**SECTION D – LV, Networking System**

**TECHNICAL SPECIFICATIONS**

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**SECTION D 6 – LV, Networking System**

# TECHNICAL SPECIFICATIONS

C.1 FIRE DETECTION AND ALARM SYSTEM - ANALOG ADDRESSABLE

### GENERAL DESCRIPTION:

1. Provide Fire Detection and Alarm System in accordance with NFPA 72 (Latest edition) and requirements of the Contract Documents. Provide a complete operable and intelligent analog addressable Fire Alarm and Detection System with associated communication and notification systems. The system shall include interfaces for foreign systems, as described herein and in accordance with the Contract Documents, and all applicable Codes, Standards and local Regulations, and be approved by Fire Services.
2. All Plant furnished shall be new and the latest state-of-the-art, products of a single Manufacturer engaged in the manufacturing of analog fire detection devices for at least 5 years.
3. All software licenses shall be supplied as part of the contract. Renewable & subscription license is not acceptable.
4. The system shall be designed, supplied, installed, tested, and approved by the local Authority having Jurisdiction, and turned over to the Contractor in an operational condition.
5. The contractor shall contract with a single supplier for the fire alarm Plant, engineering, programming, inspection and tests, and shall provide a “UL Listing Certificate” for the complete system.
6. Drawings: The Drawings shall serve to indicate the general arrangement of the various Plant and their generic functional interconnections. However, layout of Plant, accessories, specialties, conduit system and wiring, are diagrammatic and do not necessarily indicate every required device, fitting, etc., required for the complete installation.

### SCOPE:

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

**Basic Performance:**

Alarm, trouble and supervisory signals from all intelligent reporting devices shall be encoded on NFPA Style 6 (Class A) Signaling Line Circuits (SLC).

Initiation Device Circuits (IDC) shall be wired Class A (NFPA Style D) as part of an addressable device connected by the SLC Circuit.

Notification Appliance Circuits (NAC) shall be wired Class A (NFPA Style Z) as part of an addressable device connected by the SLC Circuit.

On Style 6 or 7 (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.

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.

NAC speaker circuits shall be arranged such that there is a minimum of one speaker circuit per floor of the building or smoke zone whichever is greater.

Audio amplifiers and tone generating equipment shall be electrically supervised for normal and abnormal conditions.

NAC speaker circuits and control equipment shall be arranged such that loss of any one (1) speaker circuit will not cause the loss of any other speaker circuit in the system.

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

### DRAWINGS & TECHNICAL SUBMITTALS

**General:**

All submittals shall be submitted to the Owner/PMC for review and approval.

All references to manufacturer's model numbers and other pertinent information herein is intended to establish minimum standards of performance, function and quality. Equivalent compatible UL-listed equipment from other manufacturers may be substituted for the specified equipment as long as the minimum standards are met.

For equipment other than that specified, the contractor shall supply proof that such substitute equipment equals or exceeds the features, functions, performance, and quality of the specified equipment.

**Shop Drawings:**

Shop drawings shall be submitted as mentioned in Objective section to the Owner/PMC for review and approval. Complete information, clearly presented, shall be included to determine compliance with specifications.

It shall include manufacturer's name(s), model numbers, ratings, power requirements, equipment layout, device arrangement, complete wiring point-to-point diagrams, and conduit layouts etc.

It shall also show annunciator layout, configurations, and terminations etc.

**Manuals:**

Submit simultaneously with the shop drawings, complete operating and maintenance manuals listing the manufacturer's name(s), including technical data sheets.

Wiring diagrams shall indicate internal wiring for each device and the interconnections between the items of equipment.

Provide a clear and concise description of operation that gives, in detail, the information required to properly operate the equipment and system.

**Software Modifications**

Provide the services of a factory trained and authorized technician to perform all system software modifications, upgrades or changes. Response time of the technician to the site shall not exceed 4 hours.

Provide all hardware, software, programming tools and documentation necessary to modify the fire alarm system on site. Modification includes addition and deletion of devices, circuits, zones and changes to system operation and custom label changes for devices or zones. The system structure and software shall place no limit on the type or extent of software modifications on-site.

**Certifications:**

Together with the shop drawing submittal, submit a certification from the major equipment manufacturer indicating that the proposed supervisor of the installation and the proposed performer of contract maintenance is an authorized representative of the major equipment manufacturer. Include names and addresses in the certification.

**WARRANTY:**

All work performed and all material and equipment furnished under this contract shall be free from defects and shall remain so for a period of Defect Liability. The full cost of maintenance, labor and materials required to correct any defect during this period shall be included in the submittal bid.

### POST CONTRACT MAINTENANCE:

Complete maintenance and repair service for the fire alarm system shall be available from a factory trained authorized representative of the manufacturer of the major equipment within Defect Liability Period.

 A preventive maintenance schedule shall be provided by the contractor describing the protocol for preventive maintenance. The schedule shall include:

* Systematic examination, adjustment and cleaning of all detectors, manual fire alarm stations, control panels, power supplies, relays, water flow switches and all accessories of the fire alarm system etc.

Each smoke detector shall be tested in accordance with the requirements of NFPA 72 Chapter 7.

### APPLICABLE STANDARDS AND SPECIFICATIONS:

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

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

 NFPA 13 Sprinkler 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 72 National Fire Alarm Code

 NFPA 76 Telecommunication Facilities

 NFPA 318 Clean Room Applications

 NFPA 101 Life Safety Code

 NFPA 90A Air conditioning & ventilation system

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

 UL 268 Smoke Detectors for Fire Protective Signaling Systems

 UL 864 Control Units for Fire Protective Signaling Systems 9th Edition Listed

 UL 268 A 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 346 Waterflow Indicators for Fire Protective Signaling Systems

 UL 1971Visual Notification Appliances

 UL 228 Door Holders

1. NATIONAL BUILDING CODES
2. IS CODES

The Video Display Terminal (VDT) shall comply with Swedish magnetic emission and X-radiation guidelines MPR 1990:10.

### APPROVALS:

The system shall have proper listing and/or approval from the following nationally recognized agencies:

* UL Underwriters Laboratories Inc. (9th Edition)
* The fire alarm control panel shall meet UL Standard 864 9th Edition (Control Units)
* The system shall be listed by the national agencies as suitable for extinguishing release applications. The system shall support release of high and low pressure CO2.

### PRODUCTS

### **7.1 EQUIPMENT AND MATERIAL, GENERAL**:

All equipment and components shall be new, and the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for use as part of a protective signaling system, meeting the National Fire Alarm Code.

All equipment and components shall be installed in strict compliance with manufacturers' recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc., before beginning system installation.

All equipment shall be attached to walls and ceiling/floor assemblies and shall be held firmly in place (e.g., detectors shall not be supported solely by suspended ceilings). Fasteners and supports shall be adequate to support the required load.

### **7.2 CONDUIT AND WIRE:**

**Conduit:**

Conduit shall be in accordance with The National Electrical Code (NEC), local and state requirements.

Where required, all wiring shall be installed in conduit or raceway. Conduit fill shall not exceed 40 percent of interior cross sectional area where three or more cables are contained within a single conduit.

Cable must be separated from any open conductors of power, or Class 1 circuits, and shall not be placed in any conduit, junction box or raceway containing these conductors, per NEC Article 760-29.

Wiring for 24 volt DC control, alarm notification, emergency communication and similar power-limited auxiliary functions may be run in the same conduit as initiating and signaling line circuits. All circuits shall be provided with transient suppression devices and the system shall be designed to permit simultaneous operation of all circuits without interference or loss of signals.

Conduit shall not enter the fire alarm control panel, or any other remotely mounted control panel equipment or backboxes, except where conduit entry is specified by the FACP manufacturer.

Conduit shall be 3/4-inch (19.1 mm) minimum.

**Wire:**

All fire alarm system wiring shall be new.

Wiring shall be in accordance with local, state and national codes (e.g., NEC Article 760) and as recommended by the manufacturer of the fire alarm system. Number and size of conductors shall be as recommended by the fire alarm system manufacturer, but not less than 18 AWG (1.02 mm) for Initiating Device Circuits and Signaling Line Circuits, and 14 AWG (1.63 mm) for Notification Appliance Circuits.

All wire and cable shall be listed and/or approved by a recognized testing agency for use with a protective signaling system.

### MAIN FIRE ALARM CONTROL PANEL OR NETWORK NODE:

The main FACP Central Console shall contain a microprocessor based Central Processing Unit (CPU). 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, panel modules including initiating circuits, control circuits, and notification appliance circuits, local and remote operator terminals, printers, annunciators, and other system controlled devices.

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 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. In the event of CPU failure, all SLC loop modules shall fallback to degrade mode. 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.
4. Visually and audibly annunciate any trouble, supervisory, security or alarm condition on operator's terminals, panel display, and annunciators.

1. When a fire alarm condition is detected and reported by one of the system initiating devices or

 appliances, the following functions shall immediately occur:

1. The system alarm LED shall flash.
2. A local piezo-electric audible device in the control panel shall sound a distinctive signal.
3. Upto 80-character backlit LCD display shall indicate all information associated with the fire alarm condition, including the type of alarm point and its location within the protected premises.
4. Printing and history storage equipment shall log and print the event information along with a time and date stamp.
5. All system outputs assigned via preprogrammed equations for a particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated.
6. When a trouble condition is detected and reported by one of the system initiating devices or appliances, the following functions shall immediately occur:

a. The system trouble LED shall flash.

b. A local piezo-electric audible device in the control panel shall sound a distinctive signal.

c. Upto 80-character backlit LCD display shall indicate all information associated with the trouble condition, including the type of trouble point and its location within the protected premises.

d. Printing and history storage equipment shall log and print the event information along with a time and date stamp.

e. All system outputs assigned via preprogrammed equations for a particular point in trouble shall be executed, and the associated system outputs (trouble notification appliances and/or relays) shall be activated.

1. When a supervisory condition is detected and reported by one of the system initiating devices or appliances, the following functions shall immediately occur:

a. The system trouble LED shall flash.

b. A local piezo-electric audible device in the control panel shall sound a distinctive signal.

c. The 640 to 800-character backlit LCD display shall indicate all information associated with the supervisory condition, including the type of trouble point and its location within the protected premises.

d. Printing and history storage equipment shall log and print the event information along with a time and date stamp.

e. All system outputs assigned via preprogrammed equations for a particular point in trouble shall be executed, and the associated system outputs (notification appliances and/or relays) shall be activated.

