume output control
    6. DSP-based noise rejection and voice bandwidth optimization
    7. Web-based configuration
    8. Digital Call Switch (Bogen NQ-E7020) and Analog Call Switch support (Bogen CA17, or equivalent)
    9. Audio Active Control SPDT Relay Output Rated at 2A
    10. In-wall, in-ceiling, shelf, or device mountable UL 2043 plenum-rated package
    11. Integrated slotted mounting flanges designed to mount to CSD2X2U-V2 2X2 drop-in ceiling speaker
    12. Available PS4815W 48VDC External Power Supply when PoE switched network port isn’t available
16. Nyquist NQ-GA10PV Plenum-Rated VoIP Intercom Module with HDMI Clock/Messaging Display.
    1. HDMI 1.3 (max. 1920 x 1080 @ 24/30 Hz) output that can be configured many ways:
       1. Analog Clock with Messaging
       2. Digital Clock with Messaging
       3. Single Column Messaging
       4. Two Column Messaging
       5. Three Column Messaging
       6. Priority Fullscreen Messaging
    2. PoE IEEE 802.3af Compliant
    3. Low-impedance (8-ohm) speaker output. Designed for use with Drop-In Ceiling Speaker CSD2X2L/U and other Bogen speaker models
    4. Network-based audio output (paging, intercom, audio distribution)
    5. Talkback support
    6. Alternate configurations include:
       1. Push-to-Talk Microphone that can be routed anywhere over Bogen’s Nyquist network
       2. Ambient Noise Sensor connection for Amplifier volume output control
    7. DSP-based noise rejection and voice bandwidth optimization
    8. Web-based configuration
    9. Analog Call Switch support (Bogen CA17, or equivalent)
    10. Digital Call Switch support (Bogen NQ-E7020)
    11. Audio Active Control SPDT Relay Output Rated at 2A
    12. In-wall, in-ceiling, shelf, or device mountable UL 2043 plenum-rated package
    13. Integrated slotted mounting flanges designed to mount to CSD2X2U-V2 2X2 drop-in ceiling speaker
    14. Available PS4815W 48VDC External Power Supply when PoE isn’t available
17. Nyquist NQ-S1810WT-G3 VoIP Wall Baffle Speaker(s).
    1. Adjustable volume in 3db increments 1/8, 1/4, 1/2, 1, 2, 4, and 8 Watts via web browser
    2. Built-in 10W amplifier
    3. MEMS digital microphone for talkback
    4. Audio Active Control SPDT Relay Output Rated at 2A
    5. PoE IEEE 802.3af Compliant
    6. CAN Bus 2.0 Interface connects to Nyquist Digital Call Switches (NQ-E7020)
    7. Capable of two (2) different wall mounting options:
       1. Single gang box mount
       2. Tilted mount
18. Nyquist NQ-S1810CT-G2 VoIP Ceiling Speaker(s).
    1. Adjustable volume in 3db increments 1/8, 1/4, 1/2, 1, 2, 4, and 8 Watts via web browser
    2. Built-in 10W amplifier
    3. MEMS digital microphone for talkback
    4. Audio Active Control SPDT Relay Output Rated at 2A
    5. Power over Ethernet 802.3af compliant
    6. CAN Bus 2.0 Interface connects to Nyquist Digital Call Switches (NQ-E7020).
    7. Optional mounting hardware available:
       1. RE84 Recessed Enclosure (Back box)
       2. TB8 Tile Bridge
       3. MR8 Mounting Ring (for installation where RE84 is not used)
19. Nyquist NQ-GA20P2 Plenum-Rated 20-Watt Integrated Amplifier.
    1. Single 20-watt, 8-ohm speaker output
    2. Single Balanced Line Output
    3. Power over Ethernet Plus (PoE+) 802.3at compliant
    4. Nyquist network-based audio output (paging, intercom, audio distribution)
    5. Web-based configuration
    6. Front panel Power and Status LEDs
    7. In-wall, in-ceiling, shelf, or device mountable UL 2043 plenum-rated package
    8. Integrated slotted mounting flanges designed to mount to CSD2X2U-V2 2X2 drop in ceiling speaker
    9. Available PS4830W 48VDC External Power Supply when PoE+ isn’t available
20. Nyquist NQ-GA40P3 Plenum-Rated 40-Watt Integrated Amplifier.
    1. Single 40W 8-ohm amp output
    2. One Balanced Line input
    3. One Balanced Line output
    4. Power over Ethernet Plus (PoE++) 802.3bt compliant
    5. Nyquist network-based audio output (paging, intercom, audio distribution)
    6. Web-based configuration
    7. Front panel Power and Status LEDs
    8. In-wall, in-ceiling, shelf, or device mountable UL 2043 plenum-rated package
    9. Integrated slotted mounting flanges designed to mount to CSD2X2U-V2 2X2 drop in ceiling speaker
    10. Optional PI5660W 56VDC 60W external power injector when PoE++ isn’t available
21. The Nyquist NQ-GA400P 2-Channel Audio over IP (AoIP) Gateway.
    1. Two balanced line-level outputs
    2. Two balanced line-level inputs
    3. Two Form-C SPDT-type 2-amp dry contact relays that activate when a signal is present on a corresponding line-level output
    4. 10/100 Ethernet network, the NQ-GA400P AoIP Gateway is standard PoE IEEE 802.3af compliant device
    5. Wall and shelf mounting hardware included, and rack mount brackets sold separately
22. NQ-ZPMS Zone Paging Microphone Station.
    1. 10.1” 1280x800 color display with backlight
    2. Touch screen display for one touch operation
    3. 112 one-touch DSS keys, user-definable
    4. HD audio on speaker and handset
    5. Wideband Codec: G.722
    6. Full-duplex Acoustic Echo Canceller (AEC)
    7. PoE IEEE 802.3af Compliant
    8. Built-in Wi-Fi - 2.4GHz, 802.11 b/g/n - 5GHz, 802.11 a/n/ac
    9. Headset with EHS support
    10. Dual Gigabit Ethernet ports
    11. Desk Mountable
23. NQ-T1100 VoIP Admin Phone Color Touch Display (aka Admin Station).
    1. 7” 800 x 480-pixel color display with backlight
    2. Touch screen display for one touch operation
    3. Full-duplex hands-free speakerphone with AEC
    4. Call hold
    5. Mute
    6. Redial, call return, auto answer
    7. PoE IEEE 802.3af Compliant
    8. Headset with EHS support
    9. Dual Gigabit Ethernet ports
    10. Desk Mountable
    11. Optional Wall mount available
24. NQ-T2000 VoIP Staff Phone LCD Display (aka Staff Station).
    1. 132 x 64-pixel graphical LCD with backlight
    2. Two-port 10/100M Ethernet Switch
    3. Full-duplex hands-free speakerphone with AEC
    4. Call hold
    5. Mute
    6. Redial, call return, auto answer
    7. PoE IEEE 802.3af Compliant
    8. Dual-color (red or green) illuminated LEDs for line status information
    9. Two 10/100M Ethernet ports
    10. Wall or desk mountable
25. Optional third-party equipment support Telephony interface device(s) for FXO/FXS analog port connectivity.
26. Third-party gateway hardware support includes:
    * 1. 2 port FXS gateway Cisco ATA192-3PW-K9
      2. One FXS port and one FXO port Hybrid ATA Grandstream HT813 typically used for analog interface to existing PBX CO port support
27. Sound Masking speaker options
    1. NQ-SMS1810-SCG: Nyquist Suspended Ceiling Grid Sound Masking Speaker.
       1. The NQ-SMS1810-SCG includes a ceiling grid mount and a sound masking speaker assembly, which consists of an 8” dual-cone loudspeaker with a 10-ounce magnet and a 25V/70V, 4W max., rotary tap selector. A seismic safety cable is supplied to secure the speaker to a solid object in the plenum space.
       2. Installation: Place upward-facing on top of a 24”-wide ceiling tile on a conventional suspended ceiling grid
    2. NQ-SMS1810-VF: Nyquist Variable Firing Sound Masking Speaker.
       1. The assembly for the NQ-SMS1810-VF comes with an 8” dual-cone loudspeaker with a 10-ounce magnet and a 25V/70V, 4W max., rotary tap selector. It includes two multi-position hangers for multiple mounting configurations and a safety chain kit.
       2. Installation: Connect the two multi-position hangers to the structural ceiling to hang above the suspended ceiling deck. It can face upwards, downwards, or sideways.
    3. **COMPONENTS AND DESCRIPTIONS**
28. The Bogen C4000 Series is a software-based solution for commercial paging, audio distribution, and sound masking applications that demand a high degree of scalability and flexibility.
29. The System must be capable of supporting existing 25v or 70v speaker wiring infrastructure. The VoIP capabilities of the Nyquist system will enable the support of the features across the Nyquist appliances within the facility. The following sections define how the system handles each of the features in the system. Systems that do not allow the reuse of existing speaker wiring shall not be deemed acceptable. Systems that do not allow appliances to be seamlessly integrated via the existing customers’ LAN are not considered equal.
30. Nyquist C4000 Software
31. The Nyquist C4000 software is pre-installed on a Nyquist NQ-SYSCTRL System Controller. A virtually unlimited number of facilities can be networked into a Nyquist-based system.
