OIL INDIA LIMITED

(A Government of India Enterprise)
P.O. Duliajan – 786602, Assam, India
Website: www.oil-india.com

Corrigendum No. 4 to IFB No. CPI6857P22

Construction of G+5 HR Building including Electrification, HVAC, Gas & Water supply, Sanitary & Drainage works, Road/Approach works & other ancillary services including supply of all materials complete in all respect including comprehensive Operation & Maintenance at FHQ, Duliajan

1. This Corrigendum is issued to notify that technical specification & make list for EPBAX/CCTV/LAN/Wifi /Access Control /Structured Cabling is provided as **Annexure-I** to be read in conjugation with TOW/SOW.

2. All other terms and conditions of the tender remain unaltered.

3. All the prospective bidders are requested to regularly visit OIL's Website: www.oil-india.com and e-procurement portal https://etender.srm.oilindia.in/irj/portal for further announcements/ latest information related to this tender

TECHNICAL SPECIFICATION

&

MAKE LIST

FOR

EPBAX / CCTV / LAN / WIFI / ACCESS CONTROL / STRUCTURED CABLING

STRUCTURED CABLING

Technical Specification for Structured Cable and Components:		Compliance
1	**06 Core Fiber Cable (OFC)**	
	The fiber should be optimized for operation at 1310 nm and at 1550 nm.	
	Should fulfill the requirements of ISO.IEC 11801 - 2nd Edition, type OS2, ITU-T REC G 652D spec IEC 60794-1-2 F5	
	No of Cores : 6	
	Max. Attenuation: At 1310 nm <= 0.40 dB/km, At 1550 nm <=0.30 dB/km	
	Fibre/Tube Identification : Single Tube	
	Fibre protection (Tubes) : Polybutylene Terephthalate (PBT)	
	Armouring : CST	
	Thickness : 1.6mm	
	Outer Sheath :UVStabilised Polyethylene (PE)	
	Central Strength Member: Steel wire coated with PE	
	Water Blocking : Thixotropic Gel (Tube); Petroleum Jelly (Interstices)	
	Cable Diameter (D) : 9.0 ± 0.5 mm	
	Mass (Nominal) : 91 kg/km	
	Min. Bending Radius (during Installation) : 20 D;D-Outer Diameter	
	Max. Tensile Strength-Short Term : 1500N	
	Max. Crush Resistance-Short Term : 2200N/100 mm	
	Operating Temperature range : -40°C to +70°C	
2	**LC Type 9/125µm OS2 Fiber Optic Simplex Pigtail**	
	Type : 9/125 micron fibre performance	
	Jacket Material : LSZH complying to IEC 61034-1 & 2,IEC-60332-1, IEC-60754-1 & 2	
	Operating Temperature: -40°C to +75°C	
	Connector Insertion Loss: 0.30dB(Max)	
	Attenuation: 1310/1550 : 0.36/0.22 dB/KM	
3	**Patch Cord, LC, Duplex, SM, G657A2, PC, LSZH**	
	Cable : LC-LC 9/125µm OS2 Singlemode Duplex Patch Cord Length : 3mtrs	
	Connectors : The optical fiber patch leads shall comprise of Single mode 9/125µm fiber with 2XLC type fiber connectors terminated at each end of fiber patch cord.	
	Insertion loss should be better than 0.35 dB	
	Jacket Material : LSZH complying to IEC 61034-1 & 2,IEC-60332-1, IEC-60754-1 & 2	
	Attenuation: 1310/1550 : 0.36/0.22 dB/KM	
	Connector Loss : 0.30dB(max)	
	Operating Temperature : -40°C to +75°C	

4	**Fiber Optic LIU Rack Mount LIU (12/24 Ports)**	
	Fiber optic patch panel : Fiber optic patch panel FMS Termination Drawer should have sufficient slots to accommodate 3 of 12/16 Port LC Adaptor Plates.	
	Should have Slide type drawer structure	
	Height: 1 U, 1.75 inches (12 & 24 Ports)	
	Material: Cold Rolled Steel in surface coated by electrostatic epoxy powder	
	Slots: FMS should have sufficient slots to accommodate adaptor plates	
	Empty Slots of FMS should be covered with blank plates.	
	Splice Tray : Splice Tray of ABS, Comply with UL 94V2 material should be supplied with LIU.	
5	**12/16 Port LC/SC Type Adaptor Plates (Single mode)**	
	The adaptor plate should be pre-loaded with LC/SC Type Single mode Duplex Adaptors.	
	Port Density :12/16 LC/SC Single mode Ports	
	All LC adapters should be duplex type with shutter for protection. Adapters should be snap mount for easy insertion and removal.	
	Insertion Loss: <0.2 to <0.1 dB	
	Compliance :RoHS Compliant	

	Technical Specification for Structured Cable and Components:	**Compliance**
1	**Cat 6 UTP LSZH Cable**	
	4 Pair Cable with integral cross -member pair separator for uniform characteristic impedance.	
	Category 6 Unshielded Twisted 4 Pair 100 Ω cable shall be compliant with ANSI/TIA/EIA-568-D-2018 Additional ISO/IEC 11801-1 and ISO/IEC 61156-5	
	Suitable for 10GBase-T applications in acc. with IEEE 802.3an up to 500 MHz and 55 m.	
	Transmission Performance Specification for 4 Pair 100Ω an guaranteed up to 1G	
	Category 6 Cabling	
	Category 6 UTP cables shall extend between the work area location and its associated telecommunications closet and consist of 4 pair, UTP CM cable jacket.	
	Conductor: Solid Copper	
	Conductor Diameter: 0.555+-0.01mm (23AWG)	
	Insulator HD Polyethylene solid	
	Jacket: LSZH RoHS IEC 60332-3-22 complied, Color- Grey/Blue	
	Outer Diameter: 6.0 ± 0.2mm	
	Max Temperature: -20˚C to +70˚C	
	Should be ETL certified and 4 Channel ETL Verified as per TIA 568-D-2018	
	Mechanical Test	
	Should have Pulling force of 11.5Kg.	
	Bend Radius: Installation: <4 X Cable Diameter at –20˚C ±1˚C, Operation: <4 X Cable Diameter at –20˚C ±1˚C	
	Electrical Test	

	Conductor Resistance :<9.38Ω /100m	
	Resistance Unbalance 5% Max	
	Mutual Capacitance :< 5.6nF/100m	
	Capacitance Unbalance: 330pF/100m.	
	Propagation Velocity : 69%	
	ELT certified for 4 Channel should be submitted along with bid submission	
2	**Cat 6 UTP RJ 45 Keystone Jack**	
	RJ45 Jack of Category 6, for the establishing of transmission channels of class E with up to 4 plugged connections, complies with Category 6 requirements of the standards ISO/IEC 11801:2nd edition, EN 50173-1, DIN EN 50173-1: 2002 as well as ANSI/TIA/EIA 568-B.2-1, de-embedded tested in acc. with IEC 60603-7 (603-7), interoperable and backwards compatible with Cat.5e and Cat.5.	
	Suitable for 10GBase-T applications in acc. with IEEE 802.3an up to 500 MHz and 55 m.	
	Compatible with RJ standard plugs (RJ11, RJ12, RJ45), PCB- and tool based connection of installation cables AWG 24 – 22 (0.5 mm – 0.65 mm) and flexible cables AWG 26/7 – AWG 22/7.	
	IDC termination should feature nil crossover in acc. with EIA/TIA 568-A/B, gold-plated bronze contacts for >750 mating cycles, >200 insertion cycle	
	Material: RoHS complied	
	Housing material: Polycarbonate (UL-94-V0)	
	Should be available with or without dust protection feature	
	Should be 3P certified	
3	**Faceplate**	
	Should be UK style Keystone-type Faceplates are available in 1, 2 & 4 port configurations	
	Should be featured with shutter options, the screws not to be visible	
	Should support Work with both Flush and Wall mount box	
	Should support Operating Temperature: -10～+60; Storage Temperature: -40～+68; Humidity: 10%~90% RH	
	Material: ABS, UL 94V-0; Spring: SUS304; Surface Finish: Polished	
4	**Patch Cord, U/UTP 4P, Cat.6, length 1/ 2/3/5/10 m**	
	Standardization: Compliant with Cat.6, Class E requirements: ISO/IEC 11801 2nd Edition Compliant with Cat.6 component standards IEC 60603-7-4 and 60603-7-5	
	Cable shield: U/UTP	
	Number of conductors : 8	
	Stranding: 7 x 0.20 mm (24 AWG)	
	Cable jacket characteristics: cable, metal-free	
	Cable overall diameter: 6.5±0.2 mm	
	Tube / Wire type: stranded conductor	
	Insulation: solid polyolefin, 0.97±0.02 mm diameter	
	Plug: Feature cable retension, with enhanced pull strength.	

	Cat 6 patch cord plug to have round cable holder and strain relief boot to avoid bending.	
	Jacket: PVC/LSZH with 8 different color options	
	Plug should be featured with color ring options	
	Plug should have high repeatability cross talk performance	
	Plug design should be patented with unique feature	
	Should be ETL verified; 4 Channel ETL certificate should have part code mentioned	
5	**19" 1U 24 port unshielded Patch Panel**	
	Patch panel should be modular design, populates up to 24 UTP keystone-type jacks in 1U	
	Patch panel should be Enhanced with cable strain relief with retention tray; It should be single metal both front panel and rear tray	
	Material: sub-rack made of Aluminum with dimension 44.4 mm : 482.6 mm : 105 mm (h:w:d) tray	
	Information Outlet or connectin module should comply with the specification mentioned above in 2	
	Standard : Conforms to IEC-60603-7 (603-7) for keystone-type, snap-on apertures	
	Should be RoHS complied	
6	**Cat6 Field Termination Plug**	
	Standardization: Compliant with Cat.6, Class E requirements: ISO/IEC 11801 2nd Edition Compliant with Cat.6 component standards IEC 60603-7-4 and 60603-7-5	
	Cable shield: U/UTP	
	Number of conductors : 8	
	Termination: IDC type Tool less	
	Material: PC UL 94V-2 black	
	Contact material: Phosphor bronze with 100 micro inch nickel plated	
	Wire management bar: PC UL 94V-2 white	
	Insertion force: 20N max	
	Retention strength: 7.7 kg	
	Operating Temperature: -10 degree C to +60 degree C	
	Mating cycle: 750 cycle min	

TECHNICAL SPECIFICATIONS

IP-PBX SYSTEM

S.No.	Description	Compliance
1	**IP Telephony System Architecture**	

	The IP telephony system must be based on a pure IP technology that is a software-only solution.	
	The IP telephony system must support unified communication (UC) server & gateways architecture for SIP, Digital and Analog trunks connectivity.	
	The System must be TEC Approved with GR Number.	
	The system must be capable of supporting Analog, Digital, IP Telephones, and SIP based video desk phones.	
	The communication servers must work in an Active/Active redundancy mode. It should be possible to define servers load balancing mode.	
	All servers must be provided in a cluster mode. If one cluster server fails, one of the other cluster servers in the network must be able to take the complete load of the calls automatically (without any manual intervention) and without dropping any existing calls (IP,TDM& PRI) or data (CDR, CTI). Management of all servers in cluster should be from same web page. All servers should have same database.	
	The telephony system must be able to register SIP phones/SIP video phones and MGCP phones directly to it	
	System should have Distributed Architecture	
	It should be possible to install Telephony system in VMware EXSi 5.5 or higher.	
	All Data (Numbers, COS, Routing, Applications) should reside in all the Servers	
	Database replication in All servers should be automatic and real time	
	Should support N+1 Redundancy Architecture as well as 1+1 redundancy Architecture	
	Should support Remote Survival Nodes	
	In case of failure of one server, the SIP Phones, SIP Gateways, MGCP Phones should register with second Server automatically	
	System Diagnostics should be done in Server	
	Hot Standby for SIP Phones and Gateways i.e SIP Phones and Gateways should register automatically to next available telephony server.	
	COTS - commercial off-the-shelf Servers should be used for telephony system	
	Telephony system should use Linux Operating System	

	system should support CSTA phase III Protocol	
	Full continuation for call signalling and media must be supported	
	Calls must not be disconnected and control must remain throughout the swap to an alternate server including full call control (transfer, conference actions, continuation of CDR data for the existing call).	
	Load Balancing of end points must be possible by the administrator	
	There must be no restriction on the number of endpoints being backed up in case of one server failure.	
	UC platform servers must provide full failover and redundancy	
	System should support the following SIP RFCs:	
	RFC 3261 (SIP: Session Initiation Protocol)	
	RFC 3262 (Reliability of Provisional Responses in Session Initiation Protocol)	
	RFC 3263 (Locating SIP Servers)	
	RFC 3264 (An Offer/Answer Model with Session Description Protocol (SDP))	
	RFC 3265 (Specific Event Notification)	
	RFC 2327 (SDP- Session Description Protocol)	
	RFC 1889 and 1890 (RTP/RTCP)	
	RFC 3515 (REFER)	
	RFC 2833 (DTMF over IP)	
	Scalability	
	It should be possible to add more sites and users without the need to change the software and existing configuration.	
	The system must be scalable to at least 25,000 endpoints in a single cluster architecture.	
	Each server must support a minimum of 1000 endpoints	
	The call signalling server must handle traffic at a minimum of 100K BHCC.	
	The system must be modular, scalable and distributable	
	System Survivability	

	The UC platform must consist of one or many servers where each server in the cluster provides complete 100% application functionality.	
	In case of a failed server, all endpoints registered with that server need to register instantly with a different server in the cluster with no interruption to on-going calls.	
	Media Gateways must have survival mechanisms that allow them to maintain 100% of the telephony services for their users in case of failure in the WAN links when the signalling with the call server drops.	
	The life cycle of the entire system being provided must be at least Ten (10) years.	
	The system gateway must be able to restart automatically without human intervention when the external AC power supply is resumed after complete power failure (even after the batteries are discharged).	
	The telephony system must be capable of providing 99.999% availability.	
	Distributed Architecture	
	The UC platform must have distributed architecture and centralized control for all the sites in the network.	
	The proposed solution must support Hybrid cloud solution in order to guarantee business continuity with overall survivability regardless of a failure at any single location.	
	The proposed solution must enable part of the cluster to be hosted in a Cloud Service Provider (CSP) to run all applications.	
	The proposed solution must have built in redundancy using a cloud solution to provide automatic disaster recovery option.	
	The proposed solution should have provision to be installed using an image of the application an easily implemented on the Cloud Service Provider servers.	
	Quality of Service (QOS)	
	The voice and signaling frames must be marked [tagged] in order to be recognized.	
	Server – Physical Attributes	
	COTS – Commercial Off-the-Shelf servers must be used.	
	The redundant server must have separate hardware, not sharing elements like hard drives and RAM etc., to avoid a single point of failure.	

	The server should have AC power supply.	
	The system must be based on server gateway architecture with external appliance servers	
	No card based processor systems / soft switch should be quoted.	
	The call processor must run on Linux OS.	
	Minimum Server Specifications:	
	The CPU must be from the Intel® Xeon® processor E3-1220v5 or latest	
	The server must have at least 8GB RAM	
	The server must have Hard Drives (300GB each) of storage	
	The server must have a Dual 1GB network interface.	
	Form Factor for physical server (Not Virtual Machine) should be 1 U	
	Gateways	
	The media gateways shall be capable of being centrally managed via the telephony management application. The system should support multiple gateways.	
	The system gateway should be able to restart automatically without human intervention when the external ac power supply is resumed after complete power failure	
	The system gateways should support the following type of extensions:	
	Analog	
	Digital	
	Cordless (DECT) Extension	
	SIP	
	MGCP	
	The system gateway should support the following type of trunks :	
	Analog: E&M (2W), E&M (4W), DC loop signaling, decadic, DTMF	
	Digital: 2Mb stream with the following signaling protocols (Digital CEPT, R2MFC)	
	Standard ISDN BRI, PRI	

	SIP and MGCP on VOIP	
	ISDN (30B+D / 23B+D / 2B+D)	
	SS7	
	ISDN QSIG (30B+D / 2B+D)	
	Q-sig over IP	
	Security	
	Administration of the system should be using HTTPS	
	It should support the Interop with leading SBC	
	System should use TLS (Transport Layer protocol) to encrypt SIP, HTTP, FTP and SRTP (Secure Real-time Transport Protocol) and SRTCP to encrypt RTP and RTCP	
	System should have auto Provisioning profiles contain pre-configured sets of features that must automatically polls and updates registered phones with the latest phone firmware and configuration files.	
	Mobility	
	The system should have Call Back feature. If the user dials his own extension from predefined number (mobile/landline) then system should disconnect the call and then system shoud call the user to provide the dialtone so that user can make intercom or PSTN calls.	
	The system should have Call Through feature. If the user dials his own extension from predefined number then system should provide dialtone to make intercom or o/g calls.	
	The system should have Flexi Call (Forking, reach-me-anywhere) feature. Users should be able to receive calls on any of their phones, from almost anywhere. An incoming call rings on all or specific phones until the user answers the call. The user can transfer the call, establish a conference, and so on, whether the answering device is an internal device, an external phone, or a cellular handset. If the answering phone is an external device, the call automatically becomes an authorized mobility call.	
	The system should support SIP Client on smart phone.	
	SIP Endpoints	
	All SIP phones must support the standard SIP protocol. No proprietary protocols are allowed to be used.	

	SIP phones must support the configuration of programmable buttons with functions such as Break-in, Conference call, Deflect, silent monitoring and more.	
	SIP phones must work in conjugation with the following applications:	
	1. Contact Centre (Agents Phones)	
	2. Attendant Console	
	3. Managed Audio Conferencing	
	4. Managed Video Conferencing	
	5. UC clients	
	ACD	
	System should have built in Automatic Call Distribution (ACD) with following features:	
	Busy ACD Group announcement	
	Hunt Group Release	
	IVR-ACD	
	Log In / Log Out	
	Multiple Announcements:	
	1. Mandatory announcement - All incoming callers to an ACD/HUNT group must be able to hear an introductory announcement in its entirety usually explaining about the company, product, or campaign.	
	2. First announcement - If all agents are busy, callers must be able to hear this announcement once usually informing them that their call has been placed in queue. (The system must be able to cut short this announcement if an agent becomes available to attend to the caller.)	
	3. Music - If no agents are available after the first announcement (or no First and Periodic announcers have been configured), the caller must be able to hear background music while in queue.	
	4. Periodic announcement - Alternating with background music, these announcements can also be played to callers in queue according to the Periodic Announcement Interval (see above) until the ACD/HUNT call is answered.	
	Release / Resume	

	Wait Queue	
	Wrap-Up Time	
	Automatic Release of ACD Agent	
	Automatic Call Distribution (ACD) Extended Overflow	
	Zone Page	
	A phone user must be able to simultaneously broadcast a message over all types of endpoints.	
	The maximum quantity of endpoints in one zone should not be less than 100.	
	System Administration	
	System administration should be web based.	
	All programming of system should be done through a web-based GUI interface.	
	The administrator should have Dynamic Profiles.	
	The system should allow for complete multi-level administration. The administrator must be able to define at least five (5) different administration level profiles that can be applied to allow subsets of users to access and manage particular pages in the systems Web Portal	
	Certification Requirements	
	1. The OEM must comply with ISO 9001 certification in all the company's activities.	
	2. The products must comply with Safety and EMC standards, including FCC, UL/TUV, CE, and the RoHS directive.	
	System Features	
	ANI (Caller ID) Restriction	
	ARS (Automatic Route Selection)	
	Auto Attendant	
	Call Forward at Night/Holiday	
	Call Forward Destinations	
	Call Forward for Undefined Stations	

	Call Forward on Busy	
	Call Forward on DND (Do Not Disturb)	
	Call Forward on Logout	
	Call Forward on No Answer	
	Caller id based routing for individual extension	
	Deflect (Divert) Call	
	Digit Train Conversion	
	Direct-In-Dial	
	Direct-In-Line (DIL)	
	Hot Line	
	Interactive Voice Response (IVR)	
	Least Cost Routing	
	Look Ahead Routing (LAR)	
	Numbering Plan	
	Personal Routing Rules based on caller id and DNIS	
	Predetermined Night Answer	
	Toll Restriction – Digit Analysis	
	Toll Restriction – Trunk Groups	
	Trunk to Trunk Connection	
	Trunk Transfer Restriction	
	Classes of Service	
	Night Answer Central Bell / UNA Pickup	
	Page Queue	
	Recall	
	Recall / Incomplete Destination	
	Second Ring back Tone	

	Speed Dial Public (System) and Private	
	Virtual Numbers	
	Music On Hold	
	Voice Page	
	Silent Monitor	
	Zone Page	
	Barge In	
	Wake up	
	Extension Features	
	Answer Call Waiting by Transfer	
	Auto Set Relocate	
	Auto-Answer	
	Automatic Disconnect	
	Automatic Number Identification (ANI) Display	
	Browse Personal Directory	
	Busy Lamp Field	
	Call Forward All	
	Call Hold	
	Call Log	
	Call Parking and Call Pickup	
	Call Waiting	
	Caller ID Control	
	Caller-ID Screening	
	Caller id based routing for individual extension	
	Calling Number and Name	
	Camp-on Idle	

	Configurable DSS Buttons	
	Direct Dial without Off Hook (Hands Free)	
	Directed Call Pickup	
	Display Automatic Number Identification (ANI)	
	Display Dialed Number and Name	
	Display Dynamic Call Divert Information	
	Display Select Hold Display	
	Display Time/Date Function	
	Do Not Disturb (DND)	
	DSS/BLF	
	Elapsed Time Display	
	Group Call Pickup	
	Hands Free	
	Hands-Free Announce and Reply (Idle State)	
	Last Number Redial	
	Login and Logout	
	Message Waiting Indication	
	Multi Appearance (Call Waiting)	
	Multiple Line Appearance	
	On-Hook Dialing	
	Placing Multiple Calls on Hold	
	Privacy – ANI Restriction	
	Reminder/wake up Call	
	Restrictions – Station	
	System Non-Exclusive Hold	
	Transfer with Consultation	

	Transfer without Consultation (Blind)	
	Voice Page	
	Emergency Preemption	
	Listen to Paging while in a call (Busy Condition)	
	ULA - User Line Appearance (ULA)	
2	**Emergency communication**	
	The Emergency communication resource should be from the same telephony server and have the facility to automatic dial out to connect up to 100 participants in a single conference. System should also have 100 party managed meet me conference. It should be possible to further divide 100 party conference bridge into any combination like 10 X 10 party, 5 x 20 party etc. if required. The meet me conference should be secured means to enter to the conference bridge, the user should enter the password.	
	The emergency communication management should be from Web Browser/HTML5 based GUI based interface from Windows PC and Touchscreen Devices.	
	The emergency communication must be controlled by a user defined as Group Operator from the web based GUI.	
	The Group Operator should have following features as below:	
	1. The Group Operator must be able to add / remove members	
	2. The Group Operator must be able to add other conference members	
	3. The Group Operator must be able to mute / unmute (User, None, All)	
	4. The Group Operator must be able to lock / unlock the conference	
	5. The Group Operator must be able to close the conference	
	6. It must be possible to dial out a pre-defined group (or multi-groups) of participants/numbers by simply pressing the pre-assigned virtual key on PC.	
	7. Each pre-set conference must have its own unique dial number such that when this group number is dialled; all the number stations will ring simultaneously.	

	8. Any combination of stations and external numbers must be able to be defined as members of the Group Call.	
	9. Participants may join a conference in the audible or in the mute mode, if in mute mode, the right to speak must be selectively offered to attendees per their request by a special signal sent to the Group Operator by the attendees.	
	10. Attendees must be able to be added or excluded at any time by the Group Operator	
	11.The conference must be terminated when the Group Operator leaves (auto terminate if all members left are muted).	
	12. The Group Operator must be able to barge into an existing user call based on pre-emption predefined rules.	
	13. Group operator must have two SIP phones so that if one phone is busy in conference, the second phone can be used to add participants.	
	14.Both group operator SIP phones should be controlled by web based conference management GUI for telephony feature like answer, hold, transfer etc.	
	15. The same Group operator should also function as operator console	
3	**Specification of Type -1 IP phone**	
	SIP phone should be from the same OEM of IP telephony system	
	132 x 64-pixel graphical LCD	
	1 VoIP accounts	
	XML remote phonebook	
	Auto provision via FTP/TFTP/HTTP/HTTPS for mass deployment	
	Anonymous call, anonymous call rejection	
	PoE, Headset, Wall-Mountable	
	Volume adjustment, ring tone selection	
	Voicemail, MWI	
	Call park, call pickup	
	DTMF: In-band, out-of-band (RFC 2833) and SIP INFO	

	VAD, CNG, AEC, PLC, AJB, AGC	
	Full-duplex hands-free speakerphone	
	SIP v1 (RFC2543), v2 (RFC3261)	
	NAT Traversal: STUN mode or 3rd party SBC	
	DTMF: In-Band, RFC2833, SIP Info	
	IP Assignment: Static/DHCP/PPPoE	
	1xRJ9 handset port	
	1xRJ9 headset port	
	Transport Layer Security (TLS)	
	LED for call and message waiting indication	
	2xRJ45 10/100M Ethernet ports	
	Power over Ethernet (IEEE 802.3af)	
4	**Specification of Type -2 IP phone**	
	SIP phone should be from the same OEM of IP telephony system	
	132 x 64 -pixel graphical LCD with backlight	
	2 VoIP accounts	
	Local phonebook up to 100 entries	
	Auto provision via FTP/TFTP/HTTP/HTTPS for mass deployment	
	SRTP/ HTTPS/ TLS, 802.1x	
	PoE, Headset, Wall-Mountable	
	Volume adjustment, ring tone selection	
	Voicemail, MWI	
	Call park, call pickup	
	Narrowband codec: G.711, G.723.1, G.726, G.729AB	
	VAD, CNG, AEC, PLC, AJB, AGC	

	Full-duplex hands-free speakerphone	
	SIP v1 (RFC2543), v2 (RFC3261)	
	NAT Traversal: STUN mode or 3rd party SBC	
	DTMF: In-Band, RFC2833, SIP Info	
	IP Assignment: Static/DHCP/PPPoE	
	1xRJ9 handset port	
	1xRJ9 headset port	
	Transport Layer Security (TLS)	
	LED for call and message waiting indication	
	2xRJ45 10/100M Ethernet ports	
	Power over Ethernet (IEEE 802.3af)	
5	**Specification of IP Video phone**	
	SIP phone should be from the same OEM of IP telephony system	
	7 inch (124 x 600) adjustable touch screen	
	720p30 HD Video	
	Runs Android 5.1.1	
	Built in Bluetooth 4.0 + EDR for headsets and pairing mobile devices	
	Dual Port Gigabit Ethernet with PoE	
	Built in WiFi(802.11b/g/n)	
	Call recording, hotline, one touch dial	
	Redial, call waiting, emergency call	
	Data import/export via Bluetooth	
	Ring tone selection/import/delete	
	Local phonebook up to 1000 entries	
	XML/LDAP remote phonebook	

	Intelligent search method	
	Phonebook search/import/export	
	Black list	
	HD voice, HD Handset, HD Speaker	
	Audio Codec: Opus, G.722, G.722.1, G.722.1C, G.711, G.723, G.726, G.729AB, iLBC	
	Video Coded: H.264 High Profile, H.264, VP8	
	Self View (local video preview)	
	27 one-touch DSS keys	
	Illuminated mute/headset/handsfreespeakerphone key	
	SIP v1 (RFC2543), v2 (RFC3261)	
	Call server redundancy supported	
	IPv4/IPv6	
	NAT transverse: STUN mode	
	Proxy mode and peer-to-peer SIP link mode	
	Time and date synchronization using SNTP	
	UDP/TCP/DNS-SRV(RFC 3263)	
	QoS: 802.1p/Q tagging (VLAN), Layer 3 ToS, DSCP	
	SRTP for voice encryption	
	Transport Layer Security (TLS)	
	HTTPS certificate manager	
	AES encryption for configuration file	
	Digest authentication using MD5/MD5-sess	
	OpenVPN, IEEE802.1X	
	Auto provision via FTP/TFTP/HTTP/HTTPS for mass deploy	
	Auto-provision with PnP, Zero-sp-touch, TR-069, SNMP	

	Package tracing export, system log	
	Setup assistant wizard	
6	**Help desk specification**	
	1.1 General capabilities	
	1.1.1 The proposed solution must be embedded within the platform, not installed on a separate server and should be from the same OEM of the telephony system.	
	1.1.2 The system must be an All in one solution that provides a one server solution for UC&C and 5 agent license for help desk.	
	1.1.3 Single server deployment with intuitive and central management capabilities should support true multimedia.	
	1.1.4 Help desk managers must be able to easily prioritize customers and incoming contacts regardless of the media used.	
	1.1.5 The same set of business and routing rules can be applied to voice / chat calls, emails, and faxes if required.	
	1.1.6 The help desk must support multi-layer routing including Priority, Skill Based, Statistical, Business Rules, and Customer Defined Values.	
	1.1.7 Help desk must have embedded IVR, enabling managers to design routing plans and accurately assess help desk activity trends.	
	1.1.8 The IVR application must be a GUI application that can be managed by the customer.	
	1.1.9 The customer must have the ability to build new self-services applications like new IVR flow for new service.	
	1.1.10 Customer must have the ability to define/change routing rules by himself based on customer's profile.	
	1.1.11 The help desk must support Outbound, Call-back and Campaigns – including preview, progressive and automated outbound dialling.	
	1.1.12 The supervisor must be able to see the status of help desk agents in real-time in his PC like logout, busy, free, release, non ACD etc. in graphical form in pie chart / bar chart.	
	1.2 Help desk facilities	

	1.2.1 Real-time Monitoring – must provide supervisors with statistical information about the current status of the help desk with on line refresh (1sec). The application must include pre-defined list of reports and the customer (end user) should be able to choose reports as needed.	
	1.2.2 The Real Time application must provide the ability to build/change the workspace for each user and by user (not vendor or distributor).	
	1.2.3 The RT must provide the ability to move agents to/from different groups/queues for current login only.	
	1.2.4 Historical Reports – must be able to collect all information from call entry to call termination. Call profile details for internal investigation purposes should be part of the contact center solution.	
	1.2.5 The help desk solution must have an embedded Management Information System (MIS) suite that monitors all help desk activities, generating reports that summarize the past performance of the system over a given time period, and providing statistical analysis of the help desk within a specified period. Real-time and historical reports provide:	
	Help desk agent should be able to do following activities from agent application installed on PC:	
	Login/Logout from group	
	Release/Resume	
	Ready	
	Wrap-up Code	
	Release for Break	
	Release for Meeting	
	Control Wrap Up	
	Supervisor Help	
	Agent Board	
	Answer	
	Hold	
	Retrieve	

	Hang Up	
7	**Specifications for Self Survivable Gateway:**	
	Gateway should have minimum 96 analog/CO ports. Gateway should be from the same OEM of IP telephony system	
	Voice Processing – voice codecs: G.711, G.729A, G.723.1,etc. and echo cancellation: G.168 with 64ms echo tail; dynamic jitter buffer; voice activity detector (VAD)	
	Call Handling – configurable dialing plan	
	Fax Processing – T.30, T.38 fax relay	
	User Features – caller ID, call forward, call transfer, hotline, CRBT, do not disturb, speed dialing	
	Protocol – SIP (RFC3261, MGCP etc)	
	Standards – caller ID detection (FSK)	
	Primary and Backup – the gateway can be configured and controlled in server clusters	
	LED indicators– power, system status, network status, line status	
	Ethernet Connector – Dual Gigabit ethernet. The Gateway should function as a Self-Survivable unit when the Ethernet connectivity at gateway end breaks.	
	Power Input – -48 VDC, should have dual DC power supply or dual AC power supply	
	Operation Humidity – 10% to 90% (non-condensing)	
	Operation Temperature – 0 to 40ºC	
8	**PRI Gateway specification**	
	PRI gateway should have Configuration – 1 PRI (30 Channels) or 2 PRI (60 Channels) and should be from the same OEM of telephony system.	
	Voice Processing – G.711, G.729A, G.723.1, GSM, iLBC;echo cancellation: G.168 with 64ms echo tail; dynamic jitter buffer; VAD and CNG	

	Calling Control – called/calling party number translation; second stage dialing; voice detection; auto dialing with DTMF; ring back tone generation and detection; voice announcement	
	Voice Proxy – RTP voice proxy function for NAT/firewall traversal	
	Fax Relay – T.30 transparent mode, T.38 fax relay	
	Call Handling – configurable dialing plan, up to 500 routing rules	
	Configuration Interface – Web Utility	
	Remote Management – Telnet, HTTP, TR069	
	PSTN – ISDN PRI standard: ANSI, NI-2, DMS, 5ESS	
	SIP – RFC3261, RFC2976, RFC3515, RFC3581	
	DTMF – tone detection generation and detection; DTMF relay: RFC2833, INFO (SIP)	
	DTMF detection and progress tone detection	
	Play ring-back tone	
	T.30 and T.38	
	RTP proxy for NAT traversal	
	Ethernet – RJ-45, 10/100 Base-T	
	Trunking Interface – RJ-45	
	System Memory – 128MB or higher	
	System Flash – 16MB or higher	
	Power Input – 220V AC or - 48 VDC , should have dual AC/DC power supply	
	Operation Humidity – 10% to 90% (non-condensing)	
	Operation Temperature – 0 to 40ºC	
9	**Specification of Soft client**	
	The soft client should be from the same OEM of IP telephony system. Wifi facility for smart phone to be provided by the customer.	

	Soft client should be available for Windows PC, Android Phone and IOS phone	
	It should support Windows 7, Windows 8, Windows 10	
	it should be freely downloadable from Google Play / Apple store	
	it should support following features:	
	Make a call	
	Hold	
	Retrieve	
	transfer	
	"Presences (User Select) -	
	Change status: Available, Busy No Answer, Busy call waiting, DND, Logoff, Forward to VM "	
	Dial users number - Internal, External, Mobile	
	"Instant messaging - IM with another soft client User, IM with a Multi Destination, Search on IM sessions, Save IM sessions, IM to groups"	
	3 way audio conference	
	call divert	
	camp on	
	view missed call	
	Contacts synchronized with the PBX directory	

TECHNICAL SPECIFICATION

Technical Specification of Core Switch

Item	Technical Specifications	
S. No.	**Detailed Technical Specifications**	**Compliance (Yes / No)**
A	**Solution Requirement**	
	The Switch should support non-blocking Layer 2 switching and Layer 3 routing	
	There switch should not have any single point of failure like power supplies and fans etc. should have 1:1/N+1 inbuilt level of redundancy	
B	**Hardware and Interface Requirement**	

	Switch should have the 48 x 1/10/25G and 8 x 40G/100G QSP28 ports	
	Switch should have 16GB DRAM and 32GB Flash/Storage	
	Switch should support Configuration roll-back and check point	
	Switch should support for different logical interface types like loopback, VLAN, SVI/RVI, Port Channel, multi chassis port channel/LAG etc.	
	100K IPv4 routes and 100k IPv6 routes entries in the routing table with 48000 Multicast Routes	
	The switch should support hardware based load sharing at wire speed using LACP and multi chassis etherchannel/ LAG	
	Switch should support minimum 3.6Tbps of switching capacity	
C	**Layer2 Features**	
	Spanning Tree Protocol (IEEE 8201.D, 802.1W, 802.1S)	
	Switch should support minimum 200,000 no. of MAC addresses	
	Switch should support 64 Nos. of link or more per Port channel (using LACP) and support 64 number of ports per Link Aggregation Group	
	Support for broadcast, multicast and unknown unicast storm control to prevent degradation of switch performance from storm due to network attacks and vulnerabilities	
D	**Layer3 Features**	
	Switch should support all physical ports to use either in Layer2 or Layer 3 mode and also should support layer 3 VLAN Interface and Loopback port Interface	
	Switch should support static and dynamic routing like Static, OSPF and BGP	
	Switch should provide multicast traffic reachable using PIM-SM and SSM	
E	**Availability**	
	Switch should provide gateway level of redundancy in IPv4 and IPv6 using HSRP/ VRRP	
	Switch should support for BFD For Fast Failure Detection	
F	**Quality of Service**	
	Switch system should support 802.1P classification and marking of packet CoS, DSCP etc.	
	Switch should support for different type of QoS features for real time traffic differential treatment using WRED and SP Queuing	
	Switch should support Flow control of Ethernet ports to control traffic rates during congestion by allowing congested nodes to pause link operation at the other end for receiving traffic as per IEEE 802.3x	
G	**Security**	
	Switch should support for deploying different security for each logical and physical interface using Port Based access control lists of Layer-2 to Layer-4 in IP V4 and IPv6 and logging for fault finding and audit trail	
	Switch should support control plane i.e. processor and memory Protection from unnecessary or DoS traffic by control plane protection policy	
	Switch should support for AAA using TACACS+ / Radius	
	Switch should support to restrict end hosts in the network. Secures the access to an access or trunk port based on MAC address. It limits the number of learned MAC addresses to deny MAC address flooding	
	Switch should support for Role Based access control (RBAC) for restricting host level network access as per policy defined	

	Switch should support to prevent edge devices in the network not administrator's controlled from becoming Spanning Tree Protocol root nodes	
	Switch should support unicast and/or multicast blocking on a switch port to suppress the flooding of frames destined for an unknown unicast or multicast MAC address out of that port	
H	**Manageability**	
	Switch should support for RMON I / II	
	Switch should provide remote login for administration Telnet, SSHv2	
	Switch should support for management and monitoring status using different type of Industry standard NMS using SNMP V2 and V3	
	Switch should support for basic administrative tools like Ping and traceroute	
	Switch should support central time server synchronization using Network Time Protocol NTP V4	
I	**IPv6 features**	
	Switch should support for IPv6 connectivity and routing required for network reachability using different routing protocols such as OSPFv3, BGP+ etc.	
	Should support route redistribution between these protocols	
J	**Safety and Complainces**	
	Switch should be IPv6 Certified	
	Switch Should be Common Criteria/NDPP/NDcPP certified	

Technical Specification of Access PoE Switch

S. No.	Detailed Technical Specifications	Compliance(Yes / No)
1	Minimum 24 x 10/100/1000 Base-T PoE+ and 4 x 1/10G ports. (with required transceiver modules)	
2	1 U Rack mountable and should provide stacking of minimum 9 switches with 120Gbps of dedicated stacking/ equivalent bandwidth (All the stacking accessories should be included from day 1).	
3	The Switch should have 2GB DRAM and 2GB internal Flash	
4	128 Gbps or higher Backplane capacity and minimum 95 Mpps of forwarding rate	
5	Should support Non-blocking hardware architecture	
6	All interfaces should provide wire speed forwarding for both Fiber and copper modules	
7	Support for at least 2000 VLANs & 32k MAC address	
8	It should support IGMP snooping v1,v2 & v3	
9	It should have static IP routing from Day 1 and should be upgradable to support OSPF and PIM	
10	Switch should support 8 hardware queues per port	
11	Dynamic Host Configuration Protocol (DHCP) snooping	
12	Switch should support LLDP capabilities	
13	Should support IP Source Guard , DAI and IPv6 Security feature like IPv6 RA Guard and IPv6 Neighbor Discovery Inspection	
14	Should support Secure Shell (SSH) Protocol and Simple Network Management Protocol Version 3 (SNMPv3).	

15	Switch needs to have console port for administration & management	
16	Management using CLI, GUI using Web interface should be supported	
17	FTP/TFTP for upgrading the operating System	
18	Should support Energy Efficient Ethernet	
19	IEEE 802.1x support	
20	IEEE 802.1D Spanning-Tree Protocol	
21	IEEE 802.1p class-of-service (CoS) prioritization	
22	IEEE 802.1Q VLAN	
23	IEEE 802.3 10BASE-T specification	
24	IEEE 802.3u 100BASE-TX specification	
25	Switch should have internal redundant power supply and Hotswappable fans	
26	Switch should able to support management via CLI, Web interface	
27	SNMP v1,v2,v3	
28	Switch should be manageable through both IPv4 & IPv6.	
29	Switch should be UL-UL60950-1,FCC Part 15, VCCI Class A, EN 55022, EN 55024, EN 300386, CAN/CSA 22.2 No.60950-1, Reduction of Hazardous Substances (ROHS) certified	
30	Switch should be IPv6 Logo Certified	
31	Switch Should be Common Criteria NDPP/NDcPP certified	

Technical Specification of ITAM

S.No	Specifications		Compliance
1	Web Appliance Hardware	Rack based Intel Core i7 or better, 3.20GHz w/ HD Graphics	
		Memory 32GB 4x8GB DDR4 2666MHz	
		Minimum 1 TB SATA/SSD Drive	
		Integrated NIC	
		COTS Compliant	
2	Web Appliance Software		
	Items	Capture specifications, warranties, Serial Numbers, MAC Addresses, IP info, what other H/W relates/connects to this H/W, item status, event logs, assignees	
	Software	Specifications, License information	
	Assignment and Relationships	Where each software is installed, license qty, component relations, contract relations to software/hardware/invoices	

	Commercial Data	Purchase proofs depicting date, vendor, prices, attached documents	
	Agents	Vendors, H/W & S/W Manufacturers, Buyers (for different Dpt), Contractors	
	Locations	Location of each asset building, floor, room, rack, rack row, row depth	
	Contracts	Define custom contract types, like support& maintenance, SLA, etc. Track contract events.	
	Tags	Multiple tags for items and software. You may use tags for grouping according to usage, budget, owner, importance, etc.	
	Files	Attach documents to every main object entity (Items, Software, Invoices, Contracts)	
	Users	Who has what or who is responsible for what.	
	Racks	Display rack layout with items assigned to each rack row. (Supports multiple items/rack row).	
	Print labels	Print label stickers for tag all your assets, with or without barcode, from phones and laptops to cooling units and UPS. Easily define new label paper layouts through the GUI.	
	Backup	Get a full backup of the installation and data. Ability to restore	
	PagePrint Support	All screen pages/lists/reports print-outs possible without menus, scrollbars and other clutter.	
	Interface Translations	Translation file support	
	LDAP support	Pull userlist for item assignment from an LDAP URL	
	ITAM Appliance	Approved Make: Nexxus/ Siemens/ Torque	

TECHNICAL SPECIFICATIONS

IP CCTV Surveillance System

Technical Specification of Dome Camera

S.No	Features	Specifications	Compliance
1	Form Factor	DOME	

2	Certification	UL,CE,FCC	
3	Housing	IP67 and IK10 or better	
4	System Compatibility	ONVIF profile S ,G & T	
5	Max Resolution	5MP(2592 X 1944)	
6	lens	2.7mm to 12 mm motorized varifocal length	
7	Focus	Auto focus	
8	Image sensor	1/2.8" or larger	
9	H-FOV	99 ~ 30°	
10	Min illumination	0.01 Lux @ (F1.2,AGC ON), 0 Lux with IR	
11	Shutter speed	1/5 s ~1 / 100,000 s	
12	Video compression	H.265+ ,H.265 ,H.264+ H.264	
13	Video bit rate	256 Kbps to 8 Mbps	
14	Noise reduction	2D / 3D DNR	
15	Video Streams	Quad stream , Each stream should support H.265+ compression	
16	IP filter	Should support IP filter for security purpose	
17	Frame rate	Main stream upto 5MP@25fps , sub stream upto 2MP@25fps , third and fourth stream upto VGA@25fps	
18	ROI	Should Support ROI for Better bandwidth consumption	
19	BLC	Support	
20	Day & Night	IR cut filter with auto switch	
21	Day / Night Switch	Auto / Schedule / Triggered by Alarm In	
22	Edge analytics	Motion Detection, Perimeter Intrusion, Line Crossing, Stationary Object, Pedestrian detection, Face detection (deep learning) ,Cross counting	
23	Image setting	Flip , Rotation , Corridor mode, Saturation, Brightness, Contrast, Hue, Sharpness adjustable	
24	Rotate Mode	Yes	
25	WDR	120 dB WDR	
26	Alarm	1 input, 1 output	
27	Audio	1 input, 1 output	
28	SD Card support	upto 128 GB	
29	Protocols	TCP/IP,HTTP,DHCP,DNS,DDNS,RTP/RTSP,PPPoE,SMTP,NTP,UPnP,SNMP,HTTPS,FTP,	
30	Video output	1 X BNC	
31	Reset button	Available	

32	Security	Flash-prevention, dual stream, heartbeat, password protection, privacy mask, IP address filtering	
33	Digital Zoom	Should have the capability to digitally zoomed in web browser by selecting the area using mouse	
34	Factory Default	Should have the option of setting the configuration to factory default except network settings.	
35	Privacy Zones	Min 4 Nos of selectable privacy Zones	
36	User accounts	Should support 1 admin and 6 user accounts	
37	Firmware upgrade	Firmware upgrade shall be done through web browser	
38	Remote Update	Camera IP and firmware should be upgradable through the device search tool/Software without directly logging in to the camera. Firmware should also be upgradable through web browser	
39	Defog	Should support Defog mode	
40	IR Distance	Min IR distance 40 meters	
41	Vandal resistant	IK10	
42	Operating Temperature	-30°C ~ 60°C Humidity 95% or less (non-condensing)	
43	General	OEM should not be blacklisted nationally or internationally	

Technical Specification of Bullet Camera

S.No	Features	Specifications	Compliance
1	Form Factor	Bullet	
2	Certification	UL,CE,FCC	
3	Housing	IP 67 and IK 10 or better	
4	System Compatibility	ONVIF profile S , G & T	
5	Max Resolution	5MP(2592 X 1944)	
6	lens	2.7mm to 12 mm motorized varifocal length	
7	Focus	Auto focus	
8	Image sensor	1/2.8" or larger	
9	H-FOV	99 ~ 30°	
10	Min illumination	0.01 Lux @ (F1.2,AGC ON), 0 Lux with IR	
11	Shutter speed	1/5 s ~1 / 100,000 s	
12	Video compression	H.265+ ,H.265 ,H.264+ H.264	
13	Video bit rate	256 Kbps to 8 Mbps	

14	Noise reduction	2D / 3D DNR	
15	Video Streams	Quad stream , Each stream should support H.265+ compression	
16	IP filter	Should support IP filter for security purpose	
17	Frame rate	Main stream upto 5MP@25fps , sub stream upto 2MP@25fps , third and fourth stream upto VGA@25fps	
18	ROI	Should Support ROI for Better bandwidth consumption	
19	BLC	Support	
20	Day & Night	IR cut filter with auto switch	
21	Day / Night Switch	Auto / Schedule / Triggered by Alarm In	
22	Edge analytics	Motion Detection, Perimeter Intrusion, Line Crossing, Stationary Object, Pedestrian detection, Face detection (deep learning) ,Cross counting	
23	Image setting	Flip , Rotation , Corridor mode, Saturation, Brightness, Contrast, Hue, Sharpness adjustable	
24	Rotate Mode	Yes	
25	WDR	120 dB WDR	
26	Alarm	1 input, 1 output	
27	Audio	1 input, 1 output	
28	SD Card support	upto 128 GB	
29	Protocols	TCP/IP,HTTP,DHCP,DNS,DDNS,RTP/RTSP,PPPoE,SMTP,NTP,UPnP ,SNMP,HTTPS,FTP,	
30	Video output	1 X BNC	
31	Reset button	Available	
32	Security	Flash-prevention, dual stream, heartbeat, password protection, privacy mask, IP address filtering	
33	Digital Zoom	Should have the capability to digitally zoomed in web browser by selecting the area using mouse	
34	Factory Default	Should have the option of setting the configuration to factory default except network settings.	
35	Privacy Zones	Min 4 Nos of selectable privacy Zones	
36	User accounts	Should support 1 admin and 6 user accounts	
37	Firmware upgrade	Firmware upgrade shall be done through web browser	
38	Remote Update	Camera IP and firmware should be upgradable through the device search tool/Software without directly logging in to the camera. Firmware should also be upgradable through web browser	
39	Defog	Should support Defog mode	
40	IR Distance	Min IR distance 50 meters	

41	Operating Temperature	-30°C ~ 60°C Humidity 95% or less (non-condensing)	

Technical Specification of 64 Channel NVR

S.No	Features	Specifications	Compliance
1	NVR	64 Channel NVR	
2	Recording bandwidth	Max 640Mbps	
3	Recording Resolution	8MP（4K), 5MP, 3MP ,2MP(1080P),1.3MP(960P),1.0MP(720P)	
4	Display Split	1/4/6/8/9/10/13/14/16/17/19/22/25/32/36/64	
5	live/Playback performance	4K: 4ch realtime , 4MP: 8ch realtime , 3MP: 10ch realtime , 2MP: 16ch realtime	
6	Playback	Max 8ch playback	
7	Output Interface	1 HDMI (up to 4K), 1 VGA	
8	Display Resolution	1024*768, 1280*720, 1280*1024, 1440*900, 1920*1080,2560*1440, 3840*2160	
9	Alarm Input/out	16ch in / 4ch out	
10	Ethernet	RJ-45 port (1000M)	
11	Smart Phone	iOS, Android	
12	Internal HDD	8 SATA HDDs, each HDD up to 8TB support RAID 0/1/3/5/10/JBOD/CLONE	
13	RS485	1 X RS485	
14	e-SATA	1 X e-SATA	
15	Line in	1 X Line in	
16	USB	1x3.0 USB for backup/upgrade , 2x 2.0 USB for mouse	
17	Support AI with deep learning supported cameras.AI-Registered quantity	10000 AI-Registered quantity	
18	AI-Maximum captured quantity with deep learning supported cameras	200,000 faces	
19	ONVIF	ONVIF Compliant	
20	Power Supply	AC 110~240V	
21	Certification	UL,CE,FCC	

Technical Specification of 24 Port PoE Switch

S.No	Features	Specifications	Compliance
1	Port Configuration	24 Nos of 10M/100M/1G RJ45 Port ,4 Nos of1G/10G SFP+ Port , 1 Nos of DB9 Console Port .	
2	PoE Function	IEEE802.3at (PoE+ 30W) ,IEEE802.3af (PoE 15.4W)	
3	PoE Port	24	
4	Available PoE Power	370W	
5	Switching Bandwidth	128 Gbps	
6	Forwarding Performance	95.232 Mpps	
7	MAC Address	32 K	
8	Jumbo Frames	10056 Bytes	
9	Spanning Tree	IEEE802.1D (STP),IEEE802.1W (RSTP),IEEE802.1S (MSTP)	
10	VLAN	802.1Q VLAN , Port-Based ,Private VLAN , Voice VLAN ,Guest VLAN, Q-in-Q , 802.1v Protocol VLAN , MAC-Based VLAN ,IP Subnet-Based VLAN	
		4K VLAN Entries	
11	IEEE 802.3ad LACP	Dynamic Trunk , Static Trunk	
12		GARP/GVRP , IGMP Snooping , MLD Snooping ,Multicast VLAN Registration (MVR)	
16	L3 Features	Static Route , DHCP Server	
17	Class of Service	Port Based , 802.1p ,DSCP, TCP/UDP Port	
18	Rate Limiting	Ingress , Egress	
19	Priority Queue Scheduling	WRR , Strict Priority	
20	Hardware Queues	8	
21	ACLs	L2/L3/L4 , IPv6 Support	
22	Security	Port Security (MAC-based) , IP Source Guard ,Storm Control ,RADIUS Authentication 802.1x , TACACS+ Authentication ,HTTPs and SSL (Secured Web) ,BPDU Guard ,STP Root Guard ,DHCP Snooping,Loop Protection	
23	DHCP	Client , Relay , Option 66 , Option 67 , Option 82	

24	Event/Error Log	Syslog , SMTP (RFC821)	
25	Management Access Filtering	SNMP , Web , Telnet , SSH	
26	PoE Management	Scheduling ,Auto-Checking ,Power Delay	
29		SNMP (v1, v2c, v3) , RMON (1,2,3 & 9 Groups) , Software Upgrade	
32		Configuration Export/Import , Port Mirroring ,	
34		LLDP (IEEE802.1AB)	
35		LLDP-MED (IEEE802.1AB)	
36		CDP Aware ,sFlow ,IPv6 Management , NTP	
40	Device Management	Topology View , Floor View ,Map View , Dashboard ,Traffic Monitoring , Cable Diagnostics	
41	Operating Temperature	0°C to 40°C	
42	Operating Humidity	10 to 90% RH	
43	Storage Temperature	-20 to 70°C	
44	Storage Humidity	10 to 90% RH	
45	AC Input	100V-240V	
46	Certifications	EN61000-4-5 (for RJ45 Port, Surge 6KV) ,CE/FCC Class A	

TECHNICAL SPECIFICATIONS

FIRE ALARM SYSTEM

PART 1 GENERAL

1.1 DESCRIPTION

A. The fire alarm system shall comply with requirements of NFPA Standard 72 for Protected Premises Signaling Systems except as modified and supplemented by this specification. The system shall be electrically supervised and monitor the integrity of all conductors.

B. The facility shall have an emergency voice alarm communication system. Digitally stored message sequences shall notify the building occupants that a fire or life safety condition has been reported. Message generator(s) shall be capable of automatically distributing up to eight (8) simultaneous, unique messages to appropriate audio zones within the facility based on the type and location of the initiating event. The Fire Command Center (FCC) shall also support Emergency manual voice announcement capability for both system wide or selected audio zones, and shall include provisions for the system operator to override

automatic messages system wide or in selected zones.

C. The system shall support additional, alternate Fire Command Centers, which shall be capable of simultaneous monitoring of all system events. Alternate Fire Command Centers shall also support an approved method of transferring the control functions to an alternate Fire Command Center when necessary. All Fire Command Centers shall be individually capable of assuming Audio Command functions such as Emergency Paging, audio zone control functions, and Firefighter's Telephone communication functions.

D. Each designated zone shall transmit separate and different alarm, supervisory and trouble signals to the Fire Command Center (FCC) and designated personnel in other buildings at the site via a multiplex communication network.

1.2 SCOPE

A. A new intelligent reporting, microprocessor controlled fire detection system shall be installed in accordance to the project specifications and drawings.

B. Basic Performance:

1. Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded on NFPA Class A Signaling Line Circuits (SLC).
2. Device Circuits (IDC) shall be wired NFPA Class A as part of an addressable device connected by the SLC Circuit.
3. Notification Appliance Circuits (NAC) shall be wired NFPA Class A as part of an addressable device connected by the SLC Circuit.
4. On Class A configurations a single ground fault or open circuit on the system Signaling Line Circuit shall not cause system malfunction, loss of operating power or the ability to report an alarm.
5. Alarm signals arriving at the FACP shall not be lost following a primary power failure (or outage) until the alarm signal is processed and recorded.

9. Two-way emergency telephone communication circuits shall be supervised for open and short circuit conditions.

   d. Two-way emergency telephone (Fire Fighter Telephone) communication shall be supported between the Audio Command Center and up to **thirty (30)** remote Fire Fighter's Telephone locations simultaneously on a conference in multiple FFT Risers.
   e. Means shall be provided to connect FFT voice communications to the speaker circuits in order to allow voice paging over the speaker circuit from a telephone handset.
   f. The digital audio message generator shall be of reliable, non-moving parts, and support the digital storage of up to 32 minutes of tones and emergency messages, shall support programming options to string audio segments together to create up to 1000 messages, or to loop messages and parts of messages to repeat for pre-determined cycles or indefinitely.

12. The proposed product shall not restrict the buyer to one single organization, nor shall it require any proprietary dongle or other programming tools for after sales & maintenance activity.

1.3 DESIGN INTENT

a) Main fire alarm panel with digital voice command system, Fire fighters telephone, zone selector keypad and announcement console – Ground floor – Near passenger lift lobby.
b) Secondary fire alarm panels- At each level – near lift lobby
c) Active repeater panels at security cabin
d) All fire alarm panels connected as pier to pier.
e) Fire survival cables (750 deg. 2 hours)
f) Class - A cabling to loop all detectors, devices & MCP"s to control panel.
g) Coverage per detector as per NFPA -2015, considering > 60 ACH
h) System integration (Soft integration) with all standalone panels such as agent release panels for deluge valves, Pre-action panels, lift switchboard, DG fresh air switchboard, etc
k) VESDA (Very Early Smoke Detection Apparatus) to cover the false flooring and room void areas of Data Hall, UPS,Battery rooms and MMR.
m) Emergency communication system, integral with the Main FACP, including voice alarm system components, microphones, zone selector keypads and tone generators
n) Audible Alarm Notifications
o) Fire fighters telephone system as part of main fire alarm system which is two-way, supervised voice communication proposed to link between the MFACP and remote fire fighters' telephone stations throughout the building (at all staircases at all levels)

1.4 GENERAL INSTRUCTIONS

a) Protect from moisture by using appropriate coverings. Store at dry interior locations.

b) Sequence work to avoid interferences with building finishes and installation of other products.

c) Supply as maintenance stock, consumable devices, components as recommended by Supplier, but shall not be less than two units of each type/ rating of installed consumable material/ component/ device.

d) For ease of service all panel I/O wiring terminal blocks shall be removable, plug-in types and have sufficient capacity for #18 to #12 AWG wire. Terminal blocks that are permanently fixed are not acceptable.

1.5 WARRANTY

A. The fire alarm control panel, voice panels and any head-end equipment shall have a manufacturer’s warranty of a minimum of 12months.

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1.6 APPLICABLE STANDARDS AND PRODUCT APPROVALS

A. The specifications and standards listed below form a part of this specification. The system shall fully comply with the latest issue of these standards, if applicable.

B. National Fire Protection Association (NFPA) - USA:

NFPA 12	Extinguishing Systems (low and high)
NFPA 12A	Halon 1301 Extinguishing Systems
NFPA 13	Sprinkler Systems
NFPA 15	Water Spray Systems
NFPA 16	Foam / Water Deluge and Spray Systems
NFPA 17	Dry Chemical Extinguishing Systems
NFPA 17A	Wet Chemical Extinguishing Systems
NFPA 2001	Clean Agent Extinguishing Systems
NFPA 70	National Electric Code
NFPA 90A	Air Conditioning Systems
NFPA 92A	Smoke Control Systems
NFPA 92B	Smoke Management Systems in Malls, Atria, Large Areas
NFPA 72	National Fire Alarm Code
NFPA 101	Life Safety Code

C. Underwriters Laboratories Inc. (UL) - USA:

UL 268, 7th Edition	**Smoke Detectors for Fire Protective Signaling Systems**
UL 864, 10th Edition	**Control Units for Fire Protective Signaling Systems**
UL 2572	Mass Notification Systems
UL 217	Smoke Detectors, Single and Multiple Station
UL 228	Door Closers - Holders for Fire Protective Signaling Systems
UL 268A	Smoke Detectors for Duct Applications
UL 521	Heat Detectors for Fire Protective Signaling Systems
UL 464	Audible Signaling Appliances
UL 38	Manually Actuated Signaling Boxes
UL 1481	Power Supplies for Fire Protective Signaling Systems
UL 346	Waterflow Indicators for Fire Protective Signaling Systems
UL 1076	Control Units for Burglar Alarm Proprietary Protective Signaling Systems
UL 1971	Visual Notification Appliances
UL 2017	Standard for General-Purpose Signaling Devices and Systems
UL60950	Safety of Information Technology Equipment

D. Factory Mutual – USA

E. Local and State Building Codes.

F. All requirements of the Authority Having Jurisdiction (AHJ).

G. The system shall be certified for seismic applications in accordance with the International Building Code (IBC). The basis for qualification of seismic approval shall be via shake table testing.

H. The System shall be FM 6320 (Factory Mutual) approved as a Gas Detection system when employed with the 4-20 monitor module and industry standard 4-20 m A gas detectors.

PART 2.0 PRODUCTS

2.1 MAIN FIRE ALARM CONTROL PANEL OR NETWORK NODE:

A. Main FACP or network node shall contain a microprocessor based Central Processing Unit (CPU) and power supply. The CPU shall communicate with and control the following types of equipment used to make up the system: intelligent addressable smoke and thermal (heat) detectors, addressable modules, printer, annunciators, and other system controlled devices.

B. In conjunction with intelligent Loop Control Modules and Loop Expander Modules, the main FACP shall perform the following functions:

1. Supervise and monitor all intelligent addressable detectors and monitor modules connected to the system for normal, trouble and alarm conditions.
2. Supervise all initiating signaling and notification circuits throughout the facility by way of connection to addressable monitor and control modules.
3. Detect the activation of any initiating device and the location of the alarm condition. Operate all notification appliances and auxiliary devices as programmed.

System Capacity and General Operation

A. The FACP shall can communicate on a peer-to-peer, inherently regenerative communication format and protocol. The network shall support communication speed up to 100 Mbps and support up to 200 panels / nodes per network.

B. The control panel shall be capable of expansion via up to 10 SLC loops. Each loop shall support minimum300 analog/addressable devices for a system capacity of 3000 points.The Fire Alarm Control Panel shall include a full featured operator interface control and annunciation panel that shall include a backlit 600-character liquid crystal display, individual, color coded system status LEDs, and a QWERTY keypad for the control of the fire alarm system. Said LCD shall also support graphic bit maps capable of displaying the company name and logo of either company.

C. All programming or editing of the existing program in the system shall be achieved without interrupting the alarm monitoring functions of the fire alarm control panel.

D. The FACP shall be able to provide the following software and hardware features:

1. Pre-signal and Positive Alarm Sequence: The system shall provide means to cause alarm signals to only sound in specific areas with a delay of the alarm from 60 to up to 180 seconds after start of alarm processing. In addition, a Positive Alarm Sequence selection shall be available that allows a 15-second time period for acknowledging an alarm signal from a fire detection/initiating device. If the alarm is not acknowledged within 15 seconds, all local and remote outputs shall automatically activate immediately.
2. Smoke Detector Pre-alarm Indication at Control Panel: To obtain early warning of incipient or potential fire conditions, the system shall support a programmable option to determine system response to real-time detector sensing values above the programmed setting. Two levels of Pre-alarm indication shall be available at the control panel: alert and action.
3. Alert: It shall be possible to set individual smoke detectors for pre-programmed pre-alarm thresholds. If the individual threshold is reached, the pre-alarm condition shall

be activated.

4. Action: If programmed for Action and the detector reaches a level exceeding the pre-programmed level, the control panel shall indicate an action condition. Sounder bases installed with either heat or smoke detectors shall automatically activate on action Pre-Alarm level, with general evacuation on Alarm level.
5. The system shall support a detector response time to meet world annunciation requirements of less than 3 seconds.
6. Device Blink Control: Means shall be provided to turn off detector/module LED strobes for special areas.
7. NFPA 72 Smoke Detector Sensitivity Test: The system shall provide an automatic smoke detector test function that meets the sensitivity testing requirements of NFPA 72.
8. Programmable Trouble Reminder: The system shall provide means to automatically initiate a reminder that troubles exist in the system. The reminder will appear on the system display and (if enabled) will sound a piezo alarm.
9. On-line or Off-line programming: The system shall provide means to allow panel programming either through an off-line software utility program away from the panel or while connected and on-line. The system shall also support upload and download of programmed database and panel executive system program to a Personal Computer/laptop. A single change to one CPU database shall not require a database download to other CPUs.
10. History Events: The panel shall maintain a history file of atleastlast 5000 events, each with a time and date stamp. History events shall include all alarms, troubles, operator actions, and programming entries. **The control panels shall also maintain a 1000 event Alarm History buffer**, which consists of the 1000 most recent alarm events from the 5000 event history file.
11. Smoke Control Modes: The system shall provide means to perform Fire Smoke Control Station mode. This mode controls all dampers, smoke extraction fan, fresh air supply fans, etc during Fire condition. Smoke Control to meet NFPA-92A and 90B and HVAC mode to meet NFPA 90A.
12. **The system shall provide means for all SLC devices on any SLC loop to be auto programmed into the system by specific address.** The system shall recognize specific device type ID's and associate that ID with the corresponding address of the device.
13. Passwords and Users: The system shall support two password levels, master and user. Up to 9 user passwords shall be available, each of which may be assigned access to the programming change menus, the alter status menus, or both. Only the master password shall allow access to password change screens.
14. Block Acknowledge: The system shall support a block Acknowledge for Trouble Conditions
15. Sensitivity Adjust: The system shall provide Automatic Detector Sensitivity Adjust based on Occupancy schedules including a Holiday list of up to 15 days.
16. Environmental Drift Control: The system shall provide means for setting Environmental Drift Compensation by device. When a detector accumulates dust in the chamber and reaches an unacceptable level but yet still below the allowed limit, the control panel shall indicate a maintenance alert warning. When the detector accumulates dust in the chamber above the allowed limit, the control panel shall indicate a maintenance urgent warning.
17. Custom Action Messages: The system shall provide means to enter up to 100 custom action messages of up to 160 characters each. It shall be possible to assign any of the 100 messages to any point.
18. Local Mode: If communication is lost to the central processor the system shall provide added survivability through the intelligent loop control modules. Inputs from devices connected to the SLC and loop control modules shall activate outputs on the same loop when the inputs and outputs have been set with point programming to participate in local mode or when the type codes are of the same type: that is, an input with a fire

alarm type code shall activate an output with a fire alarm type code.

19. Read status preview - enabled and disabled points: Prior to re-enabling points, the system shall inform the user that a disabled device is in the alarm state. This shall provide notice that the device must be reset before the device is enabled thereby avoiding activation of the notification circuits.
20. Custom Graphics: When fitted with an LCD display, the panel shall permit uploading of a custom bit-mapped graphic to the display screen.
21. **Group Decision Making by Smoke Detectors: The system shall provide means to link one detector with minimum two more detectors in group decision making. The group of minimum three detectors shall work in tandem to take fast and genuine alarm decision mitigating the risk of false alarm. There shall be no requirement of cross zoning or mandatory sequential address setting in the detectors to achieve this function. Thisshall be a built-in intelligence in the system to take fast & reliable decision on genuine alarm triggering. The alarm event shall be aresultofgroup of detector chamber readings considered as a consolidated alarm signal.**
22. ACTIVE EVENT: The system shall provide a Type ID called FIRE CONTROL for purposes of air-handling shutdown, which shall be intended to override normal operating automatic functions. Activation of a FIRE CONTROL point shall cause the control panel to (1) initiate the monitor module Control-by-Event, (2) send a message to the panel display, history buffer, installed printer and annunciators, (3) shall not light an indicator at the control panel, (4) Shall display ACTIVE on the LCD as well a display a FIRE CONTROL Type Code and other information specific to the device.
23. NON-FIRE Alarm Module Reporting: A point with a type ID of NON-FIRE shall be available for use for energy management or other non-fire situations. NON-FIRE point operation shall not affect control panel operation nor shall it display a message at the panel LDC. Activation of a NON-FIRE point shall activate control by event logic but shall not cause any indication on the control panel.
24. Mass Notification Override:The system shall be UL 2572 listed for Mass Notification and shall be capable, based on the Risk Analysis, of being programmed so that Mass Notification/Emergency Communications events take precedence over fire alarm events.
25. Security Monitor Points: The system shall provide means to monitor any point as a type security.
26. One-Man Walk Test: The system shall provide both a basic and advanced walk test for testing the entire fire alarm system. The basic walk test shall allow a single operator to run audible tests on the panel. All logic equation automation shall be suspended during the test and while annunciators can be enabled for the test, all shall default to the disabled state. During an advanced walk test, field-supplied output point programming will react to input stimuli such as Control By Event and logic equations. When points are activated in advanced test mode, each initiating event shall latch the input. The advanced test shall be audible and shall be used for pull station verification, magnet activated tests on input devices, input and output device and wiring operation/verification.
27. Control By Event Functions: CBE software functions shall provide means to program a variety of output responses based on various initiating events. The control panel shall operate CBE through lists of zones. A zone shall become listed when it is added to a point's zone map through point programming. Each input point such as detector, monitor module or panel circuit module shall support listing of up to 10 zones into its programmed zone map.
28. Permitted zone types shall be general zone, releasing zone and special zone. Each output point (control module, panel circuit module) can support a list of up to 10 zones including general zone, logic zone, releasing zone and trouble zone. It shall be possible for output points to be assigned to list general alarm. Non-Alarm or Supervisory points shall not activate the general alarm zone.

29. 1000 General Zones: The system shall support up to 1000 general purpose software zones for linking inputs to outputs. When an input device activates, any general zone programmed into that device's zone map will be active and any output device that has an active general zone in its map will be active. It shall also be possible to use general zone as arguments in logic equations.
30. **1000 Logic Equations**: The system shall support up to 1000 logic equations for AND, OR, NOT, ONLY1, ANYX, XZONE or RANGE operators that allow conditional I/O linking. When any logic equation becomes true, all output points mapped to the logic zone shall activate.
31. 100 trouble equations per device: The system shall provide support for up to 100 trouble equations for each device, which shall permit programming parameters to be altered, based on specific fault conditions. If the trouble equation becomes true, all output points mapped to the trouble zone shall activate.
32. Control-By-Time: A time based logic function shall be available to delay an action for a specific period of time based upon a logic input with tracking feature. A latched version shall also be available. Another version of this shall permit activation on specific days of the week or year with ability to set and restore based on a 24 hour time schedule on any day of the week or year.
33. Multiple agent releasing zones: The system shall support up to 10 releasing zones to protect against 10 independent hazards. Releasing zones shall provide up to three cross-zone and four abort options to satisfy any local jurisdiction requirements.
34. Alarm Verification, by device, with timer and tally: The system shall provide a user-defined global software timer function that can be set for a specific detector. The timer function shall delay an alarm signal for a user-specified time period and the control panel shall ignore the alarm verification timer if another alarm is detected during the verification period.

E. Central Processing Unit

1. The Central Processing Unit shall contain and execute all control-by-event (including Boolean functions including but not limited to AND, OR, NOT, ANYx, and CROSSZONE) programs for specific action to be taken if an alarm condition is detected by the system. Such control-by-event programs shall be held in non-volatile programmable memory, and shall not be lost with system primary and secondary power failure.
2. The Central Processing Unit shall also provide a real-time clock for time annotation, to the second, of all system events. The time-of-day and date shall not be lost if system primary and secondary power supplies fail.
3. The CPU shall be capable of being programmed on site without requiring the use of any external programming equipment. Systems that require the use of external programmers or change of EPROMs are not acceptable.
4. The CPU shall provide an RS-232 interface between the fire alarm control panel and the UL Listed Electronic Data Processing (EDP) peripherals.
5. The CPU shall provide two RS-485 ports for the serial connection to annunciation and control subsystem components.
6. The RS-232 serial output circuit shall be optically isolated to assure protection from earth ground.
7. In the event of CPU failure, all SLC loop modules shall fallback to **degrade mode**. **Systems not offering degrade mode shall offer Redundant CPU**. Such degrade mode shall treat the corresponding SLC loop control modules and associated detection devices as conventional two-wire operation. Any activation of a detector in this mode shall automatically activate associated Notification Appliance Circuits.

F. Display

1. The system display shall provide a **600-character** backlit alphanumeric Liquid Crystal Display (LCD). It shall also provide eleven Light-Emitting-Diodes (LEDs) that indicate the status of the following system parameters: AC POWER, FIRE ALARM, PREALARM, SECURITY, SUPERVISORY, SYSTEM TROUBLE, OTHER EVENT, SIGNALS SILENCED, POINT DISABLED, CONTROLS ACTIVE, and CPU FAILURE.
2. **These characters shall be only for fire alarm / trouble information and not for Logo or other purpose. It shall be UL Listed. Repeater panel displays in FACP is not allowed unless until approved by UL**
3. The system display shall provide a QWERTY keypad for ease of operation.
4. The keypad shall have control capability to command all system functions, entry of any alphabetic or numeric information, and **field programming without the use of any external equipment or laptop**. Two different password levels with up to ten (one Master and nine User) passwords shall be accessible through the display interface assembly to prevent unauthorized system control or programming.

G. Loop (Signaling Line Circuit) Control Module:

1. The control panel shall be capable of expansion via up to **10 SLC loops**. Each loop shall support minimum**300 analog/addressable devices** for a system capacity of **3000 points.**
2. The Loop Control Module shall contain its own microprocessor and shall be capable of operating in a local/degrade mode (any addressable device input shall be capable of activating any or all addressable device outputs) in the unlikely event of a failure in the main CPU.
3. Each loop shall maintain 20% spare capacity for future expansion.
4. Each Loop shall be capable of operating as a NFPA Class B circuit in case of single open circuit fault in existing SLC Circuit
5. The SLC interface board shall receive analog or digital information from all intelligent detectors and shall process this information to determine whether normal, alarm, or trouble conditions exist for that particular device. Each SLC Loop shall be isolated and equipped to annunciate an Earth Fault condition. The SLC interface board software shall include software to automatically maintain the detector's desired sensitivity level by adjusting for the effects of environmental factors, including the accumulation of dust in each detector. The analog information may also be used for automatic detector testing and the automatic determination of detector maintenance requirements.

H. Network Communication

The FACP shall communicate over a peer-to-peer communication network, inherently over a regenerative communication format and protocol. The network shall support communication speed up to 100 Mbps and support up to **200 Control Panels/ Network Nodes**, over a **single medium** (copper conductor / fiber optic), redundant ring, communication channel for fire alarm, voice evacuation and telephone talk-back system. The system shall support up to **200 such networks** in a single system.
The network card shall have inbuilt Fiber port for terminating Fiber Optic Cable without any third party converters.

I. Digital Voice Command Center

1. The Digital Voice Command Center located with the FACP, shall contain all equipment required for all audio control, emergency telephone system control, signaling and supervisory functions. This shall include speaker zone indication and control,

telephone circuit indication and control, digital voice units, microphone and main telephone handset.

2. Function: The Voice Command Center equipment shall perform the following functions:

   a. Operate as a supervised multi-channel emergency voice communication system. Operate as a two-way emergency telephone system control center.
   c. Audibly and visually annunciate any trouble condition for digital tone and voice units required for normal operation of the system.
   d. Provide all-call Emergency Paging activities through activation of a single control switch.
   e. As required, provide vectored paging control to specific audio zones via dedicated control switches.
   f. Provide a factory recorded "library" of voice messages and tones in standard WAV. File format, which may be edited and saved on a PC running a current Windows® operating system.
   g. Provide a software utility capable of off-line programming for the DVC operation and the audio message files. This utility shall support the creation of new programs as well as editing and saving existing program files. Uploading or downloading the DVC shall not inhibit the emergency operation of other nodes on the fire alarm network.
   i. The Digital Voice Command shall be modular in construction, and shall be capable of being field programmable without requiring the return of any components to the manufacturer and without requiring use of any external computers or other programming equipment.
   j. The Digital Voice Command and associated equipment shall be protected against unusually high voltage surges or line transients.
   j. **Fire, Voice & Telephone data shall flow through single network cable.**
   k. **The Voice Evacuation System shall be capable of establishing communication between the master voice controller and amplifier over fiber optic cable network without using any third party media converter.**
   l. **Failure of Fire Panel CPU shall not affect the operation of DVC. Incase DVC are controlled by Fire Panel CPU, a separate panel with dedicated CPU shall be considered for each DVC**

J. Power Supply

1. The Main Power Supply shall operate on 120/240 VAC, 50/60 Hz, and shall provide all necessary power for the FACP.
2. The Main Power Supply shall provide the required power to the CPU using a switching 24 VDC regulator and shall incorporate a battery charger for 24 hours of standby power using dual-rate charging techniques for fast battery recharge.
3. The Main Power Supply shall provide a battery charger for 24 hours of standby using dual-rate charging techniques for fast battery recharge. The supply shall be capable of charging batteries ranging in capacity from 7-**200 amp-hours** within a 48-hour period.
4. The Main Power Supply shall provide a very low frequency sweep earth detect circuit, capable of detecting earth faults.
5. The Main Power Supply shall be power-limited per UL864 requirements.
6. The Main Power Supply shall communicate power supply, line voltage, battery status and charger status to the local LCD display. Any abnormal condition shall be annunciated and logged to the system alarm history log.
7. The interface to the power supply from the Fire Alarm Control Panel (FACP) shall be

via the Signaling Line Circuit (SLC) or other multiplexed means Power supplies that do not use an intelligent interface are not suitable substitutes. The required wiring from the FACP to the addressable power supply shall be a single unshielded twisted pair wire.

13. The addressable power supply shall supervise for battery charging failure, AC power loss, power brownout, battery failure, NAC loss, and optional ground fault detection. In the event of a trouble condition, the addressable power supply shall report the incident and the applicable address to the FACP via the SLC.
14. The addressable power supply shall have an AC Power Loss Delay option. If this option is utilized and the addressable power supply experiences an AC power loss, reporting of the incident to the FACP will be delayed. A delay time of zero, two, eight or sixteen hours shall be programmable.
15. The addressable power supply shall have an option for Canadian Trouble Reporting and this option shall be programmable.
16. The addressable power supply mounts in either the FACP backbox or its own dedicated surface mounted backbox with cover.
17. Each of the power supply's four output circuits shall be programmed- for Notification Appliance Circuit or General Purpose 24 VDC power. Any output circuit shall be able to provide up to 2.5 amps of 24 VDC power.
18. The addressable power supply's output circuits shall be individually supervised when they are selected to be either a Notification Appliance Circuit when wired Class "A" or by the use of and end-of-line resistor. When the power supply's output circuit is selected as General 24 VDC power, the circuit shall be individually supervised when an end-of-line relay is used.
19. When selected for Notification Appliance Circuits, the output circuits shall be individually programmable for Steady, March Time, Dual Stage or Temporal.
20. When selected as a Notification Appliance Circuit, the output circuits of the addressable power supply shall have the option to be coded by the use of a universal zone coder.
21. The addressable power supply shall interface and synchronize with other power supplies of the same type. The required wiring to interface multiple addressable power supplies shall be a single unshielded, twisted pair wire.
22. An individual or multiple interfaced addressable power supplies shall have the option to use an external charger for battery charging. Interfaced power supplies shall have the option to share backup battery power.

L. Controls with associated LED Indicators

1. Emergency Two-Way Telephone Control Switches/Indicators
   a. The emergency telephone circuit control panel shall include visual indication of active and trouble status for each telephone circuit in the system.
   b. The telephone circuit control panel shall include switches to manually activate or deactivate each telephone circuit in the system.

M. Field Programming

1. **The system shall be programmable, configurable and expandable in the field without the need for special tools**. There shall be no firmware changes required to field modify the system time, point information, equations, or annunciator programming/information.
2. All field defined programs shall be stored in non-volatile memory.

N. Specific System Operations

1. Smoke Detector Sensitivity Adjust: A means shall be provided for adjusting the sensitivity of any or all addressable intelligent detectors in the system from the system keypad. **Sensitivity range shall be within the allowed UL window and have a minimum of 9 levels.**
2. Alarm Verification: Each of the intelligent addressable smoke detectors in the system may be independently selected and enabled to be an alarm verified detector. The alarm verification delay shall be programmable from 0 to 60 seconds and each detector shall be able to be selected for verification. The FACP shall keep a count of the number of times that each detector has entered the verification cycle. These counters may be displayed and reset by the proper operator commands.

O. System Point Operations

1. Any addressable device in the system shall have the capability to be enabled or disabled through the system keypad or Graphics User Interface.
2. System output points shall be capable of being turned on or off from the system keypad or the video terminal.
3. Point Read: The system shall be able to display the following point status diagnostic functions without the need for peripheral equipment. Each point shall be annunciated for the parameters listed:

    a. Device Status.
    b. Device Type.
    c. Custom Device Label.
    d. Software Zone Label.
    e. Device Zone Assignments.
    f. Analog Detector Sensitivity.
    g. All Program Parameters.

4. System History Recording and Reporting: The fire alarm control panel shall contain a history buffer that will be capable of storing up to 5000 system events. Each of these events will be stored, with time and date stamp, until an operator requests that the contents be either displayed or printed. The contents of the history buffer may be manually reviewed; one event at a time, and the actual number of activations may also be displayed and or printed. History events shall include all alarms, troubles, operator actions, and programming entries.
5. The history buffer shall use non-volatile memory. Systems which use volatile memory for history storage are not acceptable.
6. Automatic Detector Maintenance Alert: The fire alarm control panel shall automatically interrogate each intelligent system detector and shall analyze the detector responses over a period of time.
7. If any intelligent detector in the system responds with a reading that is below or above normal limits, then the system will enter the trouble mode, and the particular Intelligent Detector will be annunciated on the system display, and printed on the optional system printer. This feature shall in no way inhibit the receipt of alarm conditions in the system, nor shall it require any special hardware, special tools or computer expertise to perform.
8. The system shall include the ability (programmable) to indicate a "pre-alarm" condition. This will be used to alert maintenance personal when a detector is at 80% of its alarm threshold in a 60 second period.

2.2 SYSTEM COMPONENTS

A. Network Control Annunciator

A network control annunciator shall be provided to display all system intelligent points. The NCA shall be capable of displaying all information for **200,000 points on the network**. Network display devices, which are only capable of displaying a subset of network points, shall not be suitable substitutes.

The NCA shall include a 10" (1024 x 600) Color touchscreen display with QWERTY Keypad. Additionally, the network display shall include environmental adjustment controls to maximize LCD legibility and the ability to scroll events by type. i.e. Fire Alarm, Supervisory Alarm, Trouble, etc.

The network control annunciator shall have the ability to display multiple events in order of priority and time of occurrence. Counters shall be provided to indicate the total number of events by type.

The NCA shall mount in any of the network node fire alarm control panels. Optionally, the network display may mount in a backbox designed for this useand shall connect to the network over either a wire or fiber interface.

The network control annunciator shall have an event history buffer capable of storing a minimum of 1000 events in non-volatile memory. Additionally, the NCA shall have a fire alarm history buffer capable of storing a minimum of 200 events in non-volatile memory. Systems that do not protect fire alarm events from being overwritten by other events are not suitable substitutes.

The NCA shall include Three USB connection, USB C, USB B Micro, and USB A, industry standard RS-232 ports for UL864 listed printers and CRT's. These peripheral devices shall print or display network activity.

The network control annunciator shall include control switches for system wide control of Acknowledge, Signal Silence, System Reset, Drill, and local Lamp Test. A mechanical means by which the controls switches are "locked out", such as a key, shall be available.

The NCA shall include long life LEDs to display Power, Fire Alarm, Pre-Alarm, Security Alarm, System Trouble, Supervisory, Signals Silenced, Disabled Points, Other (non-fire) Events, and CPU Failure.

The network control annunciator shall include a Master password and up to nine User passwords. Each password shall be up to eight alpha-numeric characters in length. The Master password shall be authorized to access the programming and alter status menus. Each User password may have different levels of authorization assigned by the Master password.

The NCA shall allow editing of labels for all points within the network; control on/off of outputs; enable/disable of all network points; alter detector sensitivity; clear detector verification counters for any analog addressable detector within the network; clear any history log within the network; change the Time/Date settings; initiate a Walk Test.

The network control annunciator shall support an optional WindowsTM based program utility. This utility shall allow the user create an NCA database, upload/download an NCA database, and download an upgrade to the NCA executive. To ensure program validity, this utility shall check stored databases for errors. A compare function shall be included to identify differences between databases.

For time keeping purposes the NCA shall include a time of day clock.

B. Network Control Station / Graphics User Interface

The NCS shall utilize a Microsoft(tm) operating system. Each Network Control Station shall be capable of graphically annunciating and controlling all network activity and at least **2,50,000 network points**. Network display devices that are only capable of displaying a subset of network points shall not be suitable substitutes.

The NCS shall be an IBM (or compatible) personal computer with the following minimum requirements: Intel Pentium II(tm)-processor, operating at a minimum of 400 Mhz, 128Mbytes of RAM, 8 Mbytes Video RAM, 1.44 Mbyte floppy drive, 3.2 Gbyte hard disk, mouse, 32X CD-ROM, 3PCI / 1 ISA expansion slots, internal 3.2 Gbyte tape drive, sound card, 200 watt power supply, and SVGA graphics with a screen resolution of 1024 x 768. The network control station shall include a 19-inch monitor.

The NCS shall be capable of storing over **100,000 network events** in a history file. Events shall be stored on hard disk and shall be capable of back-up storage to a tape drive. The history buffer allows the operator to view events in a chronological order. A filter shall be available for displaying chronological events by operator, date, time, fire alarms, troubles (including security, supervisory and system/device), disabled points/zones, system programming, operator response and operator log in/log out. The ability to print NCS history files shall also be available.

The NCS shall use a Windows(tm) dialog box technology to address, interrogate, control, and/or modify intelligent points on each fire alarm node. This shall include, and not be

limited to: Activating outputs, enabling or disabling points, adding or removing intelligent points, viewing intelligent detector sensitivity levels and modifying point information (custom messages, detector type, verification, day/night selection etc.)

The NCS shall include the ability to display system information in a graphical (floor plan) form. Each view, created using standard Windows bitmap files, shall include icons created for intelligent devices. These icons shall blink and change to the appropriate programmed icon when an event occurs. When the device has been acknowledged, the icon shall become steady. Once the point has returned to normal, the normal icon is displayed. In addition to the graphical representation of the device, the user shall be able to link pictures, documents and sound files to the device. The NCS shall also provide the ability to auto-vector to the floor plan (screen) of the device that is active. By selecting a device in the graphic presentation, the operator of the NCS shall have the ability to log onto the corresponding node and interrogate the associated intelligent point.

The NCS shall have the ability to provide the following information through a Windows(tm) pull down menu: An Event Counter that contains the number of new and total events on the network. The information that is displayed shall consist of Fire Alarms, Pre-Alarms, Security Alarms, Supervisory Alarms, and Troubles. A Detailed Event window that contains all Off-Normal events, both unacknowledged and acknowledged that are present in the system. It shall contain two views, Fire events and Non-fire events that shall be user selectable. A Current Event window that shall contain all network and local events as well as system messages with a maximum of 1,000 events displayed. A Disabled Device window that shall contain all disabled devices in the system.

The NCS shall have the option, from a Windows pull down menu, to connect to a third party paging service that allows the NCS to automatically send text-based messages regarding system status to a typical text pager.

The NCS shall include help screens, available to aid the user without leaving the selected application screen.

The NCS shall be UL-Listed for fire protection (UL864) and burglary (UL1076).

The NCS shall interface with other panels as a node in the pear to pear network.

The operator shall be able to monitor the FFT system from GUI software and shall be able to monitor and control Integrated Voice Evacuation System.

The NCS shall have a flexible way of assigning operator passwords. There shall be an unlimited number of possible operators, each with specific levels of control. Each operator shall have his/her own password. Operator password and control selection shall be available to a high level "administrator" who shall have complete control over levels of control. If no action has taken place on the NCS after 10 minutes, the current operator shall be logged out and require a new log-in.

The NCS shall include an industry-standard RS-232 port for a UL864 listed printer.

The NCS shall be a table top hardware configuration.

C. Interactive Firefighters' Touchscreen Display

The network will interface and report the individually monitored system's alarm status via a user-friendly Graphical User Interface (GUI) based software.

The software shall operate under Microsoft® Windows® 7 or HigherOperating System in Embedded platform as manufactured by Microsoft Corporation.

The GUI based software must be capable of graphically representing the facility being monitored with floor plans and icons depicting the actual locations of the fire alarm device locations. It shall be capable of mapping at least **2,50,000 network points**

The software shall use a 1280 pixel x 1024 pixel GUI display capable of showing a large primary floor plan display, a site plan representative of an aerial view of the facility, the first active fire alarm on the system.

The software shall permit automatic navigation to the screen containing an icon that represents the first fire alarm device in alarm in the event of an off-normal condition.

The fire alarm device icon shall be visible only when it is in an alarm (or active) condition.

The software shall display the activated smoke detectors in a time sequence to track smoke progression.

The software shall allow the importation of externally developed floor plans in Windows Metafile (WMF), JPEG (JPG), Graphics Interchange Format (GIF) and Bitmap (BMP) format.

The software shall provide a intuitive and easy way to navigate to different screens representing floors and areas within a facility.

The system shall provide for continuous monitoring of all fire alarm conditions regardless of the current activity displayed on the screen.

The software shall display "YOU ARE HERE" along with icons representing standard building objects (stairs, elevators, etc) to be shown on the floor plan.

The software shall allow icons that represent hazardous materials stored in a facility.

The software shall provide a screen that displays preprogrammed building contact information.

The software shall provide a screen the displays building occupancy and other general building information.

The software shall allow a site plan to be imported that shows an aerial view of the facility.

The software shall display all active fire, supervisory, and security events within an event list.

Bidders also have the option to propose UL Listed Software with UL Listed Industrial Grade Hardware to achieve this functional requirement.

D. Cloud Based Facility Management Software

Remote health monitoring solution utilizing cloud based software-as-a-service web application & supplementary network gateway hardware.System shall provide secure web access to cloud based web application using any of the web browsers like Google Chrome (preferable), Internet Explorer etc. from any computer/ tablet/ smartphone connected over internet via defined credentials – username and password.Supplementary FACP gateway hardware furnished in this section shall be programmable directly from the embedded webpage in the hardware, upon completion of this project. The use of configurable or programmable controllers that require additional software tools for post-installation maintenance shall not be acceptable. The cloud based web application shall capture all fire alarm system data as received from the system via supplementary gateway hardware. Owner shall receive login and passwords at first training session. The Owner shall have full licensing and full access rights for remote monitoring system.

Cloud Based Application: The cloud hosted web application shall provide an intuitive user interface and shall provide the following features as a minimum:

1. Real time view of fire system effectiveness
2. Multi-location unified view
3. Custom dashboard view
4. Device level detailed information including current status
5. Event list
6. System reports
    a. Fault Handling
    b. Device Replacement & contamination
    c. Panel & System report
    d. Custom reports
7. Report export in PDF/ DOC format
8. Report scheduler Settings – add, delete, modify email addresses
9. Email ID settings for emailing critical alarms

B. Web Browser Navigation: The cloud hosted web application shall provide a comprehensive user interface. Using a collection of web pages, it shall be constructed to "feel" like a single application, and provide a complete and intuitive mouse/menu driven operator interface. It shall be possible to navigate through the system using Google Chrome web browser to accomplish requirements of this specification. The Web application shall (as a minimum) provide for navigation, and for display of intuitive dashboards, device information, alarms/events, reports, configuration menus for report settings

C. Login: On launching the web browser and selecting the appropriate domain name or IP address, the operator shall be presented with a login page that will require a login name and strong password. Navigation in the system shall be dependent on the operator's role-based application control privileges.

D. Navigation: Navigation through the web application shall be accomplished by clicking on dynamic links on dashboards to access detailed system information and by clicking on appropriate tabs for application settings and preferences. Both the tabs and dynamic

links shall be displayed simultaneously, enabling the operator to select a specific system information and application settings and preferences.

E. System Dashboards: The system dashboard shall provide several functional information for each system specified. This view shall be accessed by right after logging in to the system:
   1. Each building dashboard (in case of multiple buildings) shall be visible along with system effectiveness and fire alarm system information like –
      a. Number of panels
      b. Number of loops
      c. Number of devices

   2. Detailed information Section – this can be accessed upon clicking relevant links. Detailed system information like device list along with corresponding address, current status and time stamping can be viewed. Events data is also visible.
   3. Search: User shall have multiple options for searching data based upon device type, device status.

F. Reports: The Web application can be used to access system health reports of past and as-on-date. Provision for system reports to be emailed to predefined email IDs and time intervals in PDF or DOC format. Different report types –
   1. Fault Handling report – Effective measurement of turnaround time (TAT) of various
      issues and capable of drawing detailed report at individual fault level.
   2. Device Replacement Report - Proactive alerts along with active insights on the faulty devices & detectors which need attention or replacement helping customers save time and reducing fire risk.
   3. Device Contamination Report - Real time statistics of device contamination showing dirt levels along with detector efficiency
   4. Panel & System Report - List of panel faults with trouble date and time stamped, beyond the panel memory of 5000 events can store upto 100,000 events

G. Alarms: Alarms associated with a specific equipment and or device, shall be displayed dynamically in a window.
   1. The Alarm remain in the application until it is acknowledged or Panel is reset.
   2. The Alarm status also viewed in the LIST VIEW section of the application.

H. Security Access: Cloud hosted Remote monitoring web application for fire alarm system can be accessed by Google chrome web browser and shall require a Login Name and Strong Password. Separate access credentials for owner and service provider shall be provisioned.

2.3 GATEWAY AND WEB SERVERS

A. BACnet Interface Gateway: The system shall be capable of being interfaced with BACNet compliant clients. A BACnet interface supporting BACnet/IP communication shall be available from the fire alarm control panel manufacturer.**BACnet shall support 14000 data points. BACnet gateway shall communicate with all the panels in a peer to peer network.**

B. MODbus Interface Gateway: The system shall be capable of being interfaced with MODbus compliant clients. A MODbus interface supporting MODbus/TCP communication shall be available from the fire alarm control panel manufacturer.**MODbus shall support 12000 data points.MODbus gateway shall communicate with all the panels in a peer to peer network.**

C. **Webserver**: The system shall support a webserver allowing remote connection via the Internet or Intranet. Authorized users will have the ability to view panel/network history, event status and device properties. The webserver shall also support sending event information via email or text to up to 50 registered users, the webserver shall be available from the fire alarm control panel manufacturer.

D. **Web Portal Interface**: The system shall be capable of being interfaced with a web portal to integrate with Inspection and Service Manager utilities. The web portal and inspection and service manager utilities shall be available from the fire alarm control panel manufacturer.

2.4 SYSTEM COMPONENTS - ADDRESSABLE DEVICES

A. Addressable Devices – General

1. Addressable devices shall provide an address-setting means using **rotary decimal switches**. Addressable devices that require the address be programmed using a programming utility are not an allowable substitute.
2. Addressable devices shall use simple to install and maintain decade, decimal address switches.
3. Addressable devices, which use a binary-coded address setting method, such as a DIP-switch, are not an allowable substitute. Addressable devices that require the address be programmed using a special tool or programming utility are not an allowable substitute.
4. Detectors shall be intelligent (analog) and addressable, and shall connect with two wires to the fire alarm control panel Signaling Line Circuits.
6. **Addressable smoke and thermal detectors shall provide dual alarm and power/polling bi-colour LEDs.** Both LEDs shall flash green under normal conditions, indicating that the detector is operational and in regular communication with the control panel, and both LEDs shall be placed into steady red illumination by the control panel, indicating that an alarm condition has been detected. If required, the LED flash shall have the ability to be removed from the system program. An output connection shall also be provided in the base to connect an external remote alarm LED.
7. The fire alarm control panel shall permit detector sensitivity adjustment through field programming of the system. The panel on a time-of-day basis shall automatically adjust sensitivity.
8. Using software in the FACP, detectors shall automatically compensate for dust accumulation and other slow environmental changes that may affect their performance. The detectors shall be listed by UL as meeting the calibrated sensitivity test requirements of NFPA Standard 72.
9. The detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature. Base options shall include a sounder base with a built-in (local) sounder rated at 85 DBA minimum, a relay base and an isolator base designed for Style 7 applications.The system shall also support an intelligent programmable sounder base, the programmable sounder base shall be capable of providing multiple tones based on programming and at a minimum be capable of providing a Temp-4 tone for CO (Carbon Monoxide) activation and a Temp-3 tone for fire activations and be capable of being synchronized with other programmable sounder bases and common area notification appliances; 85 DBA minimum.
10. Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device (PHOTO, THERMAL).

11. Detectors will operate in an analog fashion, where the detector simply measures its designed environment variable and transmits an analog value to the FACP based on real-time measured values. The FACP software, not the detector, shall make the alarm/normal decision, thereby allowing the sensitivity of each detector to be set in the FACP program and allowing the system operator to view the current analog value of each detector.
12. Addressable devices shall store an internal identifying code that the control panel shall use to identify the type of device.
13. A magnetic test switch shall be provided to test detectors and modules. Detectors shall report an indication of an analog value reaching 100% of the alarm threshold.
14. Addressable modules shall ional surface mount Lexan enclosure shall be available.
15. **Detectors / Bases with connection terminals exposed to Ceiling / False Ceiling shall be provided with Protective Insu**mount in a 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box. An opt**lation of the same make as of Detectors.**

B. Addressable Manual Call Point (Break Glass / Pull Down Type)

1. Addressable manual call point shallsend data to the panel representing the state of the manual switch and the addressable communication module status. They shall use a key operated test-reset lock, and shall be designed so that after actual emergency operation, they cannot be restored to normal use except by the use of a key.
2. All operated stations shall have a positive, visual indication of operation and utilize a key type reset.
3. Manual fire alarm boxes shall be constructed of Lexan / ABS Plastic with clearly visible operating instructions provided on the cover. The word FIRE / Fire Sign shall appear on the front of the stations.

C. Intelligent Photoelectric Smoke Detector:

The intelligent photoelectric smoke detector shall use the photoelectric (light-scattering) principal to measure smoke density and shall, on command from the control panel, send data to the panel representing the analog level of smoke density.

1. **Designed to meet UL268 7th Edition.**
2. Modern profile with White color for improved aesthetics.
3. Sensitvity Range of 0.5% to 4.0% obs/ft
4. Stable communication technique with noise immunity.
5. Low standby current. 200 micro Amps @ 24 VDC
6. Two-wire SLC connection.
7. Rotary, decimal addressing
8. Dual bi-color LED design providing 360° viewing angle.LEDs blink green in normal condition and illuminate steady red on alarm
9. Remote test feature from the panel.
10. Walk test with address display
11. Built-in functional test switch activated by external magnet.
12. Built-in tamper-resistant feature.
13. Sealed against back pressure.
14. Expanded color options.
15. Optional relay, isolator, and sounder bases.
16.

D. Intelligent High Sensitivity Photo Smoke Detector

The intelligent high sensitivity photo smoke detector shall be a spot type detector that incorporates an extremely bright high sensitivity diode and an integral lens that focuses the light beam to a very small volume near a receiving photo sensor. The scattering of smoke particles shall activate the photo sensor.

1. **Designed to meet UL268, 7th Edition**
2. The high sensitivity detector shall have conductive plastic so that dust accumulation is reduced significantly.
2. **The intelligent high sensitivity photo detector shall have nine sensitivity levels and be sensitive to a minimum obscuration of 0.02 percent per foot.**
3. The high sensitivity detector shall not require expensive conduit, special fittings or PVC pipe.
4. The intelligent high sensitivity photo detector shall support standard, relay, isolator and sounder detector bases.
5. The high sensitivity photo detector shall not require other cleaning requirements than those listed in NFPA 72. Replacement, refurbishment or specialized cleaning of the detector head shall not be required.
6. The high sensitivity photo detector shall include two bicolor LEDs that flash green in normal operation and turn on steady red in alarm.

E. Intelligent Multi Criteria Detector

The intelligent multi-criteria detector shall be an addressable device that is designed to monitor a minimum of photoelectric and thermal technologies in a single sensing device. The detector design shall allow a wide sensitivity window, 0.5 to 4.0% per foot obscuration. This detector shall utilize advanced electronics that react to slow smoldering fires and thermal properties all within a single sensing device.

1. **Designed to meet UL268, 7th Edition**
2. The microprocessor design shall be capable of selecting the appropriate sensitivity levels based on the environment type it is in (office, manufacturing, kitchen etc.) and then have the ability to automatically change the setting as the environment changes (as walls are moved or as the occupancy changes).
3. The intelligent multi criteria detection device shall include the ability to combine the signal of the thermal sensor with the signal of the photoelectric signal in an effort to react hastily in the event of a fire situation. It shall also include the inherent ability to distinguish between a fire condition and a false alarm condition by examining the characteristics of the thermal and smoke sensing chambers and comparing them to a database of actual fire and deceptive phenomena.

F. Intelligent Thermal Detectors

The intelligent thermal detectors shall be addressable devices rated at 135 degrees Fahrenheit (58 degrees Celsius) and have a rate-of-rise element rated at 15 degrees F (9.4 degrees C) per minute. **A high heat thermal detector rated at 190 degrees Fahrenheit (87.8 degrees Celsius) shall also be available.** The thermal detectors shall connect via two wires to the fire alarm control panel signaling line circuit.

1. Modern profile with White color for improved aesthetics.
2. Advanced thermal technology for fast response.
3. Fixed temperature model factory preset to 135°F
4. Rate of Rise model preset to 15°F/min
5. High temperature model factory preset to 190°F
6. Low standby current. 200 micro Amps @ 24 VDC

7. Two-wire SLC connection.
8. Rotary, decimal addressing
9. Dual bi-color LED design providing 360° viewing angle LEDs blink green in normal condition and illuminate steady red on alarm
10. Remote test feature from the panel.
11. Walk test with address display
12. Built-in functional test switch activated by external magnet.
13. Built-in tamper-resistant feature.
14. Sealed against back pressure.
15. Optional relay, isolator, and sounder bases.

G. Intelligent Duct Smoke Detector

The smoke detector housing shall accommodate an intelligent photoelectric detector that provides continuous analog monitoring and alarm verification from the panel. When sufficient smoke is sensed, an alarm signal is initiated at the FACP, and appropriate action taken to change over air handling systems to help prevent the rapid distribution of toxic smoke and fire gases throughout the areas served by the duct system. The Intelligent Duct Smoke Detector shall support the installation of addressable Photoelectric detector capable or being tested remotely.

H. Advanced Multi-Criteria Intelligent Fire/CO Detector

1. Advanced Multi-Criteria Fire/CO detector be an addressable advanced multi-criteria smoke detector with a separate signal for carbon monoxide (CO) detection per UL 2075 standards.
2. **The detector shall be comprised of four sensing elements, including a photoelectric (light-scattering) particulate sensor, an electrochemical CO sensor, a daylight-filtered infrared (IR) sensor and solid state thermal sensor(s) rated at 135˚F (57.2˚C).** The device shall be able to indicate distinct smoke and heat alarms.
3. The advanced multi-criteria detection device shall include the ability to combine the signal of the photoelectric signal with other sensing elements in order to react quickly in the event of a fire situation. It shall also include the inherent ability to distinguish between a fire condition and a nuisance alarm condition. The detector shall be capable of selecting the appropriate sensitivity levels based on the environment type (office, manufacturing, kitchen, etc.) in which it is installed, and then have the ability to automatically change the setting as the environment changes.
4. The CO detector component shall be capable of a functional gas test using a canned test agent to test the functionality of the CO sensing cell.
5. The detector shall be capable of automatically adjusting its sensitivity by means of drift compensation and smoothing algorithms. The device shall provide unique signals to indicate when 20 percent of the drift range is remaining, when 100 percent of drift range is used, and when there is a chamber fault to show the unit requires maintenance.
6. The detector shall indicate CO trouble conditions, including six months of sensor life remaining and sensor life has expired. The detector shall indicate a combined signal for any of the following: low chamber trouble, thermistor trouble, CO self-test failure, IR self-test failure, and freeze warning.
7. The detector shall provide address-setting means on the detector head using rotary switches. Because of the possibility of installation error, systems that use binary jumpers or DIP switches to set the detector address are not acceptable. The detector shall also store an internal identifying code that the control panel shall use to identify the type of detector. Systems that require a special programmer to set the detector address (including temporary connection at the panel) are labor intensive and not

acceptable. Each detector occupies any one of at least 159 possible addresses on the signaling line circuit (SLC) loop. It responds to regular polls from the system and reports its type and status.

8. The detector shall provide a test means whereby it will simulate an alarm condition and report that condition to the control panel. Such a test may be initiated at the detector itself (by activating a switch) or initiated remotely on command from the control panel. There shall be four test methods: functional magnet, smoke entry aerosol, carbon monoxide aerosol or direct heat method.
9. The detector shall provide two LEDs to provide 360° visibility. The LEDs shall be placed into steady red illumination by the control panel indicating that an alarm condition has been detected. An output connection shall also be provided in the base to connect an external remote alarm LED. The detector must be capable of connecting to a sounder base that provides both temporal 3 and temporal 4 patterns for fire and CO alarm.
10. Two LEDs on the sensor shall be controlled by the panel to indicate sensor status. Coded signals, transmitted from the panel, shall cause the LEDs to blink, latch on, or latch off. Refer to the control panel technical documentation for sensor LED status operation and expected delay to alarm.
11. The detector shall be plug-in mounted into a twist-lock base. The detector shall be constructed of off-white, UV-resistant polymer and shall be detachable from the mounting base to simplify installation, service and maintenance. Mounting base wiring connections shall be made by means of SEMS screws. The detector shall allow pre-wiring of the base and the head shall be a plug-in type. The mounting base shall be mounted on a junction box that is at least 1.5 inches (3.81 cm) deep. The mounting base shall be available to mount to standard junction boxes. Suitable boxes include:

    a. 4.0" (10.16 cm) square box with and without plaster ring.
    b. 4.0" (10.16 cm) octagonal box.
    c. 3.5" (8.89 cm) octagonal box.
    d. Single-gang box.
    e. Double-gang box

12. Meets Agency Standards

    a. ANSI/UL 268 -Smoke Detectors for Fire Alarm Signaling Systems
    b. CAN/ULC-S529- Smoke Detectors for Fire Alarm Systems
    c. FM 3230-3250- Smoke Actuated Detectors for Automatic Fire Alarm Signaling
    d. UL 2075 – Gas and Vapor Detector and Sensors – Systems Connected

I. Intelligent Addressable Aspiration Detector

The intelligent aspiration detector shall be an addressable aspiration detector that communicates directly with the fire alarm control panel via the SLC communication protocol, no modules or high level interfaces shall be required.. The aspiration detector shall have Infra-red laser optical smoke detection for a wide range of fire detection with enhanced immunity to nuisance particulates. The FACP shall be capable of monitoring and annunciating up to five smoke event thresholds and eleven trouble conditions. Each event threshold shall be capable of being assigned a discrete type ID at the FACP.

J. Intelligent Addressable Reflected Beam Detector

1. The intelligent single-ended reflected beam smoke detector shall connect with two

wires to the fire alarm control panel signaling line circuit (SLC). The detectors shall consist of a transmitter/receiver unit and a reflector and shall send data to the panel representing the analog level of smoke density. The detector shall be capable of being tested remotely via a keyswitch; It shall be equipped with an integral sensitivity test feature.

2. The Beam Detectors shall be long range, projected beam type smoke detectors which consist of a Transmitter and receiver in a single unit and reflector on the other side.
3. The Beam Detector shall have a range upto 100 mtrs. There shall be multiple sensitivity levels. Starting from 25 %, 30 %, 40 %, 50 % and acclimate levels also 30 % to 50 % and 40 % to 50 %. There shall be trouble alarm if obscuration block is more than 96 %.

K. Addressable Dry Contact Monitor Module

1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional alarm initiating devices (any N.O. dry contact device) to one of the fire alarm control panel SLCs.
2. The IDC zone shall be suitable for Class A or Class B operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.

L. Two Wire Detector Monitor Module

1. Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional 2-wire smoke detectors or alarm initiating devices (any N.O. dry contact device)
2. The IDC zone may be wired for Class A or B operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.

M. Addressable Control Module

1. Addressable control modules shall be provided to supervise and control the operation of one conventional circuit of compatible Notification Appliances, 24 VDC powered, polarized audio/visual notification appliances
2. The control module NAC may be wired for Class A/B with a current rating of 2 Amps
3. Audio/visual power shall be provided by a separate supervised circuit from the main fire alarm control panel or from a supervised UL listed remote supply.

N. Addressable Releasing Control Module

1. An addressable releasing module shall be available to supervise and control compatible releasing agent solenoids
2. The module shall operate on a redundant protocol for added protection.
3. The module shall be configurable for Class A/B and support one 24 volt or two 12 volt solenoids.

P. Addressable Relay Module

1. Addressable Relay Modules shall be available for HVAC control and other network building functions
2. The module shall provide two form C relays rated at up to 3 Amps resistive and up to 2.0 Amps inductive.
3. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to insure that 100% of all auxiliary devices energize at the same time on the same

pair of wires;
4. For multiple relay control a module shall be available that provides 6 programmable Form-C relays.

R. Isolator Module

Isolator modules shall be provided to automatically isolate wire-to-wire short circuits on an SLC Class A or Class B branch. The isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the SLC loop segment or branch. At least one isolator module shall be provided for each floor or protected zone of the building.

1. If a wire-to-wire short occurs, the isolator module shall automatically open-circuit (disconnect) the SLC. When the short circuit condition is corrected, the isolator module shall automatically reconnect the isolated section.
2. The isolator module shall not require address-setting, and its operations shall be totally automatic. It shall not be necessary to replace or reset an isolator module after its normal operation.
3. The isolator module shall provide a single LED that shall flash to indicate that the isolator is operational and shall illuminate steadily to indicate that a short circuit condition has been detected and isolated.
4. **If Isolator Bases are proposed, Vendor needs to consider Isolator base for all detectors**

S. Serially Connected Annunciator

1. The annunciator shall communicate to the fire alarm control panel via an EIA 485 (multi-drop) two-wire communications loop. The system shall support two 6,000 ft. RS-485 wire runs. Up to 32 annunciators, each configured up to 96 points, may be connected to the connection, for a system capacity of 3,000 points of annunciation.
2. An RS-485 repeater shall be available to extend the RS-485 wire distance in 3,000 ft. increments. The repeater shall be UL864 approved.
3. Each annunciator shall provide up to 96 alarm and 97 trouble indications using a long-life programmable color LED's. Up to 96 control switches shall also be available for the control of Fire Alarm Control Panel functions. The annunciator will also have an "ON-LINE" LED, local piezo sounder, local acknowledge and lamp test switch, and custom zone/function identification labels.
4. The annunciator may be field configured to operate as a "Fan Control Annunciator". When configured as "Fan Control," the annunciator may be used to manually control fan or damper operation and can be set to override automatic commands to all fans/dampers programmed to the annunciator.
5. Annunciator switches may be programmed for System control such as, Global Acknowledge, Global Signal Silence, Global System Reset, and on/off control of any control point in the system.
6. An optional module shall be available to utilize annunciator points to drive RS-485 driven relays. This shall extend the system point capacity by 3,000 remote contacts.
7. The LED annunciator shall offer an interface to a graphic style annunciator and provide each of the features listed above.

V. Programmable Directional Sounders

1. **Shall follow NFPA 72 2019 edition Clause 18.4.8.**
2. Electronic sounders shall operate on 24 VDC nominal.
3. Electronic sounders shall be field programmable without the use of special tools, at a

sound level of at least 90 dBA measured at 10 feet from the device.
4. Shall be capable to broadcast pre programmed Voice Message.
5. Shall be flush or surface mounted as shown on plans.
6. Shall produce broad band directional sound with **20 Hz to 20 Khz frequency band** to guide occupants to safe exists even in complete darkness.

W. Addressable Portable Emergency Telephone Handset Jack

1. Portable emergency telephone handset jacks shall be flush mounted on stainless steel plates as indicated on plans. Handset jacks shall be approved for emergency telephone system application.
2. Insertion of a remote handset plug into a jack shall send a signal to the fire command center which shall audibly and visually indicate the on-line condition, and shall sound a ring indication in the handset.
3. The two-way emergency telephone system shall support thirty five (35) handsets on line without degradation of the signal.
4. **Remote Telephone Handset shall be capable of making paging announcement across all the zones in the system.**

X. Addressable Fixed Emergency Telephone Handset

1. The telephone cabinet shall be painted red and clearly labeled emergency telephone. The cabinets shall be located where shown on drawings.
2. The handset cradle shall have a switch connection such that lifting the handset off of the cradle shall send a signal to the fire command center which shall audibly and visually indicate its on-line (off-hook) condition.
3. The two-way emergency telephone system shall support thirty five (35) handsets on line (off hook) without degradation of the signal.
4. **Remote Telephone Handset shall be capable of making paging announcement across all the zones in the system.**

Y. Batteries

The battery shall have sufficient capacity to power the fire alarm system for not less than 48 hours in standby plus 2hours of alarm upon a normal AC power failure.

The batteries are to be completely maintenance free. No liquids are required. Fluid level checks for refilling, spills, and leakage shall not be required.

If necessary to meet standby requirements, external battery and charger systems may be used.

PART 3.0 - EXECUTION

3.1 INSTALLATION

A. Installation shall be in accordance with the NEC, NFPA 72, local and state codes, as shown on the drawings, and as recommended by the major equipment manufacturer.

B. All conduit, junction boxes, conduit supports and hangers shall be concealed in finished areas and may be exposed in unfinished areas. Smoke detectors shall not be installed prior

to the system programming and test period. If construction is ongoing during this period, measures shall be taken to protect smoke detectors from contamination and physical damage.

C. All fire detection and alarm system devices, control panels and remote annunciators shall be flush mounted when located in finished areas and may be surface mounted when located in unfinished areas.

D. Manual fire alarm boxes shall be suitable for surface mounting or semi-flush mounting as shown on the plans, and shall be installed not less than 42 inches (1067 mm), nor more than 48 inches (122 mm) above the finished floor.

3.2 CAUSE & EFFECT LOGIC

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3.3 TESTING

The service of a competent, factory-trained engineer or technician authorized by the manufacturer of the fire alarm equipment shall be provided to technically supervise and participate during all of the adjustments and tests for the system. All testing shall be in accordance with NFPA 72.

A. Before energizing the cables and wires, check for correct connections and test for short circuits, ground faults, continuity, and insulation.
B. Close each sprinkler system flow valve and verify proper supervisory alarm at the FACP.
C. Verify activation of all waterflow switches.
D. Open initiating device circuits and verify that the trouble signal actuates.
E. Open and short signaling line circuits and verify that the trouble signal actuates.
F. Open and short notification appliance circuits and verify that trouble signal actuates.
G. Ground all circuits and verify response of trouble signals.
H. Check presence and audibility of tone at all alarm notification devices.
I. Check installation, supervision, and operation of all intelligent smoke detectors using the walk test.
J. Each of the alarm conditions that the system is required to detect shall be introduced on the system. Verify the proper receipt and the proper processing of the signal at the FACP and the correct activation of the control points.
K. When the system is equipped with optional features, the manufacturer's manual shall be consulted to determine the proper testing procedures. This is intended to address such items as verifying controls performed by individually addressed or grouped devices, sensitivity monitoring, verification functionality and similar.

3.4 FINAL INSPECTION

A. At the final inspection, a factory-trained representative of the manufacturer of the major equipment shall demonstrate that the system functions properly in every respect.

3.5 INSTRUCTION& TRAINING

A. Instruction shall be provided as required for operating the system. Hands-on demonstrations of the operation of all system components and the entire system including program changes and functions shall be provided.

B. The contractor and/or the systems manufacturer's representatives shall provide a typewritten "Sequence of Operation."

3.6 SUBMITTALS

a) Power calculations.

- Battery capacity calculations.
- Supervisory power requirements for all equipment.
- Alarm power requirements for all equipment.
- Justification showing power requirements of the system power supplies.
- Voltage drop calculations for wiring runs in worst case condition.

b) Complete manufacturer's catalogue data including supervisory power usage, alarm power usage, physical dimensions, finish and mounting requirements.

c) Submit panel configuration and interconnection of modules and all other data as required to make an informed judgment regarding product suitability. As a minimum, data shall be submitted on the following:

- Main system including all fire detection with main and secondary control panels.
- Circuit interface panels including all modules.
- Power supplies, batteries and battery chargers.
- Equipment enclosures.
- Intelligent addressable manual pull stations, multi-criterion detectors, heat detectors, analogue smoke detectors, alarm monitoring modules, and supervised control modules.
- Audible and visual evacuation signals and devices.
- Software and firmware as required providing a complete functioning system.
- Wiring.
- System driven remote annunciators.
- Interface module and wiring configuration from local system to Fire Command System.

d) Submit copies of UL listing or FM approval data showing compatibility of the proposed devices or appliances and the panels being provided.

e) Submit the following shop drawings.

- Floor plans showing all initiating, end of line, supervisory, indicating appliances, and output control devices; including circuit interface panels, enunciators, printers, Control panel location.
- Raceways, marked for size, conductor count with type and size
- Calculations and mathematical justification for audible devices shall meet the code requirementof 15 dBA above ambient at 10 feet distance for audible warning signals.

- Wiring diagrams showing points of connection and terminals used for all electrical connections to the system devices and panels.
- Complete single-line riser diagram showing all equipment and the size type and number of all conductors.

f) Submit Method Statement for systems component wiring, installation, testing, commissioning and operating.

g) Typical installation drawings

h) Complete operation and maintenance manual with two sets of proposed installation drawings shall be submitted.

i) Warranty all system components, devices, peripherals, wiring, for Three years from date of practical completion Certificate.

j) Guarantee all wiring and raceways to be free from inherent mechanical or electrical defects for One years from date of practical completion Certificate.

TECHNICAL SPECIFICATION

Public Address/Voice Alarm SystemDesign Scheme

Part I Design Requirements

Project Overview
[This chapter mainly describes the basic information and requirements for this bid.]

System Design
The design for the Digital Public Address/Voice Alarm System should meet the user and system requirements below. Its key features and design basis are as described in the next chapters.

User Requirements
The broadcasting system uses the same device to play the background music, businessannouncement and emergency broadcast. It has an emergency call microphone in thefirecontrol center for evacuating the crowds in specific zones when accidence happens and a paging microphone in the broadcasting center to broadcast announcements and search notices.

The background music, business announcement and emergency broadcast share the same loudspeakers. In ordinary situation, the loudspeakers are for playing background music and business announcement, but for emergency broadcast instead during the fires.

The broadcasting devices located in the broadcasting center or the specified location according to the user's requirement. The placement of the devices should meet the operating environment requirement and save up floor space. The amplifier capacity should comply with national standards and be with redundancy. Meanwhile, the emergency broadcast can achieve the linkage of the adjacent layers. Users can select the layers to be linked.

System Design Requirements

Maturity

As thedevelopmentofmodernscience and technology, all kinds of the advanced technologies have been applied in the intelligent buildings to save the labor costs, to improve the efficiency and to ensure the intelligence for the modern buildings.

The modern technologies support the public address applications in the intelligent buildings. The global mature and advanced technologies are critical for designing the public address system,and only the broadcasting system incorporating mature and industry-leading technology and high-technology products can ensure the intelligence for buildings.

In the system design, advanced concepts, technologies and methods need to be adopted; system structure, product designs and wiring easiness also need to be considered.

Functionality and Reliability

Besides the technical advancement mentioned above, functional design, system structure, system performance, manufacturing process and after-sales support are also important as to ensure the reliability and stability of the system operation, maximizing the mean error-free time.

A mature technical platform and the rigorous manufacturing process are the bases of functions' realization. During the runtime, system should be able to discover and eliminate all the functional faults in time.. System administrators can easily access the failures and work logs.

Key Design Bases and Indices

Key Design Bases

- XXX Bid Document
- Architectural Plan
- Civil Architectural ElectricalDesign Code(JGJ/T16-92)
- Code for Engineering Design of Generic CablingSystem for Building and Campus(GB/T50311-2000)
- Standard for Design of Intelligent Building (GB/T50314-2000)
- Code for Design of Automatic Fire Alarm System (GBJ116-92)
- Automatic control system for fire protection (GB16806-2006)
- Technical Code for Public Address System Engineering (GB50526-2010)

Key Design Indices

Sound Field Intensity

The intensity of the sound field is close related to the background noise. In terms of the noise criterion for different environments, the noise criterion in general buildings is 25 ~45db except the parking lot with noise criterion around 55 ~56db.The uniformity of the sound field is the uniformity on the sound pressure level, and its range of variation should better be around 8db.Sound intelligibility is the subjective assessment standard of the sound articulation. The performance indices for the loudspeaker: the frequency response is the key factor that affects the intelligibility. The frequency response of the ceiling loudspeaker within 100Hz ~ 14 KHz is appropriate. The specific indices for the various loudspeakers should accord to the frequency response of the amplifier, which should be better than the loudspeaker's. The selection and location for the loudspeakers are mainly determined by factors like maximum sound pressure level, sound field uniformity, transmission frequency characteristic and space size. In terms of the technical standards,Indices of Acoustic Characteristics for Sound Reinforcement System&Civil Architectural ElectricalDesign Code, the system is designed by third level of the sound reinforcement for the voice and music. The indices are as follows:

- Vacant auditoria stable overall sound pressure level≥85dB (Within 250~4000Hz average sound pressure level)
- transmission frequency characteristic: 250 ~ 4000Hz, tolerance +4~10dB
- Sound Field Non-uniformity≤8dB
- The sound pressure of the listening point on the vertical axis along the single loudspeaker's projecting direction can be calculated by:

  LP=L0+10lgPS-20lgr
- LP: auditory point sound pressure level(dB), L0: loud speaker sound pressure level (dB SPL), PS: sound pressure power of sound source, also the loudspeaker rated power (W), r: vertical distanceofthespeakersandthelisteningpoint
- Background Music: The sound source location of the background system should not be aware by the listeners. The goal for the design is that the tone quality of the music is tender and clear. The design indices: the sound pressure inside is uniform. The average sound pressure = noise level + (3~5) db. The frequency band is 100~12000Hz, and the playback is straight.
- Emergency broadcast: The emergency system is designed to make the listener hear clear and correct sound. The design indices: The sound pressure inside is uniform. The average sound pressure = 88 ~94 db. The frequency band is 100 ~ 6000Hzand the playback is straight.
- As described above, the noise level can determine the average sound pressure for this design: Background music sound pressure = 60 ~ 70 dB, and Emergency broadcast sound pressure = 88 ~94dB.

Power Amplifier

- P=K1·K2·ΣP0
- P —Total electric power amplifier device output (W); P0— max. electric power of Ki·Pi when every branch broadcasts at the same time
- Pi— the speakers rated capacity of the i-th branch; Ki— sync coefficient of the i-th branch
- Service broadcasting programs, Ki=0.2~0.4; Background music system, Ki= 0.5~0.6
- The business of broadcasting, Ki= 0.7~0.8; Fire accident broadcasting, Ki= 1.0 (the maximum electric power broadcast should be in line with the national standards)
- K1—Line attenuation compensation coefficient: When line attenuation is 1db, K1 is 1.26; line attenuation is 2db, K1 is 1.58
- K2— the aging factor, 1.2~1.

System Function

System Design Composition and Principle

The system has placed broadcasting devices in every plant room. The distributed control device (DCD) is integrated with many functions and supports the connection via Ethernet. It has 8 loudspeaker output circuits to connect the loudspeaker in zones and 4 network connection interfaces to connect to 4 network paging control panel or Ethernet.Each DCD can connect up to 4 amplifier channels. The device has integrated amplifier switching matrix to support the redundancy switching and the general dry contact input/output interface to connect the external audio sources and dry contact interface of the linkage fire system. It has a built-in 1G memory to store the audios

such as digital voice messages and the alarm tone of the emergency broadcastand to store log files. This device can operate independently without the PC. It encompasses the functions like the audio playing, zone control, fault monitoring, log recording, volume control and amplifier switchover.

The control device for the system customized Paging Station. It has the LCD touch screen for operations, like zone selecting, calling, audio sourcing selecting, and emergency broadcast, monitoring and internal communication. The functions of the Programmable network paging console can be configured using the configuration software.

Key Features

Distributed Control

This distributed design for the system is based on the building structure to facilitate the connection of the loudspeakers in several nearby zones, which will make the control of the loudspeakers easier. The selected system devices should use the TCP/IP technologies and build on the standard network platform to ensure the extensibility, compatibility for multiple technology platforms and advancement of the system.

Faults detection and Isolation

The Faults detection function for the broadcasting system can automatically examine the host system, power amplifier, power source, communication, and detect the open circuit, short circuit and grounding fault to generate the fault alarm and log.

When the grounding fault or short circuit occurs, the amplifier or the main controller of the system should isolate the circuit to ensure the operation of the main devices and normal circuits.

Background Music Audio Source

The broadcasting system can use audio sources from devices such as the CD, radio and MP3 to provide the zones with different audio sources, which can meet the various requirements for different zones. In the tolerant power range, different zones using the same audio source can share an amplifier, reducing the system cost. The background music inputs methods are multiple: both network and local inputs are allowed.

Service Broadcasting

The paging microphone allows users to make paging and broadcast search notices by zone. The paging microphone has a color LCD touch screen. Users can configure the functions directly on the screen. Users can select the zone and audio source, adjust the volume, and enable the emergency broadcast by pressing the button on it. Paging microphones can intercommunicate. 255 broadcast priorities levels available. When the connected distributed control unit is out of order, a paging microphone can continue the intercommunication with other microphones in the network and proceed the remote broadcasting configuration on other control units.

Time Synchronization

Within the system, the controller can specify any main device as the main time source, or choose a third party system to be the time source. Other devices synchronize their time with the main time source to make sure the time is consistent in the system.

Timed Broadcast

The timed broadcast function of the broadcasting system allows users to set the periods for playing different music or service broadcasts in different zones.

Emergency broadcast

The broadcasting system can be linkage of the fire system to achieve the alarm function in the adjacent layers. The layers for linkage can be configured with the software as the requirements. Users can record the voice message for the emergency broadcast and save it in the host system. The emergency broadcast can start automatically (when linkage of the fire system) and manually. The broadcasting system has its own 1 PPT emergency microphone, which could be used to play emergency broadcasts and evacuate the crowds in specific zones.

When the fire alarm rings, the system can display the fires in planar graph and show the fire zones. According to the fire status, users can call the emergency microphone to make the fire zones enter alarm and evacuation two modes.

Priority

The broadcasting system allows users to set the priorities. Generally, the priority for the broadcast is in the order: Emergency Broadcast > Service Broadcast >Background Music, and for the microphone is Emergency Microphone > Service Broadcast Microphone.

Automatic Amplifier Shift

The system has standby amplifiers. When a main amplifier fails to function, the standby amplifier replaces it automatically. After the main amplifier recovers, the system will use it instead of the standby amplifier in an automatic way.

Broadcast Record

The controller can record sufficient voice message (up to 500Mb), and its contents can be customized. The voice message contains the emergency broadcasts for fires, such as evacuation and all-clear information, which are played by the digital speech synthesis system automatically (linkage of the fire alarm system) or manually.

Internal Communication

The call stations can communicate with each other using the simple communication functions.

The paging microphone in the broadcasting center has a color LCD touch screen. Users can configure the functions according to the actual requirements.

The call station’s calling zone can be authorized. Each call station can call the local authorized zones. Several call stations can call the same zone, and one call station can call the zones of other call stations.

Background Music Broadcast

The background music broadcasting functions and local audio sources can be specified in different zones. The administrator can configure the background music according to the time and occasion. The system will automatically switch to the emergency broadcast under emergency.

Program Source

The broadcasting control center has various audio sources, including the professional digital players for background music, CD, FM/AM tuner, remote control microphone for zone calling

Log

The system can record the device fault log and operation log. Users can search information in the logs using time, devices, operators and log types as search criteria.

Distributed Call Station

The distributed call station can call the specified zones. The call station has remote control function, which can control emergency broadcast, zone audio sources and external devices.

Local & Remote Monitoring

Users can monitor audio sources status via local distributed control units and remote call stations.

Emergency broadcast

- Emergency broadcast Requirement
  - Forced Switchover (Auto/Manual): Once the emergency broadcast is triggered by a remote control microphone or other external devices (fire alarm system), the other functions (like background music and general broadcast) will be paused, but the system will play the recorded voice message (alarm and evacuation information) for fire emergency or the information from the emergency microphone until the all-clear.
  - The system will switch to emergency broadcast in 3 seconds.
  - The signal tones and voice messages (alarm and evacuation information) of the Emergency broadcast system are stored on the voice storage flash or SD card, which will not be ageing or lost. Users can play them in all zones.
  - Emergency broadcast system should have system testing function as a standard configuration. The testing for the system can enable the operator to ensure the normal operation for the system all the time. The testing of emergency broadcast should be enabled via the software instead of playing the actual emergency broadcasts and causingpublic's panic.
  - Emergency broadcast system should have two pre-recorded emergency broadcast messages. The system should be able to edit and record the alarm and evacuation message. The prioritiesof the emergency broadcast can be programmed. DSM should be with a PTT emergency microphone, with which operators can announce real-time evacuation notices when emergency happens.
  - Users can listen to stored or audios about to play to avoid playback error message which may lead to crowd panic.
  - Language kinds should meet the user's requirements. There should be spaces left for the tags to facilitate users to stick related prompts for management.
  - System can automatically record voice messages sent by emergency microphone. Users can listen to and broadcast the voice message.
  - The linkage signals of the emergency broadcast uses the volt-free contact. All signals are from the fire control center. The number of the cables is the same as the fire control centers number.
  - Can achieve the linkage of the adjacent layers. Users can select the layers to be linked via software configuration.
  - The loudspeakers allow the 3-wire forced volume control switchover.
- Circuit Detection

  It is able to detect every zone's status to ensure the working order of the circuits and report faults in time. When a short-circuit error takes place, the device isolates the zone where error happens to protect the amplifiers and to cut off its impact on other zones.

Part II Solution

Device Selection
The system should be based on the TCP/IP network technologies with high level of integration and flexible configuration to meet various requirements. It is designed for the emergency broadcast and background music application enabling fire emergency broadcast functions like automatic fire warning, voice message presetting, emergency calling, emergency call recording and circuit monitoring, and service broadcasting functions like zone background music broadcasting, zone call broadcasting, timed music broadcasting and monitoring. The device is accordance with the Automatic Control System for Fire Protection (GB16806) and Standard EN 54-16.

With public address and voice alarm system integrated into one, the system should solve the duplication of investment and security risks and other problems caused by two individual systems. The distributed intelligent systems of the should be capable of accessing the 10/100M Ethernet network and multiple audio sources from the network. It supports connections in the Ethernet and the networking for several other control systems to perform centralized and distributed management via software. This product should be suitable formedium-scale and large-scale buildings.

Technical Characteristics

High Integration
The controller should be able to integrate audio source storage, network audio reception, voicebroadcasting, audiomatrix, volume control, monitoring, troubleshooting and main/standby amplifier switch functions together.

Safety
The system should be GB16806/EN54-16 compliant and can work in severe environment. It can be used to broadcast in case of emergency to disperse and evacuate people. It is a great guarantee for people's life security

Ethernet Based Extension
The central controller should be able to connect over the Ethernet without any external device. The configurable Network Paging Microphone could be placed anywhere in the Ethernet, which will enable the following :

- The method of distributed installation can save the cost of wiring.
- If the band width is sufficient, it can use current internal network.
- Provide plentiful network audio sources.
- Control the local or global broadcasting by the manner of permissions.
- Easy to upgrade.

Multitask Processing Mechanism
To simplify the operations, the system adopts multitask processing mechanism, thus it can process multiple tasks and make it possible to broadcast multiple audio source and broadcast in multiple zones.

Multiple Audio Sources Support
The system supports the audio sources from emergency microphone, network audio, ancillary line input, build-in audio/music files and web microphones.

Prioritized Control
The system supports255 priorities. Users can configure it in any way they want and realize all kinds of prioritizedbroadcasting controlling.

Local and Network Monitoring Function
With the built-in loudspeaker of controller or Configurable Network Paging Console, users can monitor each zone's broadcasting. The monitoring volume can be adjusted.

Touch screen
Programmable network paging console (NPC) is equipped with a touch screen. Users can operate on the touch screen to configure multi-zones settings without the need to extend hardware key modules, saving floor space on the desktop.

Troubleshooting Feature
The ASD troubleshooting technology can support the system to automaticallydetect the failure of the main power, standby power, amplifier circuit, amplifier protection/power, software, communications and loudspeakers etc. It can also locate the failure for maintainers to repair or replace the fault units.

Loudspeaker Circuit Detection
The SIM loudspeaker circuit detecting technology helps monitor loudspeaker circuits' statuses. When short-circuit or open-circuit faults are found, the device will send a warning automatically. The software can display all the circuit faults for maintenance's convenience. Usually a loudspeaker's short-circuit fault will activate the amplifier protection, affecting the working order in other zones. SIM solves this problem by automatically isolate the short-circuited zone where fault is found.

Matrix Allocation Function
This system includes the audio source matrix and power matrix to provide two kinds of work mode: low-cost power zones, and amplifiers & zones, which can meet the requirement for low-cost applications or high power zones.

Input/output Triggering
This system has input/output interfaces which can be triggered by dry contacts. Engineer staffs can configure the contact input to achieve the broadcasting control by the external device (linkage of the fire system). The contact output can be used to control the external devices for the volume, forced switchover and so on. The contact output interface can be linked of the broadcasting operations.

Voice Alarm
This system is designed in accordance with the EN54-16 Standard and national standard GB16806. It is full-featured for the fire alarm. When the fire occurs, the system will play the preset voice information. Then it can play the evacuation information for the zones with fires and the fire alarms for the nearby zones. The system can set several kinds of language for voice information, which can be played using the operation panel.

BroadcastDelay
Users can configure the time delay function in the broadcasting system. After making broadcasts, users need to wait for the time delay set previously, then the pre-recorded program will be played. This function can be utilized as in the following situation: When fire occurs, the system will pause for the administrator to confirm the fire alarm signal, and then play the emergency broadcasts. It can avoid crowd panic results from mis-operations.

OneClick Technology
To increase operation's convenience, OneClick technology is developed with which broadcasting can be started by clicking only one key. The operation shortcut can be configured with system management software and network paging console.

Internal Communication
The Programmable network paging consoleshould have built-in loudspeakers and microphones for internal communication. Users need to configure this function before using it.

-

Flexible Configuration
This system allows users to customize the configurations flexibly using the specific software. The engineering technicians and maintainers can configure the built-in audio sources, keys' functions, troubleshooting, audio source play modes, broadcasting priorities and contact input/output and other customized operations the OneClick functions. With careful configurations, the system can meet the needs of both background music broadcasting and emergency alarms. The configuration software for this system is used to configure the hardware. The default configuration for the device contains only the basic functions. Users need to work on each settings, including basic parameters, troubleshooting, broadcast preset and key events and so forth.

Configuration Software features:

- Project File Management

  It includes:
  - Create project, save project, open project, and check the latest project file;
  - Manage the subsystem and configuration files
- Property Setting

  The property setting is to set the basic property and broadcasting functions. The basic property settings include the zone settings, DSM settings and paging station settings.
- Broadcasting Setting

  The broadcasting function allows users to set the event- triggered, time-triggered and fire alarm broadcasting.
- Output Configuration

  After the error checking and building, system can generate the configuration files according to the configured project files.
- Audio Source Conversion

  It allows users to convert the audio files according to the sampling rate, digitalizing bit and channel number into the audio files in specified formats for the system.

Device Description

Digital Integrated System Manager / controller
The Digital Integrated System Manager is hereinafter referred to as the DSM.

The DSM is control equipment in the system designed for extending the number of loudspeaker zones, and can support multiple sound source files for broadcasting. The system integrates with functions such as the sound source file storage system, the network audio broadcasting system, the loudspeaker zone control system, and the system for monitoring and diagnosing faults.

The DSM offers various features, which are listed below:

- Supports the manual selection of sound source files, zone buttons, and can be directly operated.
- Supports emergencymicrophone input for emergency broadcast in the event of, for example, a fire evacuation.
- Includes differentindicator lights that identify system runningstates.
- Performs remote paging and broadcasting operation through the Configurable Network Paging Console.
- Includes 8 zone outputs. The numberof zones can be configuredthrough the software.
- 4 auxiliary inputs that can connect to external sound source equipment such as a CD player or tuner
- 4 auto volume control input ports that can set the phantom power supply and gain of each input.
- Auto loudspeaker circuits'short-circuit and open-circuit detection.
- A fuse protects the main power supply. In the case of a power supply short circuit within the DSM, the system automatically disconnects the main power supply.
- Built-in loudspeaker that can monitor the zones and sound sources, as well as monitor the network audio through the paging station.
- Contains 1GB of built-in flash memory that can store recorded voice files so as to fulfill functions such as voice information broadcasting and voice synthesis and to store LOG files
- Can simultaneously broadcast four types of sound sources, such as voice audio sources and external input or network audio sources.
- Can automatically record operation and fault logs, and can store up to 10,000 logs of each log type (operation and fault log types).
- Supports switching between the main and backup power amplifiers, and is capable of configuring the standby mode.
- Contains a self-test function.
- Supports automatic fault diagnosis.
- Supports broadcasting volume adjustment.
- Can define the zone and sound source functions. Button function description labels are also easy to install.
- An audio matrix enables broadcasting any audio source in any zone.

- Supports fire emergency broadcast mode so as to improve personnel evacuation efficiency in case of an emergency.
- Supports broadcasting designated recorded voice audio at a designated time so as to allow for unattended broadcasting.

Capable of system extension through an Ethernet network.

Parameter	Value
Power Supply	
Main power supply	~100-240V，50/60Hz
Backup power supply	DC 21.5V-28.5V
Main power fuse	T2AL 250V
Max. input power	120 W
Rated power	50 W
Audio Input	
Auxiliary input	0dB
Input impedance	20 kΩ
Frequency response	60Hz-16KHz
PTT microphone input	-51dB
SNR	>85dB
Audio Output	
Audio output channels	4 个
Output signal	0dB
Record output	0dB
Loudspeaker Circuit	
Output channels	8, with circuit fault detection function
Max. output load power	250W
Trigger Input / Output	
Trigger input ports	8
Trigger output ports	8 (NO, NC and COM)
Max. working voltage	AC 250V/DC 30V
Max. working current	2.5A
Others	
Monitoring loudspeaker	10W/8W
Ethernet speed	10M/100M
Ethernet interface number	4

Parameter	Value
Storage space	1GB
Work Condition	
Humidity	< 95%, without condensing
Working temperature	-10°C~+55°C
Storage temperature	-40°C~+70°C
Specification	
Dimension (W×H×D)	482 mm×88 mm ×420mm
Mount dimension (W×H×D)	580mm×235mm ×552mm
Net weight	9.3Kg
Gross weight	12.5Kg

Pure Final Stage Class: D Digital Power Amplifier

Pure final stage class D power amplifier 500W can be used in this system, which has the following characteristics:

- Real-time display of the temperature;
- 100V or 70Vconstant-pressure output ;
- Output volumes can be digitally adjusted
- 5.8 Unit LED display facilitates you to examine the device status.
- Perfect output short circuit protection and over-temperature protection; Automatic press limit control for long-time over loading output;
- Cool fan can be warm booted. The complete new design of the build-in short air duct cooling system structure for amplifiers can ensure the high stability performance.
- Remote fault reset function such as overloading or short circuit protection.

Parameter	Value
Rated Power	1 × 500 W
Main power supply voltage	~ 100 - 240 V, 50/60 Hz
DC Backup power supply operating voltage range	21.5 V - 28.5 V DC
Power consumption	< 700 W
Main power supply protection	T10 AL 250 V
Speaker output voltage	100 V / 70 V
Frequency response	70 Hz -18 kHz (+1 dB ~ -3 dB)
Input sensitivity	1.414 V_{RMS}
Impedance	20 kΩ
SNR	> 100 dB(withA-Weight)
Non-linear distortion	< 0.05 % (at 1/3 rated power, 1 kHz)

Configurable Network Paging Console

The Configurable Network Paging Console is hereinafter referred to as the "NPC"

The network paging microphone (NPC) connects to the system and related devices to transmit audio and control information through the Ethernet network. The NPC is used for paging, controlling broadcasts, monitoring zones, and for using the bidirectional intercom function.

The NPC has the following characteristics:

- Lightweight and innovative patent outward design. Support embedded desktop installation
- 4.3-inch color LCD touch screen. Can display system status and be operated for zones and groups'division or global paging and broadcast control
- Simple and intuitive user interface
- Can connect with up to 20 units. Button numbers can be added via software configuration
- Built-in monitor loudspeakers. Can utilize functions like zone monitoring and two-way intercom between stations.
- Digital audio processing to avoid acoustic fidelity distortion
- Can intercommunicate with other paging microphones and DSM in the network even when the connected DSM is not running
- 3 shortcut buttons: microphone talk mode switch, select all function and emergency broadcast

Parameters	Values
Power supply voltage	DC 12V
AUX input	0 dB
AUX input impedance	10 KΩ
Frequency response	60 Hz – 16 KHz (local input signal)
Microphone input	-51 dB
Audio output	0 dB
Monitoring loudspeaker	2 W/8 Ω
Monitoring sound pressure level	Higher than 65 dB and lower than 115 dB (1 m in front of where the audio is being output)
Operating temperature	-10 °C to +55 °C
Storage temperature	-40 °C to +70 °C
Humidity	<95%, without condensation

Loudspeakers

Wall mount Loudspeaker

- 6W wall mount Loudspeaker

Parameters	Values
Max power	9 W
Rated power	6 W
Power taps @ 100V	6 W / 3 W
Sound pressure level at 6W/1W (1kHz,1m)	96 dB / 88 dB
Frequency range (-10dB)	110 Hz - 13 kHz
Dispersion angle(1kHz/-6dB)	140°
Rated input voltage	100 V / 70 V
Connection	Cable
Dimensions (diameter x height)	260 x 180 x 120 mm
Weight	1.08 Kg
Case material	ABS

Ceiling mount Loudspeaker

- 6W Ceiling mount Loudspeaker

Parameters	Values
Max power	9 W
Rated power	6 W
Power taps @ 100V	6 W / 3 W/ 1.5 W
Sound pressure level at 1W (1kHz,1m)	90 +- 5 db
Frequency range (-10dB)	125Hz – 16kHz (-10 dB with reference to 1kHz)
SPL at rated power/1W	95dB / 88dB (1m & 1kHz)
Rated input voltage	100 V / 70 V
Connection	Cable
Dimensions (diameter x height)	166mm X 60mm
Weight	500 gm
Case material	ABS

Technical Specification of Indore Access Point

SN	**Specification**	**Compliance (Yes/No)**
1	The Access Point proposed must have radios to support 2.4Ghz and 5 Ghzchannels with 802.11ac Wave-2, 4X4:4 MU-MIMO with a throughput of upto 2.5 Gbps.	
2	Should come with standard Mounting Brackets	
3	Access point should have a Gigabit link that can support at least 1 Gbps of throughput.	
4	Should be capable of Band Steering	
5	Should support Way finding within covered areas to start with.	
6	Should not require any calibration for configuration of BLE location based messaging	
7	AP should support encrypted data transmission between user and also to cloud management platform	
8	Should support virtual BLE technology	
9	Should support automatic RF optimization	
10	WIPS/WIDS detection of rogue and honeypot Access Point detection,	
11	Should be able to limit per SSID or per user based, uplink or downlink bandwidth	
12	Should be based on the platform of Artificial Intelligence	
13	Should have followingcompliances:- UL 60950-1 CAN/CSAC22.2 No. 60950-1 FCC Part 15.247, 15.407, 15.107, and 15.109 RSS247 ICES003	
14	Artificial Intelligence Support from wireless access point to Switching end.	

Training

- Train the clients to know the system structure and principles.
- Train the clients to know and master the installation methods of the digital broadcasting systems.
- Train the clients to master the configuration methods of the digital broadcasting systems.
- Train the clients to use digital broadcasting system software.
- Train the clients to know basic troubleshooting and maintenance methods of the digital broadcasting systems.

LIST OF APPROVED MAKES (Additional

S.NO	Item	Approved Make
1	Cat6/6A UTP cables & Information outlet (I/O)	Belden/Siemon/Panduit/Derwiser/ Rit
2	Cat 6/6A Jack Panel	Belden/Siemon/Panduit/Derwiser/ Rit
3	CAT 6/6A patch cords	Belden/Siemon/Panduit/Derwiser/ Rit
4	Face Plate	Belden/Siemon/Panduit/Derwiser/ Rit
5	Fiber Equipment (Cable, Patch Cord &LIU .)	Belden/Siemon/Panduit/Derwiser/ Rit
6	Networking rack	Derwiser/MTS/Rittal/APC/APW
7	CCTV cameras	Tyco /Mobotix/Pelco/Honeywell/Panasonic
8	NVR	Allgovision/ Impulse / Avigilon / Cisco/ Axis
9	Switches & SFP/Firewall/Router	Cisco/ Impulse / Juniper / Nexxus
10	Workstations	Dell / HP / IBM
11	FHD LED Display	Panasonic/ Sony/ Samsung
12	Core LAN Switch	Cisco / Juniper / Impulse / Nexxus/Arista
13	Access LAN Switch	Cisco / Juniper / Impulse / Nexxus/Arista
14	IP-PBX SYSTEM & IP Phones /Digital Phone	Tadiran/ Avaya/ CISCO /MITEL/ NEC
15	Wi-Fi	Cisco / Juniper / Impulse / Nexxus/Arista
16	Fire alarm Systems	Ansul-Tyco / Notifier/ Rux / JCI(IFC) / Nohm / Gamewell
17	PA Systems	Bosch / Honeywell / Bose
18	Speaker	Bosch / Honeywell /System Sensor/ Bose
19	ITAM (for asset inventory management)	Arista/Nexxus /Juniper /Palo-alto
20	Access Control System	Cardex / Lenel / Impulse / Bosch / Smart i
21	Fire Cable	Polycab/RR Kabel/Paramount/Parasheild
22	Speaker Cable	Polycab / Skyton / Falcon / RR Kabel