PART 2 – Paging System Products

2.1 GENERAL EQUIPMENT

A. RACK ENCLOSURES: All rack-mount Paging System (PS) equipment shall be housed in EIA standard 19” equipment enclosures. Given the distributed networked nature of the system, it may be necessary to locate such rack enclosures at multiple sites throughout the facility, where each site is secure from the public. Each rack may be wall-mounted or floor-mounted, as required by specific instructions, or by the space(s) available.

   i. Adequate ventilation shall be supplied for each rack, and temperatures at all critical components shall not exceed 95 degrees F. Convection or forced-air cooling may be used, as long as this heat threshold is not surpassed, regardless of external factors. System components featuring internal forced-air cooling shall be provided adequate hot air extraction through the rear of the enclosure.

   ii. Each rack shall be constructed of 16 gauge steel with 14 gauge steel mounting rails. All joints shall be welded and bonded.

   iii. Rear access to each rack shall be lockable.

   iv. The height of each rack shall be as required for the specified equipment, plus 25% spare space for future growth.

   v. Blank panels shall be provided to fill all unused rack space.

   vi. Acceptable rack manufacturers:

      1. Middle Atlantic
      2. Atlas Sound

B. NETWORK: The Paging System (PS) shall be based on IEEE 802.3.af PoE Ethernet Network Infrastructure. All cabling, conventions and equipment shall be consistent with this IEEE standard.

   i. SWITCHES shall be managed-type, with VLAN capabilities and Power-Over-Ethernet (PoE) for all devices except AMPLIFIERS. Care should be taken to ensure that each Switch be able to supply adequate PoE power to the endpoint devices it serves. Uplink ports for each switch shall be via Optical Fiber. Either Multimode or Single-mode fiber may be used, as determined by the length of the required uplink runs. Each port on each Switch shall be capable of sustained 100MBit data rates.

   ii. SWITCHES for life safety compliant system components (Amplifiers, Life Safety Interface, Emergency Paging Station) shall be rugged industrial types with dry contact output for switch failure.
iii. SPANNING TREE single-point failure-resistant network topology shall be used, if 
the system is required to be life-safety capable or withstand failure of a network 
sector.

iv. UPS (uninterruptable power supply) systems shall be provided for all life-safety 
critical network components. UPS units shall have the capacity to power the 
units they serve for a minimum of 90 minutes from removal of mains power. 
UPS units shall monitor their proper functioning, and provide alerts via Form-C 
contact closures upon mains or any other failure.

v. One consistent VLAN (Virtual Local Area Network) shall be established across 
each managed Switch, with enough ports to accommodate the PS devices 
attached to it, plus 25% for future expansion. A second VLAN may be required 
to handle additional VoIP traffic to/from certain devices, and a third VLAN may 
be required for third-party control, and communication to other PS systems.

C. COMPUTER (CPU): A CPU may be present as part of the PS, but is not required for PS to 
function. It is recommended that the CPU and its monitor be rack-mounted, but rack-
mounting is not a requirement. The CPU and its accessories shall meet the following 
minimum specifications:

   i. Microsoft Windows 7 operating system, or XP-Professional.
   
   ii. Intel Pentium Dual Core processor, 2.6 GHz.
       
   iii. 2 GB RAM.

   iv. 160 GB SATA hard drive.

   v. Integrated video adapter, minimum 1280x1024 native output at 32-bit color.

   vi. Integrated gigabit Ethernet port.

   vii. CPU shall be Lenovo ThinkCentre A58 or equivalent.

   viii. User Interface shall be a single rack-space combined 17” LCD monitor, keyboard 
and track-pad mouse. Monitor shall be active-matrix color type, capable of 
native 1280x1024 resolution.

   ix. User Interface shall be Middle Atlantic RM-KB-LCD17.
2.2 PAGING SYSTEM (PS):

A. The PS shall be distributed in structure, such that there is no “head end” control location, and thus has no central point of failure.

B. The PS shall use the VLAN for transport of all digital audio data, including all recorded and live voice messages, preambles, background music and other audible signals, routine or emergency. This same Network shall carry monitoring and control data to and from each PS device. This audio data traffic shall be standard Cobranet at a sample rate of 48 kHz. For particulars, please access www.cobranet.info.

C. All PS components shall be continuously monitored for presence, proper function and faults. Each and every fault must be logged internally to the unit, and be able to viewed and copied to an attached Monitoring Computer, running software supplied by the Manufacturer.

D. All PS components shall be addressable on the Cobranet VLAN by means of dual 4-bit rotary ID switches.

E. All PS preambles, voice prompts and recorded announcements shall be in 16-bit monaural WAV file format. The Paging System shall be capable of importing custom preambles, prompts and announcements using an AUDIO FILE MANAGER function, through the Manufacturer Software running on an attached computer.

F. Each PS device shall have sufficient on-board memory to retain its configuration and settings in the event of power loss.

G. All PS components shall be CE marked, and shall comply with the RoHS directive.

H. AMPLIFIERS: PS amplifiers shall be located throughout the facility, as available space and efficiencies dictate. Each PS amplifier shall meet the following specifications:
   i. Power scalable in software from 100 Watts to 600 Watts per output channel, in 100 Watt increments.
   ii. Up to 2400 Watts output power capability from each amplifier chassis.
   iii. Each channel provides selected power into low impedance load, 70V line or 100V line, without the need for external transformer.
v. Up to eight (8) amplifier modules per amplifier chassis.

vi. Complete DSP (digital signal processing) per output channel, including page ducking, 5-band parametric filters, compressor/limiter, 8-band speaker equalization, and delay adjustable up to 500 milliseconds.

vii. Programmable channel-to-channel fail-over capability or chassis-to-chassis fail-over capability.

viii. Fail-over Link connector, for chassis-to-chassis fail-over logic.

ix. Ability to support end-of-line monitoring devices (ELDs). Each amplifier output module shall support up to 15 ELDs.

x. Ability to support Ambient Noise Compensation (ANC) circuitry, to allow for consistent Background Music (BGM) and routine page levels per amplifier channel or group of channels.

xi. Primary and Secondary Cobranet data ports wired to the CobraNet VLAN.

xii. Ability to store emergency messages in on-board non-volatile digital memory.

xiii. Ability to report and log all detected faults internal to each amplifier module and any ANC or ELD device attached to it.

xiv. Design Make/Model: Biamp Vocia VA-8600, with AM-600 amplifier modules.

I. END-OF-LINE DEVICE (ELD):

i. Each ELD shall be Power over Ethernet (PoE), Class-3, and wired to the Cobranet VLAN.

ii. Each ELD shall be housed in a small, surface-mountable enclosure.

iii. Each ELD shall be compatible with low impedance and constant voltage systems, and shall not rely on the speaker line as a power source.

iv. Each ELD shall respond to a digital integrity signal sent down the speaker line from the amplifier channel module. Once the channel module to ELD link is established, the absence of a response from an associated ELD shall result in a Speaker Line Fault.

v. Each ELD shall monitor its attached speaker line, and report faults to its associated amplifier.

vi. Design Make/Model: Biamp Vocia ELD-1.

J. AMBIENT NOISE COMPENSATORS (ANC):

i. Each ANC shall be Power over Ethernet (PoE), Class-3, and wired to the Cobranet VLAN.
ii. Each ANC shall be housed in a small, surface-mountable enclosure.

iii. Each ANC shall respond to its associated amplifier channel module(s), advising that channel module(s) of a substantial change in ambient noise level.

iv. Each ANC shall have two microphone inputs, each with 48V phantom power.

v. Each ANC shall offer software-adjustable microphone gain and phantom power controls.

vi. If two microphones are attached to an ANC, the ambient level reported to the associated amplifier channel(s) shall be the sum of the two microphones.

vii. Each ANC shall use an adaptive algorithm to incorporate the use of a reference, in order to accurately distinguish ambient noise from PS-generated announcements and background music.

viii. Design Make/Model: Biamp Vocia ANC-1.

K. AMBIENT NOISE SENSING MICROPHONE (AMIC): AMICs shall be located in the ceiling of a zone, away from individual speakers and persons paging. These microphones are to be uninhibited by other ceiling systems.

i. Each AMIC shall have a pickup pattern best suited for the specific application.

ii. Each AMIC shall be Self-Polarized Condenser type, phantom-powered from its ANC.

iii. Each AMIC shall be mountable to ceiling tiles and panels of at least one inch thickness, or into a deep single-gang electrical box.

iv. Design Make/Model: Audio-Technica ES945 (black) or ES945W (white).

L. RACK-MOUNTED INPUT DEVICE (RMID): Devices of this type serve to allow input from low-priority analog sources, such as Background Music (BGM) sources and local entertainment systems. Each RMID shall meet the following minimum specifications:

i. Powered over Ethernet (PoE), Class-3, and wired to the Cobranet VLAN.

ii. The ability to output a Multicast Bundle of 6 monaural signals to the Cobranet VLAN.

iii. Four pairs of unbalanced RCA jacks plus four balanced inputs. Each RCA jack pair shall mix to a single signal prior to digitization for stereo to mono summing.

iv. Two balanced Mic/Line inputs with phantom power, to accommodate other sources.

v. Adjustment of input gain and phantom power via software
vi. Complete DSP (digital signal processing) per input channel, including 5-band parametric filters and compressor/limiter.

vii. Four Control Inputs, each with variable trigger thresholds and operation modes: high/low/toggle high/toggle low.

viii. Four Form-C contact outputs with variable operation modes: high/low/pulse high/pulse low

ix. Ability to report and log any and all failure conditions associated with its operation.

x. Design Make/Model: Biamp Vocia VI-6.