32. Audio shall be transmitted between the System Controller and the Nyquist appliances using the customer supplied LAN/WAN using both G.722 and Opus 48k audio encoding and streaming technology to deliver High-Definition audio. Systems that do not use G.722 and Opus for audio encoding and streaming shall not be deemed equivalent.
33. Installers can verify that the Nyquist System Controller can access Internet-based URLs required for the system to run properly by clicking on the "Check Internet Site Access" on the license activation wizard. If the installer made mistakes in configuring the network the installer can go back and make changes to the network by clicking on the “Network Wizard” button.
34. The Nyquist software and Nyquist appliances firmware shall be maintained via the Nyquist Web UI System Update page that contains a list of available Nyquist software updates. When automatic software check and download are enabled, new software updates will automatically be downloaded and appear in the System Update list, and a dashboard message will be displayed to announce newly available software. Release notes can be viewed for each available update. System updates can be started via the System Update list. The System Update page includes a "Check for System Updates" button that can be used to manually check for and download available Nyquist software updates.
35. Prior to performing Nyquist updates the technician shall have the ability to verify if the default gateway, Network Time Protocol, and Domain Name Servers are configured and available, to obtain network interface and routing tables status, and to display the Nyquist C4000’s public IP address. See "Check Internet Site Access" under "System Parameters”. The C4000 system can be set up to automatically check for new Nyquist System software and automatic download of new Nyquist System Software.
36. It shall be possible for a Nyquist facility to make “station-to-station” calls and “remote facility” All-Call pages to a single facility or to all Nyquist facilities via the Nyquist Web UI or an Admin Station. Systems that require remote viewing software or other application software to be installed/loaded on to additional servers or PCs to make station-to-station calls and remote facility All-Call or Multi-Facility paging shall not be considered equivalent.
37. The Nyquist software is designed to handle all single and multiple facility communications, including but not limited to, inter-facility intercom calling and paging, multi-facility Emergency All-Call and local facility point-to-point calls. Via the Nyquist Web UI, every facility shall be configured with the IP addresses of all the other remote facilities. To ensure that these communications always correctly operate all of the Nyquist appliances are supervised by default, and remote facilities are monitored; if a device or facility has a fault the system can send email and/or display a message if a device changes state. Systems that don’t provide Station Supervision and remote Facility Monitoring shall not be considered equivalent.
38. Nyquist can support a virtually unlimited number of facilities; however, the maximum number of simultaneous remote facility intercom calls supported is based on the actual performance of the WAN and the Nyquist System Controller CPU load.
39. The voice quality of the facility calls may vary based on the WAN conditions. The maximum network bandwidth that All-Call and Zone Paging uses is an average of 0.086 Mbps (Multicast G.722), and intercom calls average of 0.171 Mbps (unicast, G.722).
40. The system shall facilitate the repetitive playing of Normal or Emergency audio tones or announcements directed to an All-Call or a Paging Zone until stopped by the Nyquist user via the Web UI, an Admin Station, or a dry contact closure connected to the Nyquist I/O Controller NQ-E7010.
41. Using Routines, a trained individual can create a routine that can perform a sequence of events that can include the repetitive playing of normal or emergency audio files, make or break contact closure(s), display different messages in different areas, send email(s), and place a phone call (if equipped) offsite and play a pre-recorded message. Routines can be triggered/started by a Secured Application Programming Interface (Secure API) or the playing of normal or emergency audio files, make or break contact closure(s) or almost any feature or function in the C4000 system. In conjunction with the Secure API the Nyquist system is capable of a web-hook post, The system must also be capable of executing multi-site Routines. System that doesn’t provide Routines are not equal.
42. Built-in Master Clock shall be included to automatically control shift change tones or other time-based events. The Master Clock shall have an unlimited number of Events that may be programmed into any of the number of Schedules, and unlimited number of Holiday events. The schedules shall be nameable for easy selection when assigning schedules to days or overriding a schedule. Schedules can be overridden via the Admin Web UI or Admin phone.
43. Network Time Synchronization. The system shall be capable of periodically updating/synchronizing the processor’s time with a Network Time Server running Network Time Protocol (NTP) via the facilities LAN network. Systems that do not provide Network Time Synchronization will not be deemed equivalent. The Nyquist server can be the NTP server for other devices on the LAN such as IP clocks and other IP devices.
44. Optional Sound Masking feature enables the Nyquist system to have dedicated NQ-Axxxx 2- and 4-Channel amplifier(s) and speaker(s) to generate Sound Masking Zones that are designed to reduce distractions caused by unwanted sound and to provide conversational or speech privacy. Distractions are reduced by increasing the background noise while reducing the range of fluctuations in sound levels within a targeted area. Speech privacy is provided by increasing the background noise surrounding the target area, effectively distorting and muffling sounds and voices emanating from within. Systems that do not provide a sound masking option will not be considered equivalent.
    1. Properly designed sound masking zones create an evenly distributed and diffused sound field in which listeners are unable to detect the source. This “random” noise obfuscates most sounds within the environment such as a conversation or typing thereby reducing disturbances and providing a level of privacy, even within an open space.
    2. The ceiling plenum is the most common location to install sound-masking speakers. The specific type of speaker to use depends on the plenum’s depth and available space. However, CSD2X2 speakers can be used when the plenum is shallow (less than 1’ in height) and/or contains obstructions which would prevent an even coverage of sound masking and cause difficulty in installation.
    3. Each Sound Masking Zone shall be capable of specifying speaker orientation of down, up, or sideways with a spectrum preset selection of the following: Closed-plan space, Good open-plan space, Ideal open-plan space, NC40 Contour, NCB Contour, Non-ideal open-plan space, and NCR Canada Contour. Each Zone shall allow the output gain to be set between 0 and -60 output gain to fine tune sound pressure levers or SPL.
    4. When introducing a Sound Masking system into an existing environment the system has a Slow Ramp designed to slowly introduce the Sound Masking system in either 20- or 30-days slow ramp to prevent abrupt changes in SPL that a user may detect.
    5. Sound Masking systems that don’t offer these features shall not be considered equivalent.
45. Nyquist C4000 System Software Application
    1. The Nyquist software is pre-installed on the NQ-SYSCTRL Nyquist System Controller, and upon boot-up, users can log in to the Nyquist application via a web browser that supports WebRTC. Systems that require Com Port redirect software, client PC application, software or serial-to-Ethernet adapters for user access are not deemed equal. Communications between the System Controller and the Web UI(s) shall be via secure Hyper Text Transfer Protocol (HTTPS) connections (i.e., https://).
    2. The Nyquist Web UI shall be configured with four different default user access levels, based on four unique user roles. Systems that do not provide unlimited access levels and an unlimited number of user roles are not considered equal.
    3. The four default roles shall be: admin (Administrator), optech, operator, and user. These roles provide a starting point/example for administrators to create additional roles.
    4. Only a user assigned the admin role shall be able to provide access to users, giving them the ability to create, delete, edit, and view system parameters.
46. Only an Administrator shall have the ability to adjust roles and Class of Service (CoS) of users. The roles determine if users can view the definable data objects that can include configuration, alarms, and performance data and if users can perform certain operations based on the user’s role and station’s CoS. All changes to roles and CoS are effective immediately, without the need to restart the browser or reboot the System controller or server.
47. The Nyquist Web UI Dashboard shall provide full administrative capabilities to manage/operate the following system features:
48. Calling/Paging – Used to access directory, dial pad, Page Exclusion, Call Forwarding, Zone Page, Record Page, Prepending Page, All-Call, Emergency All-Call, Manage Check-in and operate Routines.
49. Multi-Site Calling/Paging – Used for Facility Page, Multi-Site All Call, Multi-Site Emergency All Call, and Facility Announcement.
50. Tones/Announcements – Used for Tones, Announcements, Alarms, Stop Announcement, Display Message, and Remove Message.
51. View Weekly Schedule – Used to show the current active event schedules.
52. Audio Distribution – Used to distribute audio sources such as mp3 playlist, Internet radio, and/or local analog audio sources connected Nyquist devices that have line level inputs, and streaming audio to Stations, Audio Zones or entire facility. Operators can create an unlimited number Audio Distributions as needed by the facility
53. Enable or Disable Audio – Used to place the entire Nyquist system into Page Exclusion mode (i.e., “mute” the system) when a contact closure is supplied from the fire alarm panel. Systems that do not provide this capability are deemed not equal.
54. Systems that require application software to be installed on a PC or mobile device to manage the above features shall not be considered.
55. To facilitate installation and configuration of the system, additional Web UI menus are required. The menus shall only be visible to users with the correct roles and CoS. The navigation menus found on the Web UI shall be as follows:
56. System Parameters – Allow installers to adjust core system parameters including Export Repot, Product License, Sort Menu, Restart Server, Station Supervision, Email Configuration, System Update, Shut Down, Check Internet Site Access, Check Server Status, DHCP Server, Custom Configuration, Network Traffic Capture, LDAP, edit system tools and adjust all the System Parameters.
57. Zones and Queues – Allow installers to configure Paging, Time, and Audio Zones, Queues that can be used to eliminate feedback and Sound Masking Zones.