1. When a security alarm condition is detected and reported by one of the system initiating devices or appliances, the following functions shall immediately occur:

a. The system security LED shall flash.

b. A local piezo-electric audible device in the control panel shall sound a distinctive signal.

c. The 640 to 800-character backlit LCD display shall indicate all information associated with the fire alarm condition, including the type of alarm point and its location within the protected premises.

d. Printing and history storage equipment shall log and print the event information along with a time and date stamp.

e. All system outputs assigned via preprogrammed equations for a particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated.

1. When a pre-alarm condition is detected and reported by one of the system initiating devices or appliances, the following functions shall immediately occur:

a. The system pre-alarm LED shall flash.

b. A local piezo-electric audible device in the control panel shall sound a distinctive signal.

c. The 640 to 800-character backlit LCD display shall indicate all information associated with the fire alarm condition, including the type of alarm point and its location within the protected premises.

d. Printing and history storage equipment shall log and print the event information along with a time and date stamp.

e. All system outputs assigned via preprogrammed equations for a particular point in alarm shall be executed, and the associated system outputs (alarm notification appliances and/or relays) shall be activated.

### **8.1 Operator Control**

1. Acknowledge Switch:
	* + Activation of the control panel acknowledge switch in response to new alarms and/or troubles shall silence the local panel piezo electric signal and change the alarm and trouble LEDs from flashing mode to steady-ON mode. If multiple alarm or trouble conditions exist, depression of this switch shall advance the LCD display to the next alarm or trouble condition. In addition, the FACP shall support Block Acknowledge to allow multiple trouble conditions to be acknowledged with a single depression of this switch.
		+ Depression of the Acknowledge switch shall also silence all remote annunciator piezo sounders.
2. Signal Silence Switch:

Depression of the Signal Silence switch shall cause all programmed alarm notification appliances and relays to return to the normal condition. The selection of notification circuits and relays that are silence able by this switch shall be fully field programmable within the confines of all applicable standards. The FACP software shall include silence inhibit and auto-silence timers.

1. Drill Switch:

Depression of the Drill switch shall activate all programmed notification appliance circuits. The drill function shall latch until the panel is silenced or reset.

1. System Reset Switch:

Depression of the System Reset switch shall cause all electronically latched initiating devices to return to their normal condition. Initiating devices shall re-report if active. Active notification appliance circuits shall not silence upon Reset. Systems that de-activate and subsequently re-activate notification appliance circuits shall not be considered equal. All programmed Control-By-Event equations shall be re-evaluated after the reset sequence is complete if the initiating condition has cleared. Non-latching trouble conditions shall not clear and re-report upon reset.

1. Lamp Test:

The Lamp Test switch shall activate all local system LEDs, light each segment of the liquid crystal display and display the panel software revision for service personal.

1. Scroll Display Keys:

There shall be Scroll Display keys for FIRE ALARM, SECURITY, SUPERVISORY, TROUBLE, and OTHER EVENTS. Depression of the Scroll Display key shall display the next event in the selected queue allowing the operator to view events by type.

1. Print Screen:

Depression of the PRINT SCREEN switch shall send the information currently displayed on the 640 to 800-character display to the printer.

### **8.2** System Capacity and General Operation

1. The control panel shall be capable of expansion via up to 10 SLC modules. Each module shall support a maximum of 250-300 analog/addressable devices for a maximum system capacity of 2500 - 3000 points. The system shall be capable of 2500 - 3000 annunciation points per system regardless of the number of addressable devices.
2. The Fire Alarm Control Panel shall include a full featured operator interface control and annunciation panel that shall include a backlit 6 inch or 640 to 800-character liquid crystal display, individual, color coded system status LEDs, and a QWERTY style alphanumeric keypad for the field programming and control of the fire alarm system. Said LCD shall also support graphic bit maps capable of displaying the company name and logo of either the Owner/PMC or installing company.
3. All programming or editing of the existing program in the system shall be achieved without special equipment and without interrupting the alarm monitoring functions of the fire alarm control panel.

### **8.3 Software and hardware features**

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

* + - * 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.
			* 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.
			* 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.
			* Action: If programmed for action, and the detector reaches a level exceeding the pre-programmed level, the control panel shall indicate an action condition. Sounders installed will automatically activate with general evacuation on alarm level.
			* The system shall support a detector response time to meet world annunciation requirements of less than 3 seconds.
			* Device Blink Control: Means shall be provided to turn off detector/module LED strobes for special areas.
			* NFPA 72 Smoke Detector Sensitivity Test: The system shall provide an automatic smoke detector test function that meet the requirements of NFPA 72.
			* 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.
			* 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.
			* History Events: The panel shall maintain a history file of the last upto 4000 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 4000 event history file.
			* Smoke Control Modes: The system shall provide means to perform FSCS mode Smoke Control to meet NFPA-92A and 90B and HVAC mode to meet NFPA 90A.
			* 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.
			* Drill: The system shall support means to activate all silence able fire output circuits in the event of a practice evacuation or “drill”. If enabled for local control, the front panel switch shall be held for a minimum of 2 seconds prior to activating the drill function
			* 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.
			* Block Acknowledge: The system shall support a block Acknowledge for Trouble Conditions
			* Sensitivity Adjust: The system shall provide Automatic Detector Sensitivity Adjust based on Occupancy schedules including a Holiday list of up to 15 days.
			* 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.
			* 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.
			* Print Functions: The system shall provide means to obtain a variety of reports listing all event, alarm, trouble, supervisory, or security history. Additional reports shall be available for point activation for the last Walk Test performed, detector maintenance report containing the detector maintenance status of each installed addressable detector, all network parameters, all panel settings including broad cast time, event ordering, and block acknowledge, panel timer values for Auto Silence, Silence Inhibit, AC Fail Delay time and if enabled, Proprietary Reminder, and Remote Reminder timers, supervision settings for power supply and printers, all programmed logic equations, all custom action messages, all non-fire and output activations (if pre-programmed for logging) all active points filtered by alarms only, troubles only, supervisory alarms, pre-alarms, disabled points and activated points, all installed points filtered by SLC points, panel circuits, logic zones, annunicators, releasing zones, spall zones, and trouble zones.
			* 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.
			* Resound based on type for security or supervisory: The system shall indicate a Security alarm when a monitor module point programmed with a security Type Code activates. If silenced alarms exist, a Security alarm will resound the panel sounder. The system shall indicate a Supervisory alarm when a monitor module point programmed with a supervisory Type Code activates. If there are silenced alarms, a Supervisory alarm will resound the panel sounder.
			* 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.
			* Custom Graphics: When fitted with an LCD display, the panel shall permit uploading of a custom bit-mapped graphic to the display screen. Graphic shall display when all systems are normal.
			* Multi-Detector and Cooperating Detectors: The system shall provide means to link one detector to up to two detectors at other addresses on the same loop in cooperative multi-detector sensing. There shall be no requirement for sequential addresses on the detectors and the alarm event shall be a result or product of all cooperating detectors chamber readings.
			* Tracking/Latching Duct: The system shall support both tracking and latching duct detectors.
			* 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.
			* 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.
			* Security Monitor Points: The system shall provide means to monitor any point as a type security.
			* 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 CBE 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.
			* 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.
			* 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.
			* 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.
			* 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.
			* 10 trouble equations per device: The system shall provide support for up to 10 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.
			* 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.
			* 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 with four abort options to satisfy any local jurisdiction requirements.
			* 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 or indicating panel module input. 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. It shall also be possible to set a maximum verification count between 0 and 20 with the “0” setting producing no alarm verification. When the counter exceeds the threshold value entered, a trouble shall be generated to the panel.

### Central Processing Unit (Providing the information for All Modules)

1. The Central Processing Unit shall communicate with, monitor, and control all other modules within the control panel. Removal, disconnection or failure of any control panel module shall be detected and reported to the system display by the Central Processing Unit.
2. 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.
3. 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.
4. 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.
5. Consistent with UL864 standards, the CPU and associated equipment are to be protected so that voltage surges or line transients will not affect them.
6. Each peripheral device connected to the CPU shall be continuously scanned for proper operation. Data transmissions between the CPU and peripheral devices shall be reliable and error free. The transmission scheme used shall employ dual transmission or other equivalent error checking techniques.
7. The CPU shall provide an EIA-232 interface between the fire alarm control panel and the UL Listed Electronic Data Processing (EDP) peripherals.
8. The CPU shall provide two EIA-485 ports for the serial connection to annunciation and control subsystem components.
9. The EIA-232 serial output circuit shall be optically isolated to assure protection from earth ground.
10. The CPU shall provide one high-speed serial connection for support of network communication modules.
11. The CPU shall provide double pole relays for FIRE ALARM, SYSTEM TROUBLE, SUPERVISORY, and SECURITY. The SUPERVISORY and SECURITY relays shall provide selection for additional FIRE ALARM contacts.

### **9.1 Display**

1. The system display shall provide all the controls and indicators used by the system operator and may also be used to program all system operational parameters.
2. The display assembly shall contain, and display as required, custom alphanumeric labels for all intelligent detectors, addressable modules, and software zones.
3. The system display shall provide a 6 inch or 640-character backlit alphanumeric Liquid Crystal Display (LCD). It shall also provide ten 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, and CPU FAILURE.
4. The system display shall provide a QWERTY style keypad with control capability to command all system functions, entry of any alphabetic or numeric information, and field programming. 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.
5. The system display shall include the following operator control switches: ACKNOWLEDGE, SIGNAL SILENCE, RESET, DRILL, and LAMP TEST. Additionally, the display interface shall allow scrolling of events by event type including, FIRE ALARM, SECURITY, SUPERVISORY, TROUBLE, and OTHER EVENTS. A PRINT SCREEN button shall be provided for printing the event currently displayed on the 640-character LCD.

### **9.2 Loop (Signalling Line Circuit) Control Module:**

1. The Loop Control Module shall monitor and control a minimum of 318 intelligent addressable devices and additional capacity for Loop Cable Isolators. This includes 159 intelligent detectors, 159 monitor or control modules
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. The Loop Control Module shall provide power and communicate with all intelligent addressable detectors and modules on a single pair of wires. This SLC Loop shall be capable of operating as a NFPA Style 6 (Class B) circuit.
4. The SLC interface board shall be able to drive an NFPA Style 6 twisted shielded circuit up to 12,500 feet in length. The SLC Interface shall also be capable of driving an NFPA Style 6, no twist, no shield circuit up to 3,000 feet in length. In addition, SLC wiring shall meet the listing requirements for it to exit the building or structure. "T"-tapping shall be allowed in either case.
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.