M. RACK-MOUNTED OUTPUT DEVICE (RMOD): Devices of this type serve as zone outputs to non-monitored sub-systems such as legacy amplifiers, audio recording devices or local entertainment systems. Each RMOD shall meet the following minimum specifications:

i. Power over Ethernet (PoE), Class-3, and wired to the Cobranet VLAN.

ii. Four balanced analog audio outputs, selectable in software for +4/0/-10 dBu output levels.

iii. Complete DSP (digital signal processing) per output channel, including page ducking, 5-band parametric filters, compressor/limiter, crossover, 8-band speaker equalization, and delay adjustable up to 500 milliseconds.

iv. Four Control Inputs, each with variable trigger thresholds and operation modes: high/low/toggle high/toggle low.

v. Four Form-C contact outputs with variable operation modes: high/low/pulse high/pulse low.

vi. Ability to report and log any and all failure conditions associated with its operation.

vii. Design Make/Model: Biamp Vocia VO-4.

N. PAGING STATION, DESK-TYPE 4-BUTTON (PSD4):

i. Each PSD4 shall be Power over Ethernet (PoE), Class-3, and wired to the Cobranet VLAN.

ii. Each PSD4 shall have four buttons, each assignable to a specific paging task, plus a large round push-to-talk button and LEDs to indicate “wait” and “talk now.”

iii. Each PSD4 shall be equipped with a high quality dynamic cardioid (unidirectional) element, with integral secondary element for signal path testing, mounted on a flexible gooseneck.
iv. Each PSD4 shall have integral DSP functions: 5-band parametric filters and compressor/limiter.

v. Each PSD4 shall have internal memory, sufficient to store delayed pages of up to 120 seconds duration, as well as four preamble WAV files.

vi. Each PSD4 shall have a backlit LCD display, indicating page code (program) selected, availability of destination zones and security code entry, as well as other optional information.

vii. Each PSD4 shall be capable of storing a live page message, when some destination zones are busy. The PSD4 shall release the message when all destination zones become available.

viii. Each PSD4 shall have the ability to report and log any and all failure conditions associated with its operation.

ix. Design Make/Model: Biamp Vocia DS-4.

O. PAGING STATION, DESK-TYPE 10-BUTTON (PSD10):

i. Each PSD10 shall be Power over Ethernet (PoE), Class-3, and wired to the Cobranet VLAN.

ii. Each PSD10 shall have ten buttons (0 through 9, telephone-style), for the purposes of entering three digit page codes and security codes. PSD10 shall also include a large round push-to-talk button and LEDs to indicate “wait” and “talk now.”

iii. Each PSD10 shall be equipped with a high quality dynamic cardioid (unidirectional) element, with integral secondary element for signal path testing, mounted on a flexible gooseneck.

iv. Each PSD10 shall have integral DSP functions: 5-band parametric filters and compressor/limiter.

v. Each PSD10 shall have internal memory, sufficient to store delayed pages of up to 120 seconds duration, as well as four preamble WAV files.

vi. Each PSD10 shall have a backlit LCD display, indicating page code (program) selected, availability of destination zones and security code entry, as well as other optional information.

vii. Each PSD10 shall be capable of storing a live page message, when some destination zones are busy. The PSD10 shall release the message when all destination zones become available.

viii. Each PSD10 shall have the ability to report and log any and all failure conditions associated with its operation.
ix. Design Make/Model: Biamp Vocia DS-10

P. PAGING STATION, WALL-TYPE 4-BUTTON (PSW4):

i. Each PSW4 shall be Power over Ethernet (PoE), Class-3, and wired to the Cobranet VLAN.

ii. Each PSW4 shall have four buttons, each assignable to a specific paging task, plus LEDs to indicate “wait” and “talk now.”

iii. Each PSW4 shall be equipped with a dynamic noise-canceling close-talking microphone with push-to-talk button, on a 4.5-foot heavy-duty coil cord, and with an integral secondary element for signal path testing.

iv. The coil cord of each PSW4 shall be strain-relieved to its metal base structure, and shall be easily replaced with simple hand tools.

v. Each PSW4 shall have integral DSP functions: 5-band parametric filters and compressor/limiter.

vi. Each PSW4 shall have internal memory, sufficient to store delayed pages of up to 120 seconds duration, as well as four preamble WAV files.

vii. Each PSW4 shall have a backlit LCD display, indicating page code (program) selected, availability of destination zones and security code entry, as well as other optional information.

viii. Each PSW4 shall be capable of storing a live page message, when some destination zones are busy. The PSW4 shall release the message when all destination zones become available.

ix. Each PSW4 shall have the ability to report and log any and all failure conditions associated with its operation.

x. Each PSW4 shall have the ability to have the hand-held microphone replaced at the project site.

xi. Design Make/Model: Biamp Vocia WS-4.

Q. PAGING STATION, WALL-TYPE 10-BUTTON (PSW10):

i. Each PSW10 shall be Power over Ethernet (PoE), Class-3, and wired to the Cobranet VLAN.

ii. Each PSW10 shall have ten buttons (0 through 9, telephone-style), for the purposes of entering three digit page codes and security codes plus LEDs to indicate “wait” and “talk now.”
iii. Each PSW10 shall be equipped with a dynamic noise-canceling close-talking microphone with push-to-talk button, on a 4.5-foot heavy-duty coil cord and with an integral secondary element for signal path testing.

iv. The coil cord of each PSW10 shall be strain-relieved to its metal base structure, and shall be easily replaced with simple hand tools.

v. Each PSW10 shall have integral DSP functions: 5-band parametric filters and compressor/limiter.

vi. Each PSW10 shall have internal memory, sufficient to store delayed pages of up to 120 seconds duration, as well as four preamble WAV files.

vii. Each PSW10 shall have a backlit LCD display, indicating page code (program) selected, availability of destination zones and security code entry, as well as other optional information.

viii. Each PSW10 shall be capable of storing a live page message, when some destination zones are busy. The PSW10 shall release the message when all destination zones become available.

ix. Each PSW10 shall have the ability to report and log any and all failure conditions associated with its operation.

x. Each PSW10 shall have the ability to have the hand-held microphone replaced at the project site.

xi. Design Make/Model: Biamp Vocia WS-10

R. MESSAGE SERVER (MS):

i. Each MS shall be a single rack space Linux server, powered by 120-240VAC Mains.

ii. Each MS shall be wired to the Cobranet VLAN. If Telephone Paging is enabled, then it shall be wired to the VoIP VLAN as well. Likewise, if Third Party Control is utilized, and/or the MS is to communicate with other Paging Systems, then the MS shall be wired to a third VLAN for this purpose.

iii. Each MS shall have a hard drive with minimum capacity of 80 GB, for storage and playback of recorded announcements and preambles.

iv. Each MS shall act as a Configuration Server for the entire NPS, and have the ability to automatically program replacement devices, as needed.

v. Each MS shall include a VoIP Trunk Server, and support SIP (Session Initiation Protocol) calling, for purposes of telephone-based paging.
vi. Callers using VoIP into the MS shall be required to enter a 4-digit security code, plus a three-digit page code, in order to make a page over the PS. The voice prompts shall be programmable.

vii. Each MS shall have an integral scheduler, for purposes of scheduling automated announcements throughout the PS system.

viii. Each MS shall store log data from all system components, and be able to download that data to attached computer(s).

ix. Design Make/Model: Biamp Voca MS-1

S. WALL REMOTE (WR):

i. Each WR shall be Powered over Ethernet (PoE), Class-1, and wired to the Cobranet VLAN.

ii. Each WR shall include a back-lit multifunction LCD display and four buttons for user control, and mount over a standard 2-gang North American electrical box.

iii. Each WR shall allow level control over the BGM for the zone to which it is assigned.

iv. Each WR shall allow selection of BGM sources, among those programmed to be available for the WR’s assigned zone.

v. Each WR shall allow muting of low-priority pages, if this feature is enabled from the Manufacturer Software.

vi. Design Make/Model: Biamp Voca WR-1

T. LIFE SAFETY INTERFACE (LSI): This unit acts as the interface to building safety systems such as the Fire Panel, and adds the functions required to have the PS participate in a Life-Safety system.

i. Primary power for LSI shall be from approved 24VDC external power source.

ii. Secondary power for LSI shall be via Power over Ethernet (PoE) switch, Class-3, wired to the Cobranet VLAN.

iii. Tertiary power for LSI shall be via PoE switch, Class-3, via the secondary Cobranet port.

iv. LSI shall include front-panel LED indications for: Primary Power Present, System Fault, General Alarm, General Fault, Power Supply Fault, Protection Fault, Path Fault, Aux Power Present, Zone Alarms 1 through 8, Zone Faults 1 through 8.

v. LSI shall have control of four emergency zones.

vi. Design Make/Model: Biamp Voca LSI-16.
U. The system shall be able to interface to an optional Text-to-Speech Server with available language packages, for proper enunciation of messages entered as text by the PS System Operator.