58. Schedules – Allow installers and administrators to create a site schedule, predefine alternative schedules to run, prevent the events from running on a holiday, schedule an announcement to play, and Schedule Routines. The system shall allow an unlimited number of schedules to be able to switch between for a facility.
59. CoS Configuration – Allow the installer to create, modify, and delete CoS groups that control station access to the following features: Call-in Level, Zone Paging, All-Call Paging, Emergency All-Call, Inter-Facility Call/Page, Audio Distribution, Remote Pickup, Join Conversation, Call Forwarding, Walking Class of Service, External Call Routing, Call Transfer/3-way Calling, Manually Activate Tone Signals, Call Any Station, Manage Recording, Monitor Calls, Monitor Locations, Conference Admin, Conference User, Voicemail, Record Calls, Activate Alarm Signals, Disable Audio, Enable Audio, Allow Callee Auto-answer, Multi-facility Paging, Inter-Facility Features, Manage Output Contacts, and Execute Routines.
60. Admin Groups – Allow the installer to create, modify, and delete software groupings of admin phones, staff phones, and Admin Web UIs that can ring when a station calls in with a call switch.
61. Stations – Allow the installer to set up, modify, and delete stations; set up Page Exclusion; view Station Status, add New Stations, and review Appliance Status.
62. Amplifier and Gateway Devices – Allow the installer to configure Nyquist 2-channel and 4-channel and PA Amplifiers
63. Audio – Allow the installer to upload and manage Announcements, Playlists, Recordings, Songs, Tones, and Internet Radio Services. The system must support the uploading of both MP3 and WAV files and make Audio file management simple for users. Systems that limit the size of Audio files shall not be considered equal.
64. Users – Allow the installer to manage users by giving them the proper roles and assign extensions if needed.
65. Roles – Allow the installer to grant users rights to Create, Delete, Edit, Restart System, Sort Menu, Systems Update, Manage, Import/Export, Restore, Settings, or View.
66. Facilities – Allow the installer to set up the facilities for remote paging and calling across the WAN.
67. Outside Lines – Allow the installer to set up FXO ports for inbound and outbound system calling.
68. SIP Trunks – Allow the installer to set up SIP trunks into the facility for inbound or outbound calling.
69. Call Details – Allow the installer to review the historical system activities that can be used for incident investigation or system troubleshooting.
70. System Backup/Restore – Allow the installer to perform system backups or restores and allow or disallow the backups to be scheduled and run automatically.
71. System Logs – Allow the installer to view and export log files, Nyquist-Intercom, and Web Server logs that can be used for troubleshooting and technical assistance.
72. Paging Exclusions – Allow the installer to view and edit stations that are excluded from paging.
73. Firmware – Update firmware for Nyquist speakers and appliances.
74. Routines – Allow installers to create routines that are a sequence of actions, that the Nyquist system executes because of an input trigger. Routines can support crisis plans for situations such as lockdowns, weather events, or emergency evacuations.
75. Messages – Allow users to manage Message Templates and Images used for displaying messages on NQ-GA10PV HDMI output that is connected to a display device such as a monitor or projector
76. Alert Filters – Allow installers to select the National Weather Alerts that the facility needs to monitor for such as weather events, earthquakes, tsunami, volcanoes, public health, power outages, and many other emergencies.
77. Systems that do not provide these options as a minimum shall not be considered equal.
78. Nyquist NQ-P0100 Matrix Mixer Pre-Amplifier (MMPA)
79. The Nyquist NQ-P0100 MMPA is designed to bring external audio into the Nyquist system. The MMPA interfaces with a local sound system by accepting one or more analog audio sources, mixing them, and outputting them to either, a) the network for Audio Distribution, or b) the MMPA’s line level output that can then be inserted into an external amplifier to drive local sound system in gyms, cafeterias, auditoriums, etc. The MMPA supports the following:
80. Four software selectable Line/MIC Input channels via three XLR connectors and four sets of screw-terminals. Input channel four (4) shall be capable of being configured to support a Push-to-Talk microphone such as the Bogen model DDU-250. Channel-1 can be configured as a digital AES/EBU (AES3) input. Line/Monitor output – The MMPA becomes a station on the Nyquist system, allowing users to call it directly or to include it in any of the Page, Time, or Audio Zones and can be direct one-way page by calling it extension.
81. The MMPA shall support the following features: Line-Level output to drive input on a local amplifier or self-amplified speaker; One USB 2.0 host port (Type-A connector) for future use; two (2) x RGB full spectrum LED status indicators.
82. Configurable built-in Digital Signal Processing for Noise Gate, Compressor/Limiter functions, etc., Tone Controls: Low Shelving, Mid Bandpass and Hi Shelving, Multi-band Parametric EQ, and Variable Low-Cut/High-Pass filters.
83. The MMPA is powered by Universal mains supply (100VAC – 240VAC).
84. The MMPA shall be wall or shelf mountable and shall include the required mounting bracket hardware.
85. The MMPA shall support Line, MIC, and digital AES/EBU (AES3) input sources. The system supports an unlimited number of MMPAs.
86. Nyquist NQ-E7010 Input/Output Controller
87. The Nyquist NQ-E7010 I/O Controller is designed to accept contact closure inputs and activate open-collector outputs to drive relay coils. These inputs and outputs are used to trigger events or to be triggered by an event or Routine within the Nyquist system.
88. PoE Class-1; IEEE 802.3af compliant with Optional 48VDC 15W power supply
89. Eight Dry Contact Closure Inputs that can be used with Fire Alarm Override Relays, external event triggers (for example, Lockdown Buttons, etc.)
90. Eight Relay Driver Outputs (Open-Collector) for use with Clock Correction (Sync Pulse), response to contact closure inputs, etc.
91. USB 2.0 host port, Type-A connector (future use)
92. Two (2) x RGB full spectrum LED Power and Status indicators
93. The Nyquist NQ-E7010 I/O Controller shall support wall or shelf-mounting options and shall include the required mounting bracket hardware.
94. Nyquist NQ-S1810CT-G2 VoIP Ceiling Speaker with Talkback and NQ-S1810WT-G2 VoIP Wall Baffle Speaker with Talkback
95. The Nyquist VoIP Ceiling/Wall Baffle Speakers NQ-S1810CT-G2/NQ-S1810WT-G2 speakers shall not require traditional intercom wiring or transformer taps to manually set or adjust volume. Simply connecting them via Cat 5 or better to a PoE Switch or PoE Injector on the system’s network makes them ready to be added into the system. Volume is controlled via the Nyquist Web UI. All Nyquist audio appliances shall use a wideband Opus codec for Audio Distribution. Use of the Opus codec, along with G.722, allows for High Definition (HD) audio. Nyquist VoIP speakers shall be equipped with a digital MEMS microphone to achieve superior talkback audio.
96. Software adjustable volume in 3db increments 1/8, 1/4, 1/2, 1, 2, 4, and 8 Watts via web browser allow the operators to adjust the built-in 10W amplifier.
97. The MEMS digital microphone provides unprecedented talkback from the intercom station location
98. The Nyquist VoIP speakers are equipped with an audio activated control Relay Output that is normally open or closed and changes state when audio is active. This relay can be used to override a local sound system in the intercom location.
99. The VoIP Speakers shall be PoE IEEE 802.3af compliant allowing staff to add additional speakers as needed on available PoE Ports throughout the facility, making them easy to add move or change as the needs of the facility changes over time.
100. Connection to optional Digital Call Switch Nyquist NQ-E7020, which can place Normal, Urgent, or Emergency priority calls and provide station status and the ability for the user to enable and disable Privacy Mode
101. The NQ-S1810WT-G3 VoIP Wall Baffle Speaker with Talkback design facilitates mounting the speaker up to four different ways:
102. Box Mount
103. Tilted Mount
104. The NQ-S1810CT-G2 VoIP Ceiling Speaker is designed to work with the same Bogen hardware used with our analog ceiling speakers to make the installation process easy for installers that have installed ceiling speakers in the past. Available accessories include:
105. RE84 Recessed Enclosure (Back box)
106. TB8 Tile Bridge
107. MR8 Mounting Ring (for installation where RE84 is not used)
108. Like all Nyquist Appliances the NQ-S1810CT-G2 supports the most common network features to rapidly deploy Nyquist Appliances on the network such as DHCP and VLAN support to aid in this effort.
109. The VoIP Speakers come pre-assembled for faster installation
110. Nyquist NQ-GA10P 10W Plenum-rated Intercom Modules
     1. The Nyquist based plenum-rated VoIP intercom module shall be a model NQ-GA10P rated at 10 watts RMS and shall utilize UL 2043 plenum-rated packaging. The intercom module shall be capable of being powered by either 802.3af compliant Power-over-Ethernet (PoE) switch, PoE injector, or model PS4815W 48 - 56VDC .3A (5.5mm x 2.1mm Barrel Jack) power supply when PoE isn’t available.
     2. The intercom module shall provide a frequency response @ 1 Watt 20-20 kHz +/- 0.25 dB at rated power. Distortion shall be less than 0.03%. The intercom module shall contain one control relay output SPDT Rated 2A; NC (Normally Closed); Common; NO (Normally Open); and G (Ground).
     3. The intercom module shall be capable of supporting Digital Call Switch(es) model NQ- E7020 and/or CA-15C or CA-21B analog call switches. The intercom module shall provide support for a Bogen DDU250 Push-to-Talk microphone. Intercom modules that don’t provide Push-to-Talk microphone support shall not be considered equal. The amplifier shall employ convection air cooling. Amplifiers that require fans for cooling shall not be considered equal.
111. Nyquist NQ-E7020 Digital Call Switch (DCS)
112. The Nyquist DCS has been exclusively designed for use with Nyquist appliances equipped with a CAN Bus 2.0 Interface. The CAN Bus 2.0 interface provides power and signal, and multiple DCSs can connect to each CAN Bus 2.0 interface. The DCS fits into a Single Gang/ Low Voltage installation using standard ‘decora-plate’ covers (supplied).
113. The DCS has a capacitive touch button design with no moving parts to wear out. The behavior of this switch is software definable. Systems that require membrane or mechanical rocker style call switches that can wear out over time shall not be acceptable.
114. Normal call initiation involves touching the DCS one time. When a user touches the button on the DCS once, one of the three LED segments will light up green, a normal call will be placed, and the light will start blinking green. This is the indication that the Normal call has been placed to the VoIP Admin Phone or to a group of VoIP Admin Phones and that the phone or phones are ringing.
115. Urgent call initiation involves touching the DCS one time. When a user touches the button on the DCS once, one of the three LED segments will light up yellow, an urgent call will be placed, and the light will start blinking yellow. This is the indication that the Urgent call has been placed to the VoIP Admin Phone or to a group of VoIP Admin Phones.
116. Emergency call initiation involves touching the DCS one or three times depending on station programming. When a user touches the button on the DCS once or three times within three seconds, all three LED segments will light up red, an emergency call will be placed, and the light will start blinking red. This is the indication that the Emergency call has been placed to the VoIP Admin Phone or to a group of VoIP Admin Phones.
117. Single Press Emergency Call, if programmed, involves touching the DCS one time. When a user touches the button once, all three LED segments will light up red on the DCS, an emergency call will be placed, and the light will start blinking red. This is the indication that the Emergency call has been placed to the VoIP Admin Phone or to a group of VoIP Admin Phones.
118. Normal and Urgent calls can easily be upgraded to an emergency call after a normal or urgent call has been placed a single touch of the DCS will upgrade the call to an emergency call and the Normal or Urgent call will be replaced by an emergency call. Systems that don’t allow the staff to upgrade the priority of a call for specific call switches shall not be considered equivalent.
119. Privacy Mode – Pressing and holding the button on the DCS for four seconds will place the speaker into Privacy Mode. As the user continually touches the DCS button, all LED segments will turn purple; when all three LED segments are lit purple, the speaker is in Privacy Mode. If an intercom call is initiated to the station when the station is in Privacy Mode, the microphone will be disabled; the user can touch the DCS once and it will allow talkback. Once the call ends, the user will need to manually return the speaker into Privacy Mode, if desired. The user can disable Privacy Mode without placing a call by pressing and holding the button on the DCS for four seconds. As the user continually touches the DCS, all LED segments will turn blue. When all three LED segments are lit blue, the speaker is no longer in Privacy Mode. Systems that require mechanical or membrane switches to achieve Privacy Mode shall not be considered equal.
120. The colors specified above are created by three RGB full spectrum LED segments to provide installers and users with visual status and feedback when installing and using the DCS. When the DCS is being installed and the power is connected before the signal line, the LED will light up red. It will also light red if the speaker stops communicating with the Nyquist System Controller, indicating a problem with the station.
121. In addition to providing visual call status indications, a call confirmation audio file shall be played on the associated loudspeaker when a call is placed via a DCS. The three call-in levels shall have distinct audio confirmation messages:
122. Call Placed
123. Urgent Call Placed
124. Emergency Call Placed
125. Emergency Link Transfer – If an Emergency call is unanswered by the VoIP Admin Phone and the Emergency Link Transfer is active, the Emergency call will be forwarded to the loudspeaker associated with the Emergency Link Station. Any station equipped with a loudspeaker can be programmed as the Emergency Link Station. Systems that do not provide Emergency Link Transfer shall not be considered equal.
126. Bogen Analog Call Switch CA-17 for use with the NQ-GA10P(V)
127. The momentary Call Switch shall be capable of placing a combination of Normal/Urgent/Emergency Calls based on the following software configurations:
     1. Normal/Emergency call configuration: Making a Normal call in this mode involves pressing the button on the Call Switch once. A call is then placed to the designated Admin Station. An Emergency call involves pressing the call switch at least four times. The Emergency call is then routed to the designated Admin Station. In both scenarios, the calling station number and call-in level (Normal or Emergency) are displayed on the Admin Station or on a group of Admin Stations. Additionally, Emergency calls can be routed to an alternative Admin Station or Emergency Link.
     2. Urgent/Emergency call configuration: Making an Urgent call in this mode involves pressing the button on the Call Switch once. A call is then placed to the designated Admin Station. An Emergency call involves pressing the button on the Call Switch at least four times. The Emergency call is then routed to the designated Admin Station. In both scenarios, the calling station number and call-in level (Urgent or Emergency) are displayed on the Admin Station or on a group of Admin Stations. Additionally, Emergency calls can be routed to an alternative Admin Station or Emergency Link.
     3. Emergency Only call configuration: Making an Emergency call in this mode involves pressing the Emergency call switch with Call Level Emergency one time. The call is then switched to the Admin Station. This requires the display of the station number and call-in level on the Admin Station or on a group of Admin Stations. Additionally, Emergency calls can be routed to any Admin Station, including Emergency Link.
128. Emergency Link Transfer - If an Emergency call goes unanswered by the Admin Station and the Emergency link transfer is active, the Emergency call will be forwarded to the loudspeaker associated with the Emergency Link Station. Any station equipped with a loudspeaker can be programmed as the Emergency Link Transfer. Systems that do not provide Emergency Link Transfer shall not be considered equal.
129. In addition to the mechanical click of a Call Switch button press, a call confirmation audio file shall be played on the associated loudspeaker when a call is placed. The three call-in levels shall have distinct audio confirmation messages:
130. Call Placed
131. Urgent Call Placed
132. Emergency Call Placed

NOTE: Any time an emergency call is placed the system will announce “Emergency Call Placed” and immediately start recording the audio in the local area of the speaker associated with the station the emergency call was placed from. The audio recording will stop once the call has been answered and completed. The recording is time stamped and can be used after the event to better understand what was happening during the emergency call.

1. The NQ-EDP01 is a convenient remote, weather-resistant, hands-free, half-duplex intercom station with a call button. VoIP Entry Door Phone shall be a Bogen Model NQ-EDP01. The IP-based entry door phone shall be compatible with PoE 802.11af. The entry door phone shall work as part of a Nyquist C4000 series system. The network connection shall be made via an 8-position 110 punch terminal block. The NQ-EDP01 shall auto-answer and include controls for adjusting intercom switching sensitivity and volume cut level up to -42 dB. The unit shall include a vandal-resistant brushed stainless steel face plate with mounting gasket, and a heavy-duty call button and plastic cone speaker with a puncture-resistant, protective screen.
2. The Nyquist plenum-rated amplifier shall be a model NQ-GA20P2 20-watt integrated amplifier and shall utilize UL 2043 plenum-rated packaging. The amplifier shall be capable of being powered with an 802.3at compliant Power-over-Ethernet Plus (PoE+) switch, PoE+ power injector, or 48VDC external power supply (Bogen model PS4830W). The amplifier shall provide a frequency response from 20-20 kHz +/- 0.25 dB at rated power. Distortion shall be less than 0.05% THD+N. The amplifier shall include GUI-based configuration. Outputs shall be provided for both line level and 8-ohm speaker connections. The audio line level output shall be 2.2V RMS @10kΩ (+27 dB) electronically balanced. Systems that don’t offer these capabilities shall not be considered equivalent.
3. The Nyquist plenum-rated amplifier shall be a model NQ-GA40P3 40-watt integrated amplifier and shall utilize UL 2043 plenum-rated packaging. The GA40P3 is an 802.11bt class 3 Type 3 4PPoE device and requires the correct PoE++ network switch or PoE++ power injector like the Bogen PI5660W. The amplifier shall provide a frequency response from 20-20 kHz +/- 0.25 dB at rated power. Distortion shall be less than 0.05% THD+N. The amplifier shall include GUI-based configuration. Outputs shall be provided for both 40W @ 8-ohm speaker connector or line level connector. The audio line level output shall be 2.2V RMS @10kΩ (+27 dB) electronically balanced. Systems that don’t offer these capabilities shall not be considered equivalent.
4. The Nyquist based 2-Channel GEN 2 amplifier shall be a model \_\_\_\_\_, rated at \_\_\_\_ watts RMS per channel (NQ-A2060-G2/2x60 watts, NQ-A2120-G2/2x120 watts, and NQ-A2300-G2/2x300 watts) with switch-selectable 2-Channel or 1-Channel bridged operation. The amplifier shall have two dedicated Balanced Line Inputs (both Phoenix plug & RCA). The amplifier shall provide a frequency response from 20-20 kHz +/- 0.25 dB at rated power. Distortion shall be less than 0.03%. The amplifier shall include GUI-based DSP controls; 16-band Graphic Equalizer; Signal Present and Clip Monitor; Adjustable High Pass, Low Pass, and Bandpass Filters; Noise Gate; Compressor/Limiter; and 7-band Parametric Equalizer. Outputs shall be provided for 4-, 8-ohm, 25V, and 70V distributed systems. The amplifier shall be rack mountable 1/2 Rack Width - Wall, Rack, or Shelf mountable 1RU and 2RU packages or by using a 19” Rack Mount Kit (NQ-RMK03; sold separately). It shall carry the necessary safety agency listings for both the US and Canada. The amplifier shall employ convection air cooling. Amplifiers that require fans for cooling shall not be considered equivalent.
5. The Nyquist based 4-Channel GEN2 amplifier shall be a model \_\_\_\_\_, rated at \_\_\_\_ watts RMS per channel (NQ-A4060-G2/4x60 watts, NQ-A4120-G2/4x120 watts, and NQ-A4300-G2/4x300 watts) with switch selectable 4-Channel or 2-Channel bridged operation. The amplifier shall have four dedicated Balanced Line Inputs (both Phoenix plug & RCA). The amplifier shall provide a frequency response from 20-20 kHz +/- 0.25 dB at rated power. Distortion shall be less than 0.03%. The amplifier shall include GUI-based DSP controls; 16-band Graphic Equalizer; Signal Present and Clip Monitor; Adjustable High Pass, Low Pass, and Bandpass Filters; Noise Gate; Compressor/Limiter; and 7-band Parametric Equalizer. Outputs shall be provided for 4-, 8-ohm, 25V, and 70V distributed systems. The amplifier shall be rack mountable 1/2 Rack Width - Wall, Rack, or Shelf mountable 1RU and 2RU packages or by using a 19” Rack Mount Kit (NQ-RMK03 or NQ-RMK04; sold separately). It shall carry the necessary safety agency listings for both the US and Canada. The amplifier shall employ convection air cooling. Amplifiers that require fans for cooling shall not be considered equivalent.
6. The Nyquist Zone Paging Microphone Station (Model NQ-ZPMS) includes both a telephone handset and a flexible gooseneck microphone. The PoE powered station has a large 10.1” color touchscreen that shows the time and date when in an idle state and displays station numbers along with the call-in priority of staff stations that are calling in when defined as the Admin Phone for those staff stations. The NQ-ZPMS services a wide variety of Nyquist applications including high zone-count facilities (e.g., transportation hubs, etc.), or wherever a lot of zone paging occurs to facilities where a flexible microphone station is desired. Capabilities are determined by station CoS programming, and some of the CoS options include Zone Paging, All-Call Paging, Emergency All-Call Paging, alarm signals, audio files, and external functions such as initiating routines. The 112 one-touch DSS keys are easy to program directly on the device or by using the station programming within the Nyquist UI. The NQ-ZPMS includes a stand with two adjustable angles of 40 and 50 degrees. Systems that do not provide these capabilities as a minimum shall not be considered equal.
7. The Nyquist VoIP Admin Phone (NQ-T1100) with Color Touch display panel shall show the time and date along with station numbers, and the call-in priority of staff stations that are calling in. Depending upon the system CoS programming, a VoIP Admin Phone can display menus to activate Zone Paging, All-Call Paging, Emergency All-Call Paging, alarm signals, audio files, and external functions. The Admin phone has two RJ-45 Gigabit Ethernet ports, one for connection to a PoE port on the LAN and one passthrough for connecting a PC or other networked device. The phone can be desk or wall mountable with included bracket. Systems that do not provide these capabilities as a minimum will not be considered equal.
8. The Nyquist Admin Station display panel shall show the time of day and day of week, the event schedule, and the station numbers and call-in priority of staff stations that are calling in. Depending upon the system programming, an Admin Station shall display menus to activate Zone Paging, All-Call Paging, Emergency All-Call Paging, Multi-Facility All-Call paging, alarm signals, and external functions.
9. The Admin Station shall display the station that calls 911. This allows front-office administrators to direct emergency personnel to the correct physical location in the building when they arrive. If a system is not connected to outside phone lines, then 911 calls can be routed to a designated station within the facility. The system shall automatically record all 911 calls made from any station. The 911 call recording shall begin as soon as 911 is dialed and continue unit the call is terminated. Recorded calls shall be maintained on the system for later playback review and/or retrieval by authorized personnel and/or authorities. Systems that do not provide this feature will not be deemed equal.
10. The Nyquist VoIP Staff Phone (NQ-T2000) with LCD display panel shall show the time and date and the station numbers and call-in priority of staff stations that are calling in. Depending upon the system CoS programming, a VoIP Staff Phone can display menus to activate Zone Paging, All-Call Paging, Emergency All-Call Paging, alarm signals, audio files, and external functions. The Staff phone has been designed with two RJ-45 Gigabit Ethernet ports, one for connection to a PoE port on the LAN and one passthrough for connecting a PC or other networked device. Desk or wall mountable with included bracket. Systems that do not provide these capabilities as a minimum will not be considered equal.
11. The Staff Station shall be capable of the following features depending on how the station CoS is configured:
12. Emergency intercom call – Staff Stations shall be capable of making an Emergency intercom call, which is then routed to the assigned Admin Station. This requires the display of the architectural number and call-in level on the Admin Station. Systems that do not provide this feature are not equivalent.
13. Speed dial
14. Toggle audio distribution on and off
15. Call Forward activation and deactivation for All-Calls/Busy/No Answer/Busy or No Answer
16. Conference Calling
17. Transfer Call
18. Dial Administrative station– Staff Stations can allow the user to dial the station number to call the Admin phone or its associated speaker. The call shall be routed to the Admin Station showing the architectural number that is calling.
19. Emergency All-Call – An emergency page shall be routed to all the stations in the facility.
20. Place outside line calls when CoS allows and when system is connected to outside lines
21. Remote Answer
22. Single-Zone/All-Station Page
23. Call Waiting Tone for Outside Calls – It shall be possible to feed the call waiting tone to the Administrative Phone during a conversation.
24. Transfer call from VoIP speaker down to an associated Staff Station
25. Transfer call from VoIP Staff Station up to an associated VoIP speaker
    1. **SYSTEM CAPABILITIES**
26. The communication system shall be a Bogen Nyquist C4000 Series IP-based paging and audio distribution system and shall provide a comprehensive communications network between administrative areas and staff locations throughout the facility.
27. The system shall provide no less than the following features and functions:
    1. Software-based, Voice over IP (VoIP) paging, intercom, audio distribution, and sound masking solution.
    2. The system shall provide a Web User Interface (Web UI) that shall allow users to configure and control the system in accordance with their assigned User Role, from any Chrome or MS Edge Web browser enabled PC, Mac, and/or current Android and Apple devices.
    3. The system shall support any combination of the following VoIP station types: NQ-ZPMS Zone Paging Microphone Station with 10.1” capacity color touch screen, NQ-T1100 Administrative VoIP Phone – Color Touch Display (Admin Station) or NQ-T2000 Staff VoIP Phone – LCD Display (Staff Station).
       1. All VoIP station types shall utilize the same type of field wiring.
       2. There shall be no limit to the number of VoIP Stations that can be connected to a facility. Systems that require different head-end equipment to make Admin Stations function, or systems that limit the number of Admin or Staff Stations shall not be deemed acceptable.
    4. Future station alterations shall only require the Station Type to be changed in system programming. Alterations shall not require field wiring or system head-end alterations unless an analog station device is being replaced by a VoIP station device or vice versa.
    5. The system shall be a global non-blocking system. The system shall be capable of unlimited amplified intercom paths per facility. All hardware, etc., required to achieve the necessary number of amplified-voice intercom channels for this system shall be included in this submittal. Systems requiring the use of a push-to-talk switch on administrative telephones shall not be acceptable.
    6. The system shall provide 911 Dial-Through via outside FXO/FXS lines or SIP trunks to ensure that one or more lines are always available for 911 calls. The 911 Dial-Through is available to any properly configured station (via CoS). When a station dials 911, the 911 call is processed as follows:
       1. Call routes to an Emergency Group where the call can be answered.
       2. The 911 CO lines can 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, then one of the ongoing calls shall be disconnected and the 911 call shall be placed.
       3. When 911 is dialed from any station, its designated Admin Station or Admin Group will receive a message that the station has dialed 911.
       4. The system shall automatically record all 911 calls made from any station. The 911 call recording shall begin as soon as 911 is dialed and shall continue until the call is terminated. Recorded calls shall be maintained on the system for later playback review and/or retrieval by authorized personnel and/or authorities.
    7. It is of highest importance that Emergency calls from stations receive prompt attention. Therefore, it is important that there be an alternative destination in case the Emergency call does not get answered at the primary location. Details are as follows:
       1. Staff-generated Emergency calls shall be treated as the second highest system priority. Therefore, all Emergency calls shall be displayed at the top of the call queue of their respective Admin Station or Admin Group. Should that Emergency call go unanswered for 15 seconds, the call shall be re-routed to an alternative speaker station. Then, a tone will prompt the caller to make a verbal call for help and annunciates to the Emergency link station “Emergency.” During the transfer, the original administrative telephone shall continue to ring the distinctive Emergency Ring. Should the Emergency Transfer-to-Station have an associated Admin Station, it will also ring for the Emergency call.
       2. The Emergency Transfer-to-Station shall be software-configurable.
       3. Systems failing to transfer unanswered Emergency calls or failing to immediately connect to the designated Admin Station shall not be deemed as equal.
    8. There shall be a Facility Wide Emergency All-Call feature. The Emergency All-Call shall be accessed from designated Admin Stations or the Nyquist Dashboard or by the activation of an external contact closure that shall give a microphone 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.
       1. Considering that Emergency calls are to be treated with the highest level of concern, systems that do not regard Emergency All-Call with the highest priority shall not be deemed as equal.
       2. Upon touching the Directory icon, a menu shall appear on the Admin Station display prompting the user to select the desired menu.
       3. The Emergency All-Call shall capture the highest-level system priority and shall be transmitted over all speakers in the facility. It shall also be capable of activating an external control output, which can be used to activate external relays to automatically override volume controls, local sound systems, or strobe circuits.
       4. This Emergency All-Call feature can have a four-digit pin number associated with it that would be required to use the feature or override someone that is already using this feature.
       5. Systems without Emergency All-Call or systems with All-Call that cannot be activated by external means or that do not capture complete system priority or activate an external relay, shall not be acceptable.
    9. There shall be unlimited Alarm Tones (four by default). Each may be accessed by dialing \*91 and the two-digit tone number from any Admin Station, SIP Trunk, or FXO/FXS system interface. These Alarm Tones are separate from the Time Tones. Users shall be able to add an unlimited number of Alarm Tones to the system by uploading MP3 or WAV files. Systems that do not allow the user to upload MP3 and WAV files to customize the Alarm Tones or need to use external alarm/tone generators or special software or have less than four Emergency Alarm Tones shall not be acceptable.
    10. Upon touching the Directory icon on an Admin Station, a menu shall appear on the display prompting the user to select from the sub-menus. The Alarms sub-menu is the first available. This precludes the user from having to memorize complicated key sequences to access Alarm Tones.
    11. There shall be unlimited I/O Controller relay driver outputs accessible and controllable by properly authorized users via an Administrative Web UI. These outputs remain set until accessed and reset. Users shall have the ability to review the status of each relay driver output. Users shall be prompted through fields via a plain English menu, precluding users from having to remember any dialing sequences to control this feature. The system shall support an unlimited number of I/O Controllers, and each I/O Controller shall be able to interact with any and all other I/O Controllers on the system (i.e., an input on one I/O Controller can trigger an output on one or more different I/O Controllers). Systems that require the user to remember complicated dialing schemes or prompt the user via cryptic commands shall not be acceptable.
    12. The I/O Controller can create a contact closure when the following operations are performed in the system:
        1. 911 call placed
        2. Audio distributed
        3. Alarm is played
        4. Announcement is played
        5. All-Call performed
        6. Multi-Site All-Call performed
        7. Multi-Site Emergency-All-Call
        8. Emergency-Call
        9. Emergency-All-Call
        10. Audio-Disabled
        11. Page
    13. The system shall provide software controlled and programmable control outputs for external relay activation for use with strobe lights, magnetic locks, card access systems, motion detectors, cameras, or any low-voltage, or any device that creates a dry contact. Systems using dedicated security stations for control of external functions shall not be acceptable.
    14. The system shall be capable of interfacing to PSTN/PBX/iPBX via both FXO/FXS line and SIP trunk connectivity.
    15. The system shall be capable of providing each facility (i.e., (i.e., Nyquist location) an unlimited number of incoming FXO/FXS or SIP trunk lines that can be designated by the user to ring the designated Day Admin or Night Admin station. Where an Admin Station is designated to receive outside line calls, the incoming call’s Caller ID information shall appear on the display. The system shall also provide the ability to make outside line calls from Admin Stations. This ability shall be programmable for each Admin Station. There shall be an unlimited number of Class of Services that can be configured and available to assign to any station.
    16. The system shall be capable of supporting DID, DISA, and Security DISA functions.
        1. The system shall provide a password-protected Security DISA feature that shall only be accessible from authorized Police, Fire, Emergency personnel, or an off-premises security office that monitors the facility’s security system. The Security DISA feature shall function as follows: Upon dialing the Security DISA phone number, the caller will receive a dial tone from the system, after which he or she must enter the assigned Security DISA passcode on the dial pad. Upon confirmation, the system will present the dial tone again and will allow the authorized personnel to dial any station on the system and monitor the activity without any pre-announce tone or privacy beep. This will allow the authorized personnel to audibly assess the situation and determine what actions need to be taken.
        2. All DISA and Security DISA calls shall be automatically recorded by the system for later playback review and/or retrieval by authorized personnel and/or authorities.
    17. The system shall provide for field-programmable three-, four-, five-, or six-digit architectural station numbers.
    18. There shall be an automatic level control for return speech during amplified-voice communications.
    19. Each station loudspeaker circuit shall be assigned to all or any combination of Paging, Time, and/or Audio Zones. Systems that do not provide unlimited Paging, Time, and/or Audio Zones shall not be acceptable.
    20. There shall be unlimited schedules with unlimited programmable events per facility. Each event shall sound one user-selected tone or external audio source. It shall be possible to assign each schedule to a day of the week or to manually change schedules from an authorized user via a web-based UI. Systems that do not provide unlimited schedules, events, and tones, or that require software to be installed on a PC to perform these functions shall not be acceptable.
        1. The system must be capable of providing Music to be played from an external audio source or audio files that are stored in playlists on the system (i.e., (i.e., one or more Time Zones) on an automated schedule.
        2. Each event shall be able to be directed to any one or more of the unlimited Time Zones.
        3. Each of the unlimited Time Zones shall have a programmable, customizable Preannounce Tone and volume control that is unique unto itself.
        4. Each event shall play any of the Normal tones or external audio. Each event may utilize a different tone as required.
        5. Each of the unlimited Time Tones may be manually activated by selected VoIP Admin Phones or via an authorized user with access to the Web UI. These tones shall remain active as long as the telephone remains off-hook or until canceled from the keypad or the Nyquist Web UI.
        6. Systems that do not provide an unlimited number of schedules or do not provide automatic activation of schedules shall not be acceptable.
    21. Internal Master Clock shall be included, allowing an unlimited number of events per facility. Systems that do not provide an internal master clock or that must supply an external master clock to meet these specifications shall not be acceptable.
    22. The Nyquist C4000 can synchronize with an NTP server and automatically adjust for Daylight Savings Time for any time zone in the world. The server that the Nyquist C4000 application is running on can also be used as an NTP server for other systems on the LAN (for example, IP Clocks and control systems).
    23. There shall be a Zone Page/All-Call Page feature that is accessible by selected Admin Phones and FXO/FXS or SIP connection to the PSTN or PBX/iPBX.
    24. There shall be an option to play a pre-announce tone at any loudspeaker selected for voice paging.
    25. There shall be a voice-intercom feature that is accessible by CoS authorized staff phones, all Admin VoIP phones, and Admin Web UIs.
        1. There shall be a privacy beep played every 15 seconds at any selected loudspeaker to indicate that an intercom call is in progress. This feature can be disabled in System Parameters.
        2. There shall be a pre-announce tone played at any selected loudspeaker for intercom call communication. This feature can be disabled in System Parameters.
        3. There shall be a switch over to private telephone communications should the person at the loudspeaker pick up the staff station and dial \*3 to transfer the call down to an associated Staff Station.
    26. There shall be various levels of telephonic communication accessible by all Admin Stations and Staff Stations.
        1. Staff Stations must be capable of being programmed to ring one Admin Station during day hours and a different Admin Station during night hours. Day and Night start hours shall be configurable. Staff Stations shall be capable of being assigned to any Admin station. Systems that limit the number and assignment of staff call-ins to an Admin Station shall not be acceptable.
    27. Each VoIP speaker with a call switch (analog or digital) shall be configurable as one of three call-in types, as follows:
        1. Normal/Emergency
        2. Urgent/Emergency
        3. Emergency
    28. Call buttons programmed for access Normal / Emergency or Urgent / Emergency shall be able to initiate an Emergency call by repeated flashing of the phone’s hook switch, or repeated pressing of the DCS or the Call Switch. Systems that require additional switches and/or conductors to initiate an Emergency call, shall not be acceptable.
    29. Normal and Urgent calls shall be placed into the queue for the designated Admin Station or Admin Web UI.
    30. Each Admin Station call queue shall first be sorted per call priority (for example, Emergency, then Urgent, and then Normal). 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 that do not sort calls per priority and order received shall not be acceptable.
        1. The display shall simultaneously display a minimum of three intercom calls pending.
        2. Additional calls beyond three shall be indicated by a scrolling option on the right-hand side of the screen thus prompting the user that additional calls are waiting.
    31. It shall be possible to answer any incoming call by picking up the handset while it is ringing. It shall not be necessary to press any buttons to answer a call unless the call has dropped into the queue.
    32. Staff Stations shall receive a 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, dials \*3, and presses Enter/OK.
    33. Staff Stations shall be programmable for any type of system access, provided by or restricted by the following CoS options:
        1. CoS Name
        2. Call-in Level
        3. Zone Paging
        4. All-Call Paging
        5. Emergency All-Call
        6. Inter-Facility Call/Page
        7. Audio Distribution
        8. Remote Pickup
        9. Join Conversation
        10. Call Forwarding
        11. Walking Class of Service
        12. External Call Routing
        13. Call Transfer/3-way Calling
        14. Manually Activate Tone Signals
        15. Call Any Station
        16. Manage Recordings
        17. Monitor Calls
        18. Monitor Locations
        19. Conference Admin
        20. Conference User
        21. Voicemail
        22. Record Calls
        23. Activate Alarm Signals
        24. Disable Audio
        25. Enable Audio
        26. Allow Callee Auto-answer
        27. Multi-facility Paging
        28. Inter-Facility Features
        29. Manage Output Contacts
        30. Execute Routines
    34. Each Station in a facility can have a unique CoS programmed with an unlimited number of CoS combinations.
    35. Staff Stations shall be able to make a Normal call to any Admin Station by dialing the Admin Station’s extension number. Staff Stations shall also be able to initiate an Emergency Intercom Call by dialing \*\*\*\*. Emergency Calls shall ring the Designated Day/Night Admin Station. The system shall provide for each station to have a Personal Identification Number (PIN). By dialing the PIN at any system telephone, the administrator shall have access to Emergency paging regardless of the restrictions on the phone being used.
    36. Admin Stations shall receive a 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 or her handset.
    37. The display shall normally show the time of day and day of week, bell schedule name, and the numbers of a minimum of three stations calling-in, along with the call-in status of each station (Normal, Urgent, Emergency). The Admin Station’s display shall indicate the station number being dialed from the Admin Station.
    38. The display shall also provide user-friendly menu selections to assist the operator when using the Nyquist system. Displays shall be in English for maximum ease-of-use. Systems that require the operator to memorize long lists of operating symbols or control codes shall not be acceptable.
    39. Admin Stations shall be programmable for any type of system access, providing or restricting the following CoS options:
        * + 1. Call-in Level
            2. Zone Paging
            3. All-Call Paging
            4. Emergency All-Call
            5. Inter-Facility Call/Page
            6. Audio Distribution
            7. Remote Pickup
            8. Join Conversation
            9. Call Forwarding
            10. Walking Class of Service
            11. External Call Routing
            12. Call Transfer/3-way Calling
            13. Manually Activate Tone Signals
            14. Call Any Station
            15. Manage Recordings
            16. Monitor Calls
            17. Monitor Locations
            18. Conference Admin
            19. Conference User
            20. Voicemail
            21. Record Calls
            22. Activate Alarm Signals
            23. Disable Audio
            24. Enable Audio
            25. Allow Callee Auto-answer
            26. Multi-facility Paging
            27. Inter-Facility Features
            28. Manage Output Contacts
            29. Execute Routine
    40. Program selection and its distribution or cancellation shall be accomplished from a designated Admin Station with the assistance of the menu display system. Distribution and cancellation shall be to any one or combination of speakers, any Audio Zone or Audio Zones, or All Zones. It shall be possible to provide an unlimited number of program channels for the user to pick from.
        1. It shall be possible via an Admin Station to manually initiate any of the unlimited Normal Tones or Emergency Tones. The Tones shall be separate and distinctly different from the Alarm Tones. The Tone selected shall be capable of being played one time, continuously until it is canceled, or until the administrative display phone is placed back on-hook.
        2. Each Admin Station shall maintain a unique queue of all stations calling that Admin VoIP phone.
    41. VoIP Wall Baffle and VoIP Ceiling Speakers shall be configurable as either a VoIP Speaker Only or as a VoIP Speaker with a Digital Call Switch.
        1. The Bogen Nyquist VoIP speakers are powered via PoE. Use an 802.3af compliant PoE network switch port or PoE Injector to power these speakers. One PoE network switch port or PoE Injector is required per VoIP speaker.
        2. VoIP speakers can be equipped with a DCS that can be programmed as a Normal/Emergency, Urgent/Emergency, or Emergency Only and shall be able to initiate an Emergency call by touching the DCS one, two, or three times depending on the CoS and current call state of the DCS. If the station is authorized for Privacy Mode, the users can touch and hold for 4 seconds to enable Privacy Mode or hold for four seconds to disable Privacy Mode. Systems that require mechanical, membrane, or an additional number of switches to initiate an Emergency call, shall not be acceptable.
        3. Emergency Calls from VoIP Speaker with DCS shall have priority over the Normal and Urgent calls in the queue on the Admin Stations and will show up at the top of the list. Systems that do not provide priority for Emergency Call shall not be acceptable.
        4. Normal and Urgent calls shall be logged into queue for the designated Admin Stations.
           1. Admin Stations shall ring when they receive a call, and then the call will be removed from the queue when the call is answered or when the Admin Queue times out (default is 30 minutes).
        5. Each queue call shall first be sorted by call priority (Emergency, then Urgent, and then Normal). 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 that do not sort calls by priority and order received shall not be acceptable. The display shall simultaneously show a minimum of three staff calls pending. Additional staff calls beyond three shall be indicated by an arrow pointing down thus prompting the admin user that additional calls are waiting.
        6. 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.
    42. System programming shall be from an authorized Nyquist Admin User via any web browser. A valid username and password shall be required to gain access to the following programmable functions:
        1. System Parameters – Allow installers to adjust core system parameters.
        2. Zones – Allow installers to create and modify Paging, Time, and Audio Zones.
        3. Schedules – Allow installers and administrators to create Event Schedules for the facility, predefine alternative schedules to run. Holiday Events prevent the schedule from ringing on a holiday.
        4. Admin Groups – Allow the installer to create, modify, and delete software groupings of admin phones that can ring when a station calls in with a call switch.
        5. CoS Configuration – Allow the installer to create, modify, and delete CoS groups that can have the following features defined: Call in Level, Zone Paging, All-Call Paging, Emergency All-Call, Inter-Facility Call/Page, Audio Distribution, Remote Pickup, Join Conversation, Call Forwarding, Walking Class of Service, External Call Routing, Call Transfer/3-way Calling, Manually Activate Tone Signals, Call any Station, Manage Recording, Monitor Calls, Monitor Locations, Conference Admin, Conference User, Voicemail, Record Calls, Activate Alarm Signals, Disable Audio, Enable Audio, Allow Callee Auto-answer, Multi-facility Paging, Inter-Facility Features, and Execute Routines.
        6. Stations – Allow the installer to set up, modify, delete stations, set up Page Exclusion, view stations’ status, and add a station.
        7. Audio – Allow the installer to upload and manage Announcements, Playlists, Announcements, Songs, and Tones. They must support the uploading of both MP3 and WAV files making Audio file management simple for users. Systems that limit the size of Audio files shall not be considered equal.
        8. Users – Allow the installer to manage users by giving them the proper Role and assign an Extension if needed.
        9. Roles – Allow the installer to limit user to the following: create, delete, edit, restart server, sort menu, systems update, manage, import/export, restore, settings, or view.
        10. Facilities – Allow the installer to set up the multiple facilities for remote paging and calling.
        11. Outside Line – allow the installer to set up FXS and FXO ports for inbound and outbound system calling.
        12. SIP Trunks – allow the installer to set up SIP trunks into the facility for inbound or outbound calling.
        13. Call Details – allow the installer to review the historical system activities that can be used for incident investigation or system troubleshooting.
        14. System Backup/Restore – allow the installer to perform system backup or restores and allow the backups to be scheduled to run automatically.
        15. System Logs – allow the installer to view and export Server, Nyquist-Intercom, and Web Server logs that can be used for trouble shooting and technical assistance.
        16. Paging Exclusions – allow the installer to view and edit stations that are excluded from paging.
        17. Firmware – is used to update Nyquist appliances.
        18. Routines – Allow installers to create routines that are a sequence of actions, that the Nyquist system executes because of an input trigger. Routines can support crisis plans for situations such as lockdowns, weather events, or emergency evacuations
        19. Alert Filters – Allow installers to select the National Weather Alerts that the facility needs to monitor for such as weather events, earthquakes, tsunami, volcanoes, public health, power outages, and many other emergencies.
        20. Help –Provides information about the system, online help topics, and System Administrator Manual.
        21. Systems not capable of supporting web-based configuration and control, or require plugins or dedicated application software, shall not be deemed as equal.
        22. Systems that require a Serial-to-Ethernet converter or require additional application software on a PC for configuration and/or control shall not be deemed as equal.
    43. Admin Groups
        1. Admin Stations can be placed into Admin Groups, which are used if incoming calls are not answered by the assigned Admin Station, or the Day or Night Admin associated with the Admin Station. Admin Groups act as an always answer feature by providing an alternate list of Admin Stations. If an incoming call is not answered by the assigned Admin Station within 30 seconds for normal calls or 15 seconds for emergency calls, all Admin Stations in the Admin Group will ring.
        2. If Call Forwarding is enabled at the Admin Station, Nyquist tries the forwarded extension. If that station does not answer or is busy, the call timeout is reduced to 15 seconds. After 15 seconds, the call rolls over to the Admin Group.
        3. If an emergency level call receives no answer, the Admin Group will ring if the Day Admin or Night Admin does not answer.
        4. Admin Stations can be assigned to multiple Admin Groups. A Day or Night Admin can also be assigned to one or more Admin Groups.
    44. Call Detail Reporting
        1. The Call Details feature allows the viewing and/or printing of detailed records of every call in a facility in a call log format. Calls include scheduled announcements, paging, and internally and externally made or received telephone calls.
    45. System Backup/Restore
        1. The system backup feature allows users with access to back up the system database, voicemail, and recordings.
        2. The system restore allows users with access to perform a system restore of previously backed up database, voicemail, and/or recordings.
        3. The installer also can set up an automatic backup that can be performed daily, weekly, or monthly.
    46. System Log Files
        1. A log file records either events or messages that occur when software runs and is used when troubleshooting the system. The following parts of the Nyquist system generate log files:
           1. Server (This provides access to the Debian Linux OS server log files.)
           2. Intercom (This provides access to the Intercom application server log files.)
           3. Web Server (This provides access to the web server log files.)
        2. From the web-based UI, system logs can be viewed directly or exported via download to a PC, Mac, or Android device and then copied to removable media or attached to an email to technical support.
    47. Paging Exclusions
        1. System administrators shall be able to put stations into Page Exclusion mode. During this time, the stations will only receive Emergency All-Call pages – not music, tones, or All-Calls. Emergency pages will still be heard at the station even if that station is set to exclude paging.
    48. Firmware
        1. Installers can manage the available firmware. Because the Nyquist C4000 is constantly evolving and changing, new versions of firmware will become available and the Firmware section provides installers or authorized users the ability to upload, check for updates, or configure the system to automatically download new firmware for later installation. Systems that can’t automatically check for new software are not considered equivalent.
    49. Routines are designed to automatically launch a procedure, or sequence of actions, that the Nyquist system executes because of an input trigger.
    50. Some of the events (triggered by dashboard, IP Phone, I/O Controller contact, or optional Routines API) that can be created are as follows:
        1. Lockdown Routines
        2. Emergency Evacuation Routines
        3. Fire Alarm Routines
        4. Weather Alert Routines
        5. Web-Hook Post in conjunction with optional Routines API
    51. Alert Filters Configuration - The Common Alerting Protocol (CAP) is an international standard format for emergency alerting and public warning. It is designed for all hazards related to weather events, earthquakes, tornado, tsunami, volcanoes, public health, power outages, and many other emergencies.
        1. CAP elements and values are used when configuring alert filters for your Nyquist system. This part of the configuration allows installers to select or “Enable” or disable the filters needed for each facility. This filtered information can then be displayed on the NQ-GA10PV through the facility.
        2. The list of information that can currently be displayed are as follows: 911 Telephone Outage, Administrative Message, Air Quality Alert, Air Stagnation Advisory, Arroyo And Small Stream Flood Advisory, Ashfall Advisory, Ashfall Warning, Avalanche Advisory, Avalanche Warning, Avalanche Watch, Beach Hazards Statement, Blizzard Warning, Blizzard Watch, Blowing Dust Advisory, Blowing Dust Warning, Brisk Wind Advisory, Child Abduction Emergency, Civil Danger Warning, Civil Emergency Message, Coastal Flood Advisory, Coastal Flood Statement, Coastal Flood Warning, Coastal Flood Watch, Dense Fog Advisory, Dense Smoke Advisory, Dust Advisory, Dust Storm Warning, Earthquake Warning, Evacuation - Immediate, Excessive Heat Warning, Excessive Heat Watch, Extreme Cold Warning, Extreme Cold Watch, Extreme Fire Danger, Extreme Wind Warning, Fire Warning, Fire Weather Watch, Flash Flood Statement, Flash Flood Warning, Flash Flood Watch, Flood Advisory, Flood Statement, Flood Warning, Flood Watch, Freeze Warning, Freeze Watch, Freezing Fog Advisory, Freezing Rain Advisory, Freezing Spray Advisory, Frost Advisory, Gale Warning, Gale Watch, Hard Freeze Warning, Hard Freeze Watch, Hazardous Materials Warning, Hazardous Seas Warning, Hazardous Seas Watch, Hazardous Weather Outlook, Heat Advisory, Heavy Freezing Spray Warning, Heavy Freezing Spray Watch, High Surf Advisory, High Surf Warning, High Wind Warning, High Wind Watch, Hurricane Force Wind Warning, Hurricane Force Wind Watch, Hurricane Local Statement, Hurricane Warning, Hurricane Watch, Hydrologic Advisory, Hydrologic Outlook, Ice Storm Warning, Lake Effect Snow Advisory, Lake Effect Snow Warning, Lake Effect Snow Watch, Lake Wind Advisory, Lakeshore Flood Advisory, Lakeshore Flood Statement, Lakeshore Flood Warning, Lakeshore Flood Watch, Law Enforcement Warning, Local Area Emergency, Low Water Advisory, Marine Weather Statement, Nuclear Power Plant Warning, Radiological Hazard Warning, Red Flag Warning, Rip Current Statement, Severe Thunderstorm Warning, Severe Thunderstorm Watch, Severe Weather Statement, Shelter In Place Warning, Short Term Forecast, Small Craft Advisory, Small Craft Advisory For Hazardous Seas, Small Craft Advisory For Rough Bar, Small Craft Advisory For Winds, Small Stream Flood Advisory, Snow Squall Warning, Special Marine Warning, Special Weather Statement, Storm Surge Warning, Storm Surge Watch, Storm Warning, Storm Watch, Test, Tornado Warning, Tornado Watch, Tropical Depression Local Statement, Tropical Storm Local Statement, Tropical Storm Warning, Tropical Storm Watch, Tsunami Advisory, Tsunami Warning, Tsunami Watch, Typhoon Local Statement, Typhoon Warning, Typhoon Watch, Urban And Small Stream Flood Advisory, Volcano Warning, Wind Advisory, Wind Chill Advisory, Wind Chill Warning, Wind Chill Watch, Winter Storm Warning, Winter Storm Watch, and Winter Weather Advisory.
        3. Systems that are not capable of displaying National Weather Service CAP information to give advanced warning to facilities shall not be considered equal.

**PART 3 - EXECUTION**

* 1. **EXAMINATION**

1. Examine conditions, with the installer present, for compliance with requirements and other conditions affecting the performance of the Nyquist C4000 Series IP-Based Intercom and Audio Distribution System.
2. Do not proceed until unsatisfactory conditions have been corrected.
   1. **EQUIPMENT MANUFACTURER'S REPRESENTATIVE**
3. All work described herein to be done by the contractor shall be provided by a documented factory authorized representative of the basic line of equipment to be utilized.
   1. **DIVISION OF WORK**
4. While all work included under this specification is the complete responsibility of the contractor, the following division of actual work listed shall occur:
5. The conduit, outlets, terminal cabinets, etc., which form part of the rough-in work, shall be furnished, and installed completely by the electrical contractor.
6. The balance of the system, including installation of speakers and equipment, making all connections, etc., shall be performed by the contractor. The entire responsibility of the system, its operation, function, testing and complete maintenance for one year after final acceptance of the project by the owner, shall also be the responsibility of the contractor.
   1. **INSTALLATION**
7. The installation, adjustment, testing, and final connection of all conduits, wiring, boxes, cabinets, etc., shall conform to local electrical requirements and shall be sized and installed in accordance with the manufacturer’s approved shop drawings.
8. Low-voltage wiring may be run exposed above ceiling areas where they are easily accessible.
9. The contractor shall install the new system at the location shown on the plans.
10. All Staff Stations and Call Switches shall be wall-mounted:
    1. Mount at 54" AFF.
    2. All wiring should be concealed.
    3. Verify exact location with architect.
    4. Avoid mounting near doors to prevent students from activating and running out of the rooms.
11. Admin / Staff VoIP phones can be desk or wall mounted.
12. Zone Paging Microphone Station is only desk mountable
13. Speaker and telephone lines run above ceiling and not in conduit shall be tie-wrapped to a ceiling joist with a maximum spacing of 8' between supports. No wires shall be laid on top of ceiling tile.
14. Connect field cable to each Analog Speaker transformer using UL butt splices for #18/2 shielded AWG wire.
15. Plugs disconnect: All major equipment components shall be fully pluggable by means of multi-pin receptacles and matching plugs to provide ease of maintenance and service.
16. Protection of cables: Cables within terminal cabinets, equipment racks, etc., shall be grouped and bundled (harnessed) to type and laced with No. 12 cord waxed linen lacing twine or T and B wire-ties, or hook and loop cable management. Edge protection material shall be installed on edges of holes, lips of ducts, or any other point where cables or harnesses cross a metallic edge.
17. 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.
18. 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 the same manner as conductors.
19. Provide complete “in service" instructions of system operation to facility personnel.
    1. **GROUNDING**
20. The contractor shall 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 ensure permanent and effective grounds.
21. The contractor shall provide 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.
22. The contractor shall provide all necessary transient protection on the AC power feed and on all station lines leaving or entering the building.
23. The contractor shall note in their drawings the type and locations of these protection devices and all wiring information.
24. 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.
    1. **DOCUMENTATION**
25. Provide the following directly to the Supervisor of Technology Services.
    1. One printed copy of all field programming for all components in system
    2. One copy of all diagnostic software with a copy of field programming data for each unit
    3. One copy of all field wiring runs, location, and end designation of system

**END OF SECTION**