### **9.3 Enclosures:**

1. The control panel shall be housed in a UL-listed cabinet suitable for surface or semi-flush mounting. The cabinet and front shall be corrosion protected, given a rust-resistant prime coat, and manufacturer's standard finish.
2. The back box and door shall be constructed of 0.060 steel with provisions for electrical conduit connections into the sides and top.
3. The door shall provide a key lock and shall include a glass or other transparent opening for viewing of all indicators. For convenience, the door may be site configured for either right or left hand hinging.
4. The control unit shall be modular in structure for ease of installation, maintenance, and future expansion.

### **9.4 Power Supply:**

1. The Addressable Main Power Supply shall operate on 120/240 VAC, 50/60 Hz, and shall provide all necessary power for the FACP.
2. The Addressable Main Power Supply shall provide sufficient 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 Addressable 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 25-200 amp-hours within a 48-hour period.
4. The Addressable Main Power Supply shall provide a very low frequency sweep earth detect circuit, capable of detecting earth faults.
5. The Addressable Main Power Supply shall be power-limited per 1995 UL864 requirements.

### **9.5 Auxiliary Addressable Power Supply**

1. The auxiliary addressable power supply is a remote 24 VDC power supply used to power Notification Devices and field devices that require regulated 24VDC power. The power supply shall also include and charge backup batteries.
2. The addressable power supply for the fire alarm system shall provide up a minimum of 6.0 amps of 24-volt DC regulated power for Notification Appliance Circuit (NAC) power or 5 amps of 24-volt DC general power. The power supply shall have an additional 0.5 amp of 24 VDC auxiliary power for use within the same cabinet as the power supply. It shall include an integral charger designed to charge 7.0 - 25.0-amp hour batteries.
3. The addressable power supply shall provide four individually addressable Notification Appliance Circuits that may be configured as two Class "A" and two Class "B" or four Class "B" only circuits. All circuits shall be power-limited per UL 864 requirements.
4. The addressable power supply shall provide built-in synchronization for certain Notification Appliances on each circuit without the need for additional synchronization modules. The power supply's output circuits shall be individually selected for synchronization. A single addressable power supply shall be capable of supporting both synchronized and non-synchronized Notification Devices at the same time.
5. The addressable power supply shall operate on 120 or 240 VAC, 50/60Hz.
6. 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.
7. 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.
8. 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 eight or sixteen hours shall be Dip-switch selected.
9. The addressable power supply shall have an option for Canadian Trouble Reporting and this option shall be Dip-switch selectable.
10. The addressable power supply mounts in either the FACP back box or its own dedicated surface mounted back box with cover.
11. Each of the power supply's four output circuits shall be DIP-switch selected 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.
12. 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 24VDC power, the circuit shall be individually supervised when an end-of-line relay is used.
13. When selected for Notification Appliance Circuits, the output circuits shall be individually DIP-switch selectable for Steady, March Time, Dual Stage or Temporal.
14. 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.
15. 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.
16. 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.

### **9.5 Field Charging Power Supply:**

The FCPS is a device designed for use as either a remote 24-volt power supply or to power Notification Appliances and provide synchronization signals to visual strobe devices.

1. The FCPS shall be available in two models offering either up to 6.0 amps (4.0 amps continuous) or 8.0 amps (6.0 amps continuous) of regulated 24-volt power. It shall include an integral charger designed to charge 7.0-amp hour batteries and to support 60-hour standby.
2. The Field Charging Power Supply shall have two input triggers. The input trigger shall be a Notification Appliance Circuit (from the fire alarm control panel) or a relay. Four outputs (two Style Y or Z and two style Y) shall be available for connection to the Notification devices.
3. The FCPS shall include an attractive surface mount back box.
4. The Field Charging Power Supply shall include the ability to delay the AC fail delay per NFPA requirements.
5. The FCPS include power limited circuitry, per 1995 UL standards.

### **9.6 System Circuit Supervision:**

1. The FACP shall supervise all circuits to intelligent devices, annunciators and conventional peripherals and annunciate loss of communications with these devices. The CPU shall continuously scan above devices for proper system operation and upon loss of response from a device shall sound an audible trouble, indicate that device or devices are not responding and print the information in the history buffer and on a printer.
2. Sprinkler system valves, standpipe control valves, PIV and main gate valves shall be supervised for off-normal position.

### **9.7 Field Wiring Terminal Blocks:**

1. All wiring terminal blocks shall be the plug-in/removable type and shall be capable of terminating up to 12 AWG wire. Terminal blocks that are permanently fixed to the PC board are not acceptable.

### **9.8 Field Programming**

* 1. The system shall be programmable, configurable and expandable in the field without the need for special tools, laptop computers, or other electronic interface equipment. There shall be no firmware changes required to field modify the system time, point information, equations, or annunciator programming/information.
	2. It shall be possible to program through the standard FACP keyboard all system functions.
	3. All field defined programs shall be stored in non-volatile memory.
	4. Two levels of password protection shall be provided in addition to a key-lock cabinet. One level shall be used for status level changes such as point/zone disable or manual on/off commands (Building Manager). A second (higher-level) shall be used for actual change of the life safety program (installer). These passwords shall be five (5) digits at a minimum. Upon entry of an invalid password for the third time within a one-minute time period an encrypted number shall be displayed. This number can be used as a reference for determining a forgotten password.
	5. The system programming shall be "backed" up on a CD/DVD/USB utilizing an upload/download program. This system back-up disk shall be completed and given in duplicate to the building Owner/PMC and/or operator upon completion of the final inspection. The program that performs this function shall be "non-proprietary", in that, it shall be possible to forward it to the building owner/operator upon his or her request.
	6. The installer's field programming and hardware shall be functionally tested on a computer against known parameters/norms which are established by the FACP manufacturer. A software program shall test Input-to-Output correlations, device Type ID associations, point associations, time equations, etc. This test shall be performed on an IBM-compatible PC with a verification software package. A report shall be generated of the test results and two copies turned in to the engineer(s) on record.
	7. It shall be the responsibility of the contractor to ensure that all equipment supplied shall fit in locations designated in the specifications and approved plans.

### **9.9 Specific System Operations**

1. Smoke Detector Sensitivity Adjust: Means shall be provided for adjusting the sensitivity of any or all analog intelligent smoke detectors in the system from the system keypad or from the keyboard of the video terminal. Sensitivity range shall be within the allowed UL window.
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 function shall be programmable from 5 to 50 seconds and each detector shall be able to be selected for verification during the field programming of the system or anytime after system turn-on. Alarm verification shall not require any additional hardware to be added to the control panel. 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.
3. System Point Operations:
* Any addressable device in the system shall have the capability to be enabled or disabled through the system keypad or video terminal.
* System output points shall be capable of being turned on or off from the system keypad or the video terminal.
1. 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:
* Device Status.
* Device Type.
* Custom Device Label.
* Software Zone Label.
* Device Zone Assignments.
* Analog Detector Sensitivity.
* All Program Parameters.
1. System Status Reports: Upon command from an operator of the system, a status report shall be generated and printed, listing all system statuses.
2. System History Recording and Reporting: The fire alarm control panel shall contain a history buffer that shall be capable of storing up to 4000 system events. Each of these events shall 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.

The history buffer shall use non-volatile memory. Systems that use volatile memory for history storage are not acceptable.

1. 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.
2. If any intelligent detector in the system responds with a reading that is below or above normal limits, then the system shall enter the trouble mode, and the particular Intelligent Detector shall 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.
3. The system shall include the ability (programmable) to indicate a "pre-alarm" condition. This shall be used to alert maintenance personal when a detector is at 80% of its alarm threshold in a 60 second period.

### Network Repeater Panel

1. A NRP shall be provided to display all system intelligent points. The NRP shall be capable of displaying all information for all 200,000 possible points on the network. Network display devices, which are only capable of displaying a subset of network points, shall not be suitable substitutes.
2. The NRP shall include a minimum of 6 inch or 640-800 characters, backlit by a long life, solid state LCD display. It shall also include a full QWERTY style keypad with tactile feel. Additionally, the network display shall include ten soft-keys for screen navigation and the ability to scroll events by type. i.e. Fire Alarm, Supervisory Alarm, Trouble, etc.
3. The network control annunciator shall have the ability to display up to eight events in order of priority and time of occurrence. Counters shall be provided to indicate the total number of events by type.
4. The NRP shall mount in any of the network node fire alarm control panels. Optionally, the network display may mount in a back box designed for this use. The network shall support a minimum of 103 network control annunciators (not to exceed total node capacity) and shall connect to the network over either a wire or fiber interface.
5. The network control annunciator shall have an event history buffer capable of storing a minimum of 1000 events in non-volatile memory. Additionally, the NRP 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.
6. The NRP shall include two optically isolated, 9600 bauds, industry standard EIA-232 ports for UL864 listed printers and CRT's. These peripheral devices shall print or display network activity.
7. 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.
8. The NRP 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.
9. 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.
10. The NRP 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.
11. The network control annunciator shall support an optional WindowsTM based program utility. This utility shall allow the user create an NRP database, upload/download an NRP database, and download an upgrade to the NRP executive. To ensure program validity, this utility shall check stored databases for errors. A compare function shall be included to identify differences between databases.
12. For time keeping purposes the NRP shall include a time of day clock.
13. Each NCA shall support up to 32 additional 80-character remote display annunciators for displaying network activity. These "Terminal Mode" displays shall mimic the activity appearing on the corresponding NRP.

### Signalling Line Circuits (SLC)

1. Each FACP or FACP network node shall support up to two SLCs. Each SLC interface shall provide power to and communicate with up to 159 intelligent detectors, 159 intelligent modules (monitor or control) of 318 devices. The addition of the optional second loop shall double the device capacity, supporting a total of 600 devices. Each SLC shall be capable of NFPA 72 Style 4, Style 6, or Style 7 (Class A or B) wiring.
2. CPU shall receive analog information from all intelligent detectors to be processed to determine whether normal, alarm, pre-alarm, or trouble conditions exist for each detector. The software shall 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 shall also be used for automatic detector testing and for the automatic determination of detector maintenance requirements.

### SYSTEM COMPONENTS - ADDRESSABLE DEVICES

### **12.1 Addressable Devices - General**

1. Addressable devices shall use simple to install and maintain decade, decimal address switches. Devices shall be capable of being set to an address in a range of 001 to 159. However, electronic addressing shall be accepted only if all the devices can be fully programmed for sensitivity settings, pre alarm level etc. from the panel with no extra programming tools and computer shall be used.
2. Detectors shall be intelligent (analog) and addressable, and shall connect with two wires to the fire alarm control panel Signaling Line Circuits.
3. Addressable smoke and thermal detectors shall provide dual alarm and power/polling 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.
4. 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.
5. 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, Chapter 7.
6. The detectors shall be ceiling-mount and shall include a separate twist-lock base with tamper proof feature. Bases 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.
7. The detectors shall provide a test means whereby they 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 magnetic switch) or initiated remotely on command from the control panel.
8. Detectors shall also store an internal identifying type code that the control panel shall use to identify the type of device.
9. 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.
10. Addressable devices shall store an internal identifying code that the control panel shall use to identify the type of device.
11. 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.
12. Addressable modules shall mount in a 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box. An optional surface mount Lexan enclosure shall be available.

### **12.2 Addressable Manual Fire Alarm Box (manual station)**

1. Addressable manual fire alarm boxes shall, on command from the control panel, send 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 with clearly visible operating instructions provided on the cover. The word FIRE shall appear on the front of the stations in raised letters, 1.75 inches (44 mm) or larger.

### **12.3 Intelligent Multi-Co-Operative Sensing Type Photoelectric Smoke Detector**

1. The detectors shall use the photoelectric (light-scattering) principal to measure smoke density and shall be in position to work in advance multi Co-Operative Sensing, on command from the control panel, send data to the panel representing the analog level of smoke density.

### **12.4 Intelligent Multi Criteria Acclimating Detector**

1. The intelligent multi criteria Acclimate detector shall be an addressable device that is designed to monitor a minimum of photoelectric and thermal technologies in a single sensing device. The design shall include the ability to adapt to its environment by utilizing a built-in microprocessor to determine its environment and choose the appropriate sensing settings. The detector design shall allow a wide sensitivity window, no less than 1 to 4% per foot obscuration. This detector shall utilize advanced electronics that react to slow smoldering fires and thermal properties all within a single sensing device.
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.

### **12.5 Addressable Control Module**

1. Addressable control modules shall be provided to supervise and control the operation of one conventional NACs of compatible, 24 VDC powered, polarized audio/visual notification appliances.
2. The control module NAC may be wired for Style Z or Style Y (Class A/B) with up to 1 amp of inductive A/V signal, or 2 amps of resistive A/V signal operation.
3. Audio/visual power shall be provided by a separate supervised power circuit from the main fire alarm control panel or from a supervised UL listed remote power supply.
4. The control module shall be suitable for pilot duty applications and rated for a minimum of 0.6 amps at 30 VDC.

### **12.6 Addressable Relay Module**

1. Addressable Relay Modules shall be available for HVAC control and other building functions. The relay shall be form C and rated for a minimum of 2.0 Amps resistive or 1.0 Amps inductive. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to insure that 100% of all auxiliary relay or NACs may be energized at the same time on the same pair of wires.

### **12.7 Isolator Module**

1. 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.
2. 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.
3. 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.
4. 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.
5. The isolator module shall not consume any detector or device address from the loop capacity.

### BATTERIES:

1. The battery shall have sufficient capacity to power the fire alarm system for not less than twenty-four hours plus 5 minutes of alarm upon a normal AC power failure.
2. The batteries are to be completely maintenance free. No liquids are required. Fluid level checks for refilling, spills, and leakage shall not be required.
3. If necessary to meet standby requirements, external battery and charger systems may be used.
4. The Unit shall be UL / FM / VDS approved.

C.2 PUBLIC ADDRESS SYSTEM:

### General description

 The contractor shall design, supply, install, test, connect and commission a high quality fast-acting **Public Address and Voice Alarm System** complying strictly with BS 5839 part8 and EN60849 and shall be TUV or Equivalent Agency approved. The Public Address and Voice Evacuation System shall comprise of Audio Matrix Units, High quality speakers, Audio rack all mounted on a 19” Rack and fully connected and **integrated on the fire alarm loop**. The system shall be used for Professional Sound Reproduction for all the areas where possible special events take place.

 Prior to placing order for any equipment, the contractor shall submit comprehensive document comprising working drawings, catalogues and descriptive literature of components, acoustic calculation to meet with BS5839 part8 RASTI (Room Acoustic Speech Transmission Index) requirements of 0.5 on the STI scale and 0,7 on the CIS scale. The contractor shall be required to train and instruct client's personnel in the correct use, operation and supervision of the system, preferably prior to the handing over of the project.

 In order to ensure whole site integration capability, the fire and voice alarm system shall be executed by a single specialist local supplier who will be responsible along with main contractor for the design, global operation, management and interfacing of the system. The contractor shall make sure that all power tapping of the speakers must be carried out as specified and approved, even if the acoustic calculations indicates less power tapings. The contactor must endure minimum of 10dB above the ambient noise levels are achieved.

 The system shall be fully programmed to accommodate fire alarm and voice communication zones as indicated on the approved drawings and schematics. The system shall be configured to allow on site modifications with the minimum of disruption using the PC based software to facilitate future changes or alterations to the buildings.

 **APPLICABLE STANDARD:**

 EVAC Compliant with IEC/EN60849

 Loudspeakers -Rated power IEC 60286-Part 5

 Tested in accordance with BSEN60268-5

 Acoustic models ready for CATT, ULYSSES & EASE

 Compliant with BS5839 Part 8

 Battery backup/charger compliant with EN54 part 4

### Scope of Work

 The scope of work under this head shall include designing, supplying and installing of Public Address System. The work under this system shall consist of furnishing all materials, equipment’s and appliances and labor necessary to install the said system, complete with Speakers, Amplifiers, Microphone, Zone Selection Panel etc. for interfacing with other systems.

 The PA system shall be designed to serve the dual purpose of making general announcement and Voice Evacuation at the time of Fire alarm activation.

### System Design

The PAVA (Public Address/ Voice Alarm) system shall be connected on the same Fire Alarm loop with in-built isolators to protect the system in case of any cable faults. The system shall be de-centralized in nature, each distributed rack DAU (Distributed Amplifier Unit) shall have all the DSP (Digital Signal Processing), messages, amplifiers, monitoring etc. in such a way that it can work in a stand-alone mode in case the master rack is faulty or down.

The Man Machine Interface (MMI) shall be connected back to the control room, to monitor and control the entire PAVA system. The MMI shall be fully BS5839 part 8 and EN60849 compliant and TUV approved. The DAU shall play background / Foreground music and in case of Fire Alarm / Paging announcement, the system shall go to full power as programmed to provide the enough SPL (Sound Pressure Level) levels to comply with BS5839 part8, with minimum of 10dB above the noise levels.

All system components shall be digitally monitored including and not limited to, Messages, Amplifiers, and back up amplifiers, Speaker Circuits, Audio Matrix units, Paging Microphone, Battery Charger and the 230VAC line. Each amplifier / line circuit shall be monitored individually and shall report any faults back to the Master Audio Matrix Unit as well as the Paging Microphone.

The system shall be capable of sending messages automatically to any zone at any time interval, without affecting the music in the other areas. Each Zone and circuit speaker shall have separate amplifier, system sharing two amplifiers to multiple circuit speakers are not acceptable. There shall be one back up amplifier for every eight amplifiers, the system shall automatically change over to the back up in case of any amplifier failure, and the backup amplifiers shall be monitored as well. In case of any system component failure, the paging microphone shall override any defective unit and provide paging to the required zone. The System can provide any Cause & Effect programs after integrating with the Fire Alarm System, thus Alert/Evacuate messages can be programmed and delayed as well as played on any zone / floor as per the Cause & Effect approved by the Engineer.

The Battery Backup shall provide 24 hours of back up and 30 min of alarm operation. The power supply / charger must comply with EN54 part 4 and shall be 19” rack mounted. Battery calculation must strictly comply with BS5839 part 8 and shall be based on the amplifier size and not the speaker circuit load.

The PAVA system shall be properly integrated with the fire alarm system. The integrated PAVA system shall cover all normally accessible areas including the car parks. All stair cases shall have dedicated zone riser. The system shall be capable of being used for everyday background music and public announcement duties with the fire alarm initiated emergency announcements overriding all other facilities. Initiation of voice alarm shall take immediate priority and shall cancel all other PA operations.

In addition, a FIRE DRILL, BOMB ALERT, EARTHQUAKE ALERT and an ALL CLEAR message shall be incorporated into the operation. A fire alarm broadcast signal shall cancel any public address operation and shall override it. When a fireman’s microphone is operated, this shall override any automatic voice alarm signal being transmitted to the zone selected. The Alert and Evacuate pre-recorded messages shall be maintained in other zones while live voice fire announcements shall be broadcast to selected loudspeaker zones as per requirement.

All amplifier gain shall be monitored and measured for open, short or earth faults. The Entertainment Rack shall be located in the Control/Security Room enabling the operator to select music from the CD player, FM tuner or the double cassette deck to transmit music to selected zones or all the zones in the building from the touch screen paging microphone. A public address announcement shall override the music transmission to selected zones or all zones. Paging any zone shall not interrupt music in other zones. The Speakers shall be distributed in the entire floor and shall be configured in different zones. The announcement shall be made in zone wise or to all the speakers simultaneously in ALL CALL mode. Fire Alarm shall be announced immediately on receipt of Fire signal from the panel to all zones or group of Zones.

**System shall have following functions:**

1. Voice Evacuation and Public Address system integration includes paging system and background music system.
2. Monitoring of microphone, controller, amplifier, fireman microphone, source modular, and amplifier changeover, AC&DC power Supply, Loudspeaker Line and Volume Control.
3. The Amplifier shall be used only Class-D with Digital switching power technology
4. System shall have facility for Backup amplifier for at least one backup amplifier over Working Amplifier.

### Amplifiers

All amplifiers shall be power amplifier with High quality speech and Music broadcast. The power amplifiers shall have adequate continuous (RMS) power output to meet the requirement of the configuration. The unit shall be capable of delivering the rated output power with less than 0.1% harmonic distortion in the design bandwidth. The amplifier shall have a broad band frequency response of 40 Hz to 20 KHz. The output voltage and impedance shall meet with the system requirements. Amplifiers shall be protected against over loads and output shorts and a special thermal overload on the heat sink.

The Amplifier shall be Class –D Amplifier and shall have one channel, Two Channel, Three Channel and four channels and each channel have rated power 120/240or 500W. The Amplifier shall have switch power technology for power electricity saving, Separate PFC design for highest reliability, separate power supply system for each channel, Separate cooling system etc. and sleep mode shall automatically be enabled when no signal input is detected.

Amplifier shall have AC 100V or 230V power supply and DC 24V input, having separate fuse for each channel. The Amplifier shall be connected through balanced audio input and shall work on 100V Speaker Line.

**Technical Specifications**

* Rated Output Voltage(RMS) 120/240/500W or 2x120/2x240/2x500

4x120/4x240/4x500W

* Amplification Class-D
* Battery Voltage 24VDC (max 10% déviation)
* Frequency Response 40Hz to 20KHz
* S/N Ratio >90 dB
* Total Harmonic Distortion <0.1% @ 1kHz
* Power Efficiency >80%
* Approval EN

### Speakers

1. Speakers shall be especially designed for broadcasting high quality, integrated emergency fire alarm signals and voice communications and approved by an appropriate authority for use in such situations.
2. Speakers shall be ceiling, wall mounted or Horn Speaker as per approved drawings and shall be completed with mounting brackets accessories etc. Speakers shall be in metal enclosures only.
3. Speakers shall be of high efficiency providing maximum output at minimum power across 120 – 14000 Hz frequency range for Indoor Speakers. Speakers shall have a line matching transformer for direct connection to amplifiers with multiple taps.
4. Speaker external appearance shall be approved by Owner/PMC.
5. Speakers shall be interconnected in the zone configuration.

### **5.1 6W Ceiling Mounted Speaker**

The ceiling mounted 6 W speakers shall be installed as per approved drawings. The speakers shall support EASE, CATT or ULYSSES models for acoustic studies. This means, the acoustic model shall be designed to simulate the sound quality and distortion prior to installation. The Speaker should be in compliance BS/EN 60065, 2003 and EMC (BS EN 61000-6-Part 1/2/3/4). The Ceiling speaker shall work on 100V line so that it can reduce line losses over long distance and allow easy parallel connection of multiple loudspeakers. The Speaker shall have multiple tapping for different application according to room size and ambient noise environment. The Speaker shall have aluminum grille and metal baffle and shall have spring clip clamp for easy installation.

**Technical Specifications**

* Rated power 6 W
* Tapings 100V line 6/3/1.5W
* Operation Voltage 100V or 70V
* Effective frequency ranges 120 ~ 14kHz (10% Variation allowed)
* SPL @ 1W/m >91 dB
* S.P.L., @Full power/ 1m, dB >100 dB
* Color White
* Ceiling Cut-out 170mm
* Dimensions 200 mm x 55 mm (10% Variation allowed)

### **5.2 6W Wall Mount Speaker**

The Wall mounted 6 W speakers shall be installed as per approved drawings. The speakers shall support EASE, CATT or ULYSSES models for acoustic studies. This means, the acoustic model shall be designed to simulate the sound quality and distortion prior to installation. The Speaker should be in compliance BS/EN 60065, 2003 and EMC (BS EN 61000-6-Part 1/2/3/4). The speaker shall work on 100V line so that it can reduce line losses over long distance and allow easy parallel connection of multiple loudspeakers. The Speaker shall have multiple tapping for different application according to room size and ambient noise environment. The Speaker shall have Metal grille and ABS Enclosure and shall be closed cabinet.

**Technical Specifications**

* Rated power 6 W
* Tapings 100V line 6/3/1.5W
* Operation Voltage 100V or 70V
* Effective frequency range 90 ~ 18kHz (10% Variation allowed)
* SPL @ 1W/m >90 dB
* S.P.L. ,@Full power/ 1m, dB >98 dB
* Color White
* Dimensions 285mm x 200mm x 85mm (10% Variation allowed)

### **5.3 10/20W Dual directional sound projection Speaker**

The speakers with 10/20W Output shall be installed as per approved drawings. The speakers shall support EASE, CATT or ULYSSES models for acoustic studies. This means, the acoustic model shall be designed to simulate the sound quality and distortion prior to installation. The Speaker should be in compliance BS/EN 60065, 2003 and EMC (BS EN 61000-6-Part 1/2/3/4). The speaker shall work on 100V line so that it can reduce line losses over long distance and allow easy parallel connection of multiple loudspeakers. The Speaker shall have multiple tapping for different application according to room size and ambient noise environment. The Speaker shall have metallic grille and metal baffle and shall have clamp for easy installation.

**Technical Specifications**

* Rated power 10/20W
* Tapings 100V line 5/10/20W
* Operation Voltage 100V or 70V
* Effective frequency range 110 ~ 15kHz (10% Variation allowed)
* SPL @ 1W/m >92 dB
* S.P.L. ,@Full power/ 1m, dB >102dB
* Color White
* IP Rate IP 66

### Remote Paging Microphone

The Remote Paging Microphone shall have following:

* Digital voice evacuation system remote paging microphone.
* Each microphone of 8 zone capacity.
* Zone expansion by connection with expansion unit.
* System indicators of AC, DC, fault, Mic status and test.
* 6 inputs & mic/line selection buttons.
* 8 zone selection buttons with three-colored indicators
* Reset/Cancel, All Call & Call buttons.
* Two RJ45 ports for input and link output.
* CAT5 or CAT6 cable communication up to 600 meters.
* AC 230V and DC24V battery inputs.
* Built-in monitor speaker.
* Voice Alarm Controller (VCA)
* Digital voice evacuation system all in one amplifier.
* Specifications shall meet the standards of BS EN54-32 & EN608409.
* EN54-16 standards certificate shall be under taken.
* Built-in 240W & 500 8 zone Class-D amplifier.
* Integration of EVAC system, paging system, PA system & BGM system together.
* Built-in two separate players for EVAC and alert voice message by SD card.
* Built-in 8 zone AB speaker line low impedance supervision.
* Built-in amplifier auto changeover into standby when fault.
* With external amplifier input to expansion the power.
* Capacity of connection 8 unit’s remote microphone.
* Red button EVAC message push to activate with priority except fireman mic.
* 8 zone speaker outputs with separate zone volume control.
* 8 zone separate indicator for EVAC, fault, music/paging & select.
* System indicators of AC, DC, fault and indicators for EVAC, alert & fireman mic.
* Zone capacity of 96 zones by cascaded 11 unit’s router.
* With 8 programmable control inputs and 8 programmable control outputs for voice evacuation system.
* With Fault, EVAC outputs and Reset input for third party system integration.
* With fireman microphone of highest priority.
* Priority level: fireman mic, EVAC, input 1, remote microphone, timer & BGM.
* Two combo inputs for mic/line, 4 line inputs and one REC output.
* Two RJ45 for cascade router, two RJ45 for remote microphone input and two RJ45 for LAN/WAN/Internet network.
* IP network module for optional to buy. The IP network
* AC 230V and DC24V battery input. Auto switch into the battery backup when AC fails.

**Technical Specification:**

* Description 8 Zone Voice Evacuation Amplifier
* Rated Power Output 240W
* Fireman Microphone 5Mv, 600Ω
* Line 1-2 Inputs 385mV, 10kΩbalanced Combo
* Line 3-6 Inputs 350mV, 10kΩ, RCA
* Frequency Response 80Hz~20kHz
* THD ＜1% at RMS,1KHz
* S/N Ratio >70dB
* Speaker Output 100V AB 8 zone speaker outputs
* REC Output 200mV
* Control Input & Output 8 programmable control inputs: Max 3.3V (voltage mode) or 0V

closed contact.

8 programmable control outputs: 0V closed contact.

Control output for fault & EVAC: 0V closed contact.

Reset control input: 0V closed contact.

* Voice Message MP3 or WMA format, two separate players of SD card with

protection cover, programmable voice message up to 255, 10 years valid

* Event Record HEX format, Hard Flash memory, events up to 1000 records, 10

 years valid

* Operation Environment Operation Temp: +5℃ ~ +40℃

Store Temp: -20℃ ~ +70℃

Operation Humidity: <95%

* Power Consumption 600W
* Power Supply AC230V or 115V & DC24V battery inputs, 50-60HZ

C.3 IP CCTV SYSTEM (FOR CONNECT TO CAMERA)

### Enterprise Class Video Management Server & Recorder

### **1.1 The Video Management Software**

It should support below basic functions:

1. The Video Management (VMS) should be a highly stable software, easy to use on any network and very easy to deploy with the advanced Auto Detection feature for IP cameras. It should be extreme flexible as it should be able to manage unlimited servers, sites, and cameras etc. remotely, quickly and efficiently.
2. The Video Management Server (VMS) should be an open architecture Video Management Software (VMS) for Windows. The Video Management Server (VMS) should accepts MJPG, MPEG-4 and H.264, as well as Full HD and megapixel video streams from Network (IP) cameras, encoders and capture boards. This, along with The Video Management Server (VMS) client-server architecture, should allow to build hybrid scalable solutions from a single NVR/DVR to multiple servers handling thousands of cameras.
3. The Video Management Server (VMS) should be Optimized and designed for Microsoft Windows Server 2008/2012 / Windows 7/8.1/Windows 10.
4. The Video Management Server (VMS) should support multiple client options Web client, The Video Management Server (VMS) Mobile client app for IOS, and Android. Web client for The Video Management Server (VMS) Streaming Server supports Chrome, Firefox, Safari, iOS, Android, etc.
5. The VMS should support Enterprise Scalability and Monitoring: All functions such as: Screen Mapping, Layout Sequencing, Alert Notifications, PTZ Control, Camera Configurations and more without exception may be accessed and administered both locally and remotely allowing management and administration for an unlimited number of servers around the world. Flexible Event & Action configurator enables should allow to manage events and notifications such as emails, text messages and more tasks for multiple servers from a single interface.
6. The Video Management Server (VMS) API/SDK should be Included: The VMS should allow to integrate third party applications. Custom programming and exclusive features also available. The Video Management Server (VMS) offers customizable integration with other software systems in form of software development kit (SDK), The Video Management Server (VMS) Client Kit.
7. **The Video Management Server (VMS) simplified HTTP API** should allow implementation of many different features for third party applications and systems.

### **1.2 Video Support**

1. Supported codecs: H.264, MPEG4, MJPEG, JPEG, MxPEG
2. RTSP, HTTP, and native video transport supported
3. Configurable compression, resolutions, FPS, bitrate (exact available settings depend on camera)

### **1.3 Support for IP and Analog Devices**

* 1. Support of wide range of IP cameras and video encoders: all IP cameras on the LAN shall be configured via Auto Search Wizard. Using the Wizard, a user shall be able to find all Network IP cameras available within the network.
	2. Each camera should be individually configurable
	3. Support for video, audio, hardware-side motion detectors and digital I/O
	4. For IP Camera compatibility, follow link
	5. ONVIF Profile S support
	6. Generic drivers (RTSP, MJPEG, PSIA, ONVIF)
	7. Support for Direct Show compatible devices: the list of these devices includes everything from very basic USB cameras to camcorders to advanced multichannel video capture boards. These devices shall be used alone or together with supported hardware and/or IP cameras, including GigE cameras installed via DirectShow driver.
	8. Capture boards
	9. External I/O devices via TCP/IP
	10. Video streaming from Android and iOS phones and tablets
	11. Camera search (automatic discovery)
	12. Single and multiple (bulk) device configuration

### **1.4 Archive Recording**

1. Channel replication (backup)
2. Flexible recording setup
3. Sub streams
4. Audio
5. Schedules
6. Reduced frame rate
7. Dedicated storage
8. Recording by motion and alarms of different kinds (DI, VIDEO ANALYTICS events, custom events)
9. Bookmarks

### **1.5 Edge Recording Support**

 For ONVIF Profile G conformant devices

### **1.6 Recording Options**

1. Recording of video, audio, DI event streams
2. Configurations and profiles
3. Pre- and post-recording for event-based recording plans
4. Automatic triggering of unlimited number of recording profiles for a wide variety of events
5. Manual controlling of recording profiles via The Video Management Server (VMS) Monitor application, e.g., emergency recording start/stop
6. Duration and storage quotas
7. Configurable storage cleanup hours
8. Schedules
9. Individual stream quotas for storage and duration
10. Fully independent recording, storage and quota setup for dual streaming (main and secondary stream)

### **1.7 Watchdog**

1. Protects the software from certain types of failures by automatically attempting to restart the service and the server machine, if required
2. Scheduled restarts (default maintenance restart period is one week) with configurable time limitations
3. Operates based on the software and system overall health monitoring
4. Default trigger values selected based on extensive tests run on systems of different configuration and stability levels
5. Configured for each server independently
6. Logging of watchdog activity

### **1.8 Motion Detector**

1. Camera-side motion detection support for most devices: analysis of raw (non-compressed) video stream on the device side decreases resource usage on the server side and provides best detection results
2. High performance software motion detector mode: analysis of key frames only, lower CPU and memory usage, limited accuracy
3. High accuracy software motion detector mode: analysis of the whole video stream, maximum accuracy for motion detection on a compressed video stream. Recommended for use cases where motion shorter than 1 second must be detected.

### **1.9 Software for VIDEO ANALYTICS Support**

Software should have provision for VIDEO ANALYTICS Support (additional license shall be provided if required) as mentioned below:

1. Video Analytics with DATA MINING Filters
2. No extra hardware required
3. Counting lines
4. Camera Tamper Detection
5. Camera Shake Cancellation
6. Surveillance tracker
7. Presence filter
8. Appear and Disappear Filters
9. Abandoned Object Detection
10. Removed Object Detection
11. Class and speed filters + calibration
12. Direction & dwell filters
13. Tail-gating filter
14. On-screen counters
15. Object Meta data
16. Counting (people, cars, object counting): highly accurate information on the number of people who enter their premises to use their facilities. It can apply to different applications, such as airports, bus and train stations, bars and clubs, car parks, retail stores and shopping malls, museums and tourist attractions, sports and leisure facilities, and many more.

### **1.10 Events & Actions (E&A)**

1. Send emails notifications: text macros are supported for automatic insertion of such data as timestamp, event source etc.
2. Send custom notifications via Run third party program feature, for example, using telnet or generic socket connections
3. Events: Disk Excluding, Video Lost, Video Restored, Motion Events, VIDEO ANALYTICS Events, Digital Input, user's events, scheduled event (clock event)
4. Actions: PTZ preset, Digital Output, Write to Application/Event log, Activate Layout, Popup Live Channel/Layout, Email notification, Run program, Activate Recording profile for dual streaming.

### **1.11 Highlight Camera on the Map**

1. Multiple SMTP server configuration: use many different email servers
2. Rule schedules: configured rules can be triggered on weekends or working days only, or follow a fully custom time schedule
3. Global events: share events between servers and make events from one server trigger actions on another one
4. Rule combining (conditions): use two events (event conditioning) to trigger a single action
5. Event postponing and aggregation (timers): action execution may be postponed for the required amount of time
6. Single event can trigger an unlimited number of actions

### **1.12 Audio Support**

1. Receive audio from device: supported compressions are G.711 (PCM a-law and u-law) and raw audio.
2. Transmit to device (two-way audio)
3. External audio source support (microphone connected to the server directly or using additional hardware)

### **1.13 Organizations**

1. Enterprise feature for hosted solution providers or projects that require splitting of resources on a logical basis
2. Sub-administrator role with the ability to create/manage new user accounts inside the organization and manage resource permissions
3. Resource management: channels, sub-admins and regular users can be assigned to organizations

### **1.14 Failover Clustering**

1. Failover setup for recording servers
2. Unlimited number of failover clusters and failover nodes (servers) available for The Video Management Server (VMS) Global without any extra fee
3. 1-to-many, many-to-1 configurations supported
4. Automatic failover server start in case of a failure with an option to define time for failover event triggering
5. Failover server can be forcibly (manually) started to take over operation of a recording server, allowing server hardware maintenance procedures without any system downtime
6. Real-time node status monitoring

### **1.15 Multicast Support**

1. Video via multicast from cameras to server(s)

### **1.16 Networks**

1. Enterprise feature for sites with multiple different networks: provides centralized connection via central server address
2. TCP/IP routing configuration for The Video Management Server (VMS) Global installation
3. Makes system infrastructure transparent for the user

### **1.17 Groups**

1. For easy resource management
2. Grouping available for: servers, users, devices, channels, e-maps, shared layouts, layout templates, video walls, user buttons Visual groups for resource arrangement in The Video Management Server (VMS) Monitor application

### **1.18 Users**

1. User details: login, password, email, organization attachment, PTZ priority
2. Resource permissions for organizations, servers, networks, devices, channels, e-maps, user buttons, layout groups, video walls
3. Membership in groups, nested and/or overlapping groups can be configured
4. Virtually unlimited number of user

### **1.19 AD & LDAP**

1. Export of users from Active Directory
2. Support for Active Directory groups
3. Automatic synchronization for the deleted and newly created users

### **1.20 Health Monitoring**

1. Real-time monitoring for servers, devices, channels, user sessions, video walls and external services (LPR, FR)
2. Connectivity, failover, video stream status

### **1.21 Audit Log**

1. Logging of important events, such as: user log in/log out, administer server, access live/recorded video, server connected/disconnected, configuration added
2. Event reports for servers and users
3. Event filtering by period, by event or by server/user
4. Audit export to a CSV file

### **1.22 E-Maps**

1. Group and organization attachment
2. All popular image types supported: JPG/JPEG, PNG, TIF, BMP, static GIF
3. Images of size up to 8.25 megapixels
4. Markings for devices, user buttons and links to other maps for easy navigation
5. Variety of icons and colors to choose from for each object placed on the map

### **1.23 Layout Templates**

1. Custom layout templates for the Video Management Server (VMS) Monitor application
2. Up to 20 rows/columns, up to 100 viewports per layout in total
3. Groups for sharing layouts between multiple The Video Management Server (VMS) Monitor applications throughout the whole system

### **1.24 User buttons**

1. Manual action controls for The Video Management Server (VMS) Monitor: user buttons are used to manually trigger events, which can be linked to any available action including DO control, activation of recording profiles, notifications
2. Schedules, timers and conditions can be applied in the Event & Action Configurator for user button related rules just as for any other regular Event & Action scenarios.

### **1.25 External services**

* 1. LPR - License Plate Recognition software (separate application)
	2. FR - Face Recognition module (separate service)
	3. HTTP API interface for third party integration and events' exchange - e.g., access control systems, POS systems, building management systems etc.

### **1.26 Client Application**

1. Free distribution - license free application
2. Multiple servers can be connected to a single The Video Management Server (VMS) Monitor
3. Multiple displays for live view and main multi-purpose window
4. Configurable viewport overlay controls in live mode
5. Configurable viewport overlay controls in playback mode
6. Snapshot and video export

### **1.26 Live View**

1. Live video streaming to one or multiple client applications without delays
2. Dual streaming support with automatic switching mode for optimal resource and bandwidth usage
3. Two-way audio support
4. Global and individual stream aspect ratio

### **1.27 Instant Playback**

1. Playback of the newest footage simultaneously with the live view
2. Supported for one or multiple viewports

### **1.28 Archive Playback**

1. Multichannel playback
2. Channel layout is retained from live view mode
3. Dual timeline presenting the currently selected channel and the summary for all channels present on the layout
4. Up to 32x speed playback in both directions
5. Video, audio and motion marking on the timeline
6. Controls for browsing timeline in both directions
7. Snapshot and video clip export
8. Bookmarks

### **1.29 Sequence Explorer**

1. Footage sequencing: splitting the video from specified time range into specified number of pieces
2. Quick visual investigation of the footage by the means of repeated sequencing, down to 2 minutes each portion of footage
3. Smart search by motion region

### **1.30 Joysticks and DCZ Support**

1. Default set of commands for keyboards and DCZ keyboards
2. Custom command mapping for any type of keyboard/joystick
3. Generic DirectShow compatible controller devices are supported
4. Multiple application windows can be controlled with joysticks and DCZ keyboards

### **1.31 Operation Modes**

1. Exclusive: application shall not allow accessing other applications until a pre-defined password is provided
2. Always on top: application window stays on top of other windows
3. Locked: application controls shall not be available until a pre-defined password is provided
4. Combined settings for operation modes
5. Startup operation mode setting
6. Screen saver overriding

### **1.32 Screen Layouts**

1. Built-in layout templates for each Monitor application
2. Custom layouts that can be saved locally on the client workstation or shared via central server
3. Shared layouts: layouts are shared between all Monitor applications via central server
4. Individual viewport settings in the live view are saved with the layout
5. PTZ presets and DPTZ positions for each individual camera are saved with the layout
6. Layout sequences: automatically loaded series of layouts with the possibility of manual control and controllable time per layout

### **1.33 PTZ**

1. Generic PTZ: pan, tilt and zoom controls available for PTZ-capable devices
2. PTZ controls for Monitor as well as for The Video Management Server (VMS) Mobile and Web clients
3. DCZ keyboard and generic joystick support for PTZ control and related actions, such as calling presets
4. HUD: Heads Up Display control overlay for Monitor application
5. PTZ controls can be hidden via application settings for Monitor
6. Presets
7. Preset positions for each camera are saved with the layout
8. PTZ Tours: custom sets of presets for the PTZ camera to follow

### **1.34 Digital PTZ**

1. Supported for any video stream
2. For live view and playback modes
3. DPTZ settings saved and loaded with the layout
4. Single video stream can be displayed multiple times with different regions of interest

### **1.35 Fisheye Dewarping**

1. Generic dewarp for any fisheye image
2. Configurable via The Video Management Server (VMS) Console application
3. Region mode, 180-degree and 360-degree panorama
4. Immersion Enables® Panomorph lens support

### **1.36 E-Maps**

1. Can be displayed in any viewport just like any regular channel
2. Map contents shall be interactive: it shall be possible to click the markers on the maps to display related contents, e.g. other maps and channels, and to trigger custom actions assigned to user buttons placed on the map

### **1.37 Alerts for server connection errors and user actions**

### **1.38 Library**

1. Pre-configurable library directory
2. Pre-configurable default settings for snapshot and video export

### **1.39 External Services**

1. Representation of data from LPR, FR and third-party integrations

### **1.40 Video Wall**

1. Convenient management of monitoring workstations in big installations with large number of displays
2. Unlimited number of video walls - no extra fee
3. Up to 100 physical displays per each video wall - up to 20 rows/columns and up to 100 viewports per layout
4. Send individual channels to the video wall manually via user interaction from the The Video Management Server (VMS) Monitor application or automatically via Event & Action scenarios, including half-automated solution with user buttons

### **1.41 Watermark Validation**

1. All data is signed while received and recorded
2. AVI and JPEG codecs
3. Portable tool

### **1.42 SDK (**Software Development Kit)

1. Client Kit API for customizable integrations with third party software systems, available functionality:
	* 1. Access live video from one or multiple local or remote servers
		2. Access archived video from servers
		3. Configure camera and recording settings
		4. Receive motion detection notifications
		5. Create and delete media devices
		6. Adjust software motion detector properties
		7. Receive motion region information for media device
		8. Export archive video (with optional subtitles if exported with recompression)
		9. Pan/tilt/zoom/focus (PTZF) control motorized and otherwise PTZF-enabled cameras
2. Client Kit API requires two ActiveX components to be installed: CDVR Client Kit and Screen
3. Client Kit API Is based on Microsoft Component Object Model (COM) technology and can be used with various development environments
4. Microsoft Visual Studio .NET (VB.NET, C#, C++) and earlier versions (VB), Borland/Inprise Delphi
5. Simplified HTTP/CGI API - Already included in the software installation

### **1.43 Mobile Applications**

1. Android & iOS ready
2. Live video streaming
3. Video playback - access to recorded video streams
4. Two-way audio
5. PTZ control for live view: pan, tilt and zoom for PTZ-capable devices
6. Chrome cast support
7. Live video and audio streaming from mobile app to the server
8. No stream re-compression on the server side - no extra CPU usage
9. Main and sub stream switching
10. 1x1, 2x1, 2x2 and 3x2 stream layouts
11. Snapshot saving
12. Multiple server setup
13. Built-in and Active Directory user login
14. Connect over Wi-Fi, 3G and 4G

### **1.44 OS X Client**

1. Live video streaming
2. Video playback - access to recorded video streams
3. Two-way audio
4. PTZ control for live view: pan, tilt and zoom for PTZ-capable devices
5. Chrome cast support
6. No stream re-compression on the server side - no extra CPU usage
7. Main and sub stream switching
8. 1x1, 2x1, 2x2 and 3x2 stream layouts
9. Snapshot saving
10. Multiple server setup
11. Built-in and Active Directory user login
12. Connect over Wi-Fi, 3G and 4G

### **1.45 Web Client**

1. Local and remote access via dedicated configurable HTTP port
2. Live video streaming to browser Client application
3. Access to recorded video streams
4. Pan, tilt and zoom control for PTZ-capable devices
5. 1x1, 1x2, 2x1, and 2x2 stream layouts
6. Main and sub stream switching
7. No stream re-compression on the server side - no extra CPU usage
8. Built-in and Active Directory user login

### **1.46 LPR (License Plate Reader)**

1. Designed to detect, recognize and register vehicle license plates with a high level of reading reliability
2. Intuitive installation process
3. Designed to work with The Video Management Server (VMS) with both live and recorded streams
4. Works with any camera The Video Management Server (VMS) supports
5. Live result presentation in VMS.
6. Result browsing in The Video Management Server (VMS)
7. Can be used for vehicle access, traffic control and enforcement applications
8. High performance recognition with low error rate
9. Recognizes license plates from multiple countries
10. Recognition area adjustment for system load optimization
11. Lighting conditions adaptive algorithm
12. Support for local and remote unlimited “White” and “Black” lists
13. Result re-filtering
14. Interface to external applications and devices
15. Storing recognized license plates and snapshots on local or central database
16. No imposed limitation on the number of cameras

### **1.47 Face Recognition**

1. Designed to work with The Video Management Server (VMS) Premier and The Video Management Server (VMS) Global
2. Suited for human resource control applications as well as for security and enforcement applications
3. Simultaneous multiple face recognitions
4. 1-to-1 and 1-to-N face matching modes
5. Simple interface
6. Simultaneous processing of multiple video streams
7. Connection to one or more The Video Management Server (VMS) servers
8. Local or central database

###  24 port access Switch

* Switch should be Enterprise grade switch.
* Port type/density: 24 port 10/100/1000 Base T with Poe+ (802.3at) and 4 SFP (total active 28 Ports)
* Switch should support single IP management of minimum 8 switches or more
* End user can be authorized via IEEE 802.1X, MAC address or web based authentication.
* Non-blocking switch with support for Redundant Power supply and PoE Budget of 100W
* Switches can be managed via the CLI or the excellent web interface.
* Command Line Interface (CLI) with four access levels
* Multi–configuration File Support
* Full/half duplex auto – sense support on all ports (Auto – MDIX)
* One–to–One and Many–to–One Port Mirroring Port Description
* IGMP Snooping v1/v2/v3
* MLD Snooping
* Mixed Queuing Control – Strict and Weighted Round Robin
* TACACS+ authentication
* SYSLOG – up to 4 servers supported Authentication, Authorization and Accounting (AAA) management
* RMON (Stats, History, Alarms, Events)
* RADIUS Accounting for network access
* Dual IPv4/IPv6 Management Support
* Should support 16 K MAC address
* Secured Socket Layer (SSL v3)
* Denial of Service (DoS) Attack Prevention
* BPDU Attack Protection
* Multi–user Authentication Per Port.
* Web–based Port Authentication
* Should support 8 QOS Queues per port and 250 active Vlans, Support for multiple queuing control Should support ingress and egress bandwidth control with 64 kbps granularity
* Should support IP source Guard, Arp Spoof protection, Loopback detect, DHCP snooping
* Should support CFM and OAM tools and Cable Diagnostics in the PHY for detecting Copper Cable issues
* Should support one to many mirroring and remote mirroring/ RSPAN
* Should support Private Vlan for port isolation, MAC based VLAN, Protocol Based Vlan / 802.1V and IEEE 802.1 Q-in-Q
* Should support Static Routes for IPv4 and IPv6, DHCP relay/ Helper
* Should support 802.1x, EAP, Local Data Base for authentication
* Should also Support Web based Authentication for port access for guest access
* Should support traffic analysis with sFlow/Netflow
* Should support minimum 12K Jumbo Frame
* Should be IPv6 ready in hardware and software from day 1, TELNET, Web, SSL, SNMP, and SSH over IPv6
* Should support ACL rules for L2, L3, L4 and also user defined packet content
* Should support G.8032/ ERPS for fast recovery
* Link Aggregation support 802.3ad
* IEEE 802.1p – Traffic classification
* Should support multiple config file and auto configuration for ease of management
* Should be equipped with minimum128 MB RAM and 32 MB flash or more
* Operating Temp: 0° C to +50° C
* Packet Buffer 1.5 MB or more
* MTBF (Mean Time before Failure) to be provided by the OEM. Should be minimum 500 khr or more
* Humidity 5 to 95 % non-condensing
* Should be supported for 5 years by replacement from direct OEM depot in India
* Should have operational India Toll free support number
* OEM should be present in India with RND operation (Office address should be provided in website) for atleast past 5 years

### Indoor/Outdoor Dome Cameras

### **3.1 Network, Outdoor DOME type, Mega-Pixel True Day/Night, Surveillance**

1. The camera shall be designed to provide advanced image support for resolutions up to 3MP
2. The camera shall provide dual-codec functionality, for simultaneous transmission of H.264 and Motion JPEG (MJPEG) video (2nd stream only)
3. The camera shall be designed to provide H.264 compressed video of up to 3MP, resolution at image rates up to 30 frame per second & 2MP at 60 fps
4. The camera shall use a high-quality 1/2.8” Progressive Scan CMOS image sensor.
5. The camera shall be designed with an integrated f 3~10.5mm motorizes Varifocal lens with P-iris
6. The camera shall provide Color pictures in light as low as 0.81 lux
7. The camera shall provide B&W pictures in light as low as 0 lux IR ON
8. The camera shall be capable of accepting a power source from either 12VDC, 24VAC or IEEE 802.3af Power-over-Ethernet (PoE).
9. The camera shall be capable of transmitting analog PAL or NTSC (1Vp-p) video for setup and installation purposes.
10. IP66 of weather rating shall be supported.
11. 18 IR LEDs shall be equipped as IR illuminator

### **3.2 Adjustments and Features**

1. Progressive Scan CMOS technology for optimal image clarity.
2. 2048 x 1536 maximum resolution at 30 fps &1080p 60fps
3. Provides True Day/Night functionality, allowing automatic switching between Color mode and B&W mode, as well as removal of an IR cut filter for enhanced low light performance.
4. Camera shall have integrated, programmable motion detection, with up to four (4) user-defined detection zones, and the ability to map each detection zone to be able to trigger a recording event and/or analog alarm output from the camera unit. Each zone can be configured with a 10-level sensitivity setting.
5. The camera shall support Back Light Compensation (BLC).
6. The camera shall provide motorized Varifocal lens, which allows the user to adjust the lens focal length and focus remotely from a web-browser or any supported NVR software.
7. Two (2) authority levels of user privileges shall be available:
* Admin level shall have full access to all functions.
* User level will be restricted to monitoring live video only.

### **3.3 Video Requirements and Adjustments**

1. Minimum Adjustments and Requirements
2. Imager: Progressive Scan 1/2.8” CMOS Sensor.
3. Pixels: up to 206460(H) x 1552(V) effective picture elements
4. Resolution:
	* + 2048 x 1536 @ 30fps
		+ 1920 x 1080 @ 60fps
5. Iris ControlP iris lens shall be installed. P iris technology shall give a best resolution at any light condition.
6. Optical Field of view: 84 / 61 / 94º (wide) 30 / 23 / 37º (tele)
7. Optical Zoom (3.5X) &Digital 2~10x zoom shall be available from Client Software on Internet Explorer.
* Minimum Illumination (color/day mode) : 0.81lux
* Minimum Illumination (B&W/night mode): 0 lux IR ON
1. Shutter: Electronic range (in seconds) of 4, 1/10, 1/12.5, 1/20, 1/25, 1/30, 1/50, 1/60, 1/100, 1/120, 1/240, 1/480, 1/960, 1/1024, 1/2000,1/5000 max
2. The camera shall provide selectable White Balance settings include Auto-tracing White (ATW), control with Preset.
3. The camera shall support Backlight Compensation (BLC) & DEFOG
4. Electronic iris: Selectable On/Off.
5. Day/Night: Selectable Auto/Color/Black & White.
6. AGC Gain: Selectable On/Off. Adjustable gain control in ‘Off’ mode.
7. True WDR >120 dB
8. In-built ceramic Heater & Fan

### **3.4 Operating Environment**

1. PC: IBM PC/AT or compatible.
2. Operating Systems: Windows XP Professional (32-bit), Windows Vista, Windows 7.
3. CPU: Pentium (or equivalent) 2.80GHz (or higher).
4. Memory: 1GB (or higher).
5. Network Interface: 10/100/1000 Base-Tx (up to 1Gigabit operation) (RJ-45 connector).
6. Graphics Chip: NVIDIA GeForce 8500GT 256MB (or higher).
7. Web Browser: Internet Explorer 7.0 (or higher).

### **3.5 Network Interfaces**

1. Protocols supported: IPv4/6, HTTP, SMTP, UPnP, DNS, DDNS, NTP, RTSP, RTP, TCP, UDP, IGMP, RTCP, ICMP, DHCP, and ARP.

### **3.16 Camera IP interface:**

1. RJ-45 10/100 Base-Tx, PoE compatible.
2. The camera shall interface to:
* Microsoft Internet Explorer 7.0, or above.
* Compatible PDA / smart phone
* When accessed from a browser online, the camera shall provide a web-based graphical user interface and menu system, for viewing and configuration of the camera.
* Web access protected by user ID and password. The camera shall maintain an event log which includes all remote login events.
* Up to 4 users may access a camera via the web server simultaneously.
* One (1) alarm input (NO/NC) shall be provided.
* One (1) alarm output (NO/NC) shall be provided.
* One (1) audio input (mono, line-level, unbalanced) shall be provided.
* The camera shall support both static IP addresses and dynamically-assigned IP addresses provided by a Dynamic Host Control Protocol (DHCP) server.
* Third party application integration of the camera is supported via HTML Application Programming Interface (API), which would provide the necessary information and command lines for accessing the camera using command lines or third-party software application.
* This device is certified ONVIF compliant (conformant), allowing it to be accessed using a generic ONVIF device driver.
* This device has the ability to upload still snapshot JPEG images to an FTP site, based on user-defined events or regularly upon scheduled intervals.
* This device supports Micro-SDHC cards from most major brands, capacity up to 32GB

### **3.7 Environmental**

1. Operating Temperature: (not cold start): -40ºC ~ 50ºC (-40ºF ~ 122ºF) RH less than 90% (non- condensing)
2. Weather rating : IP66, IK 10 housing

### Bullet Cameras

### **4.1 Network, Outdoor Bullet type, Mega-Pixel True Day/Night, Surveillance**

1. The camera is designed to provide advanced image support for resolutions up to 3MP
2. The camera provides dual-codec functionality, for simultaneous transmission of H.264 and Motion JPEG (MJPEG) video (2nd stream only)
3. The camera is designed to provide H.264 compressed video of up to 3MP, resolution at image rates up to 30 frame per second & 2MP at 60 fps
4. The camera uses a high-quality 1/2.8” Progressive Scan CMOS image sensor.
5. The camera is designed with an integrated f 3~10.5mm motorizes Varifocal lens with P-iris
6. The camera shall provide Color pictures in light as low as 0.81 lux
7. The camera shall provide B&W pictures in light as low as 0 lux IR ON
8. The camera shall be capable of accepting a power source from either 12VDC, 24VAC or IEEE 802.3af Power-over-Ethernet (PoE).
9. The camera shall be capable of transmitting analog PAL or NTSC (1Vp-p) video, for setup and installation purposes.
10. IP66 of weather rating is supported.
11. 42 IR LEDs are equipped as IR illuminator
12. Progressive Scan CMOS technology for optimal image clarity.
13. 2048 x 1536 maximum resolution at 30 fps.
14. Provides True Day/Night functionality, allowing automatic switching between Color mode and B&W mode, as well as removal of an IR cut filter for enhanced low light performance.
15. Camera shall have integrated, programmable motion detection, with up to four (4) user-defined detection zones, and the ability to map each detection zone to be able to trigger a recording event and/or analog alarm output from the camera unit. Each zone can be configured with a 10-level sensitivity setting.
16. The camera shall support Back Light Compensation (BLC).
17. The camera shall provide motorized varifocal lens, which allows the user to adjust the lens focal length and focus remotely from a web-browser or any supported NVR software.
18. Two (2) authority levels of user privileges shall be available:
* Admin level shall have full access to all functions.
* User level will be restricted to monitoring live video only.

### **4.2 Video Requirements and Adjustments**

1. Imager: Progressive Scan 1/2.8” CMOS Sensor.
2. Pixels: up to 206460(H) x 1552(V) effective picture elements
3. Resolution: 2048 x 1536 @ 30fps, 1920 x 1080 @ 60fps
4. Iris Control: P iris lens is installed. P iris technology gives a best resolution at any light condition.
5. Optical Field of view: 84 / 61 / 94º (wide) 30 / 23 / 37º (tele)
6. Optical Zoom (3.5X) is available from Client Software on Internet Explore
7. Minimum Illumination (color/day mode): 0.81lux
8. Minimum Illumination (B&W/night mode): 0 lux IR ON
9. Shutter: Electronic range (in seconds) of 4, 1/10, 1/12.5, 1/20, 1/25, 1/30, 1/50, 1/60, 1/100, 1/120, 1/240, 1/480, 1/960, 1/1024, 1/2000.
10. The camera shall provide selectable White Balance settings include Auto-tracing White (ATW), and Manual control with Preset.
11. The camera shall support Backlight Compensation (BLC) & DEFOG
12. Electronic iris: Selectable On/Off.
13. Day/Night: Selectable Auto/Color/Black & White.
14. AGC Gain: Selectable On/Off. Adjustable gain control in ‘Off’ mode.
15. True WDR >120 dB
16. Inbuilt ceramic Heater & Fan

### **4.3 Network Interfaces**

1. Protocols supported:
* IPv4/6, HTTP, SMTP, UPnP, DNS, DDNS, NTP, RTSP, RTP, TCP, UDP, IGMP, RTCP, ICMP, DHCP, ARP.
1. Camera IP interface: RJ-45 10/100 Base-Tx, PoE compatible.
2. The camera shall interface to:
* Microsoft Internet Explorer 7.0, or above.
* Compatible PDA / smart phone
1. When accessed from a browser online, the camera shall provide a web-based graphical user interface and menu system, for viewing and configuration of the camera.
2. Web access protected by user ID and password. The camera shall maintain an event log which includes all remote login events.
* Up to 4 users may access a camera via the web server simultaneously.
* One (1) alarm input (NO/NC) shall be provided.
* One (1) alarm output (NO/NC) shall be provided.
* One (1) audio input (mono, line-level, unbalanced) shall be provided.
1. The camera shall support both static IP addresses and dynamically-assigned IP addresses provided by a Dynamics Control Host Protocol (DHCP) server.
2. Third party application integration of the camera is supported via HTML Application Programming Interface (API), which would provide the necessary information and command lines for accessing the camera using command lines or third-party software application.
3. This device is certified ONVIF compliant (conformant), allowing it to be accessed using a generic ONVIF device driver.
4. M. This device has the ability to upload still snapshot JPEG images to an FTP site, based on user-defined events or regularly upon scheduled intervals.
5. This device supports Micro-SDHC cards from most major brands, capacity up to 32GB.

### **4.4 Environmental**

1. Operating Temperature: (not cold start):-40ºC ~ 50ºC (-40ºF~122ºF )　 RH less than 90% ( non-condensing)
2. Weather rating : IP66

### Network High Definition PTZ Camera

5.1 The camera shall:

1. Be designed to provide H.264 and Motion JPEG (MJPEG) video.
2. Be designed to support resolutions up to 1920 x 1080 pixels.
3. Be designed to provide video at 25/30 frames per second (fps) for all resolutions.
4. Provide an embedded web-server.
5. Be equipped with a slot for microSD/SDHC memory card.
6. Support Power over Ethernet (PoE) as a power source or 24VAC or 12VDC.
7. Be designed to meet IP66 level of dust and water proofed.

5.2 The camera shall meet or exceed the following specifications:

1. 1 / 2.8" progressive scan CMOS sensor
2. IR-cut filter
3. Manual & auto iris lens
4. 30x optical zoom lens & 12x digital zoom
	* + Focal length 4.3 mm (wide) to 129.0 mm (tele)
		+ F1.6 (wide) and F4.7 (tele)
5. Angle of view
	* + 63.7°(wide) and 2.3°(tele)
6. Minimum Illumination
	* + Day mode (Color): 1.4lux at F1.6 (with IR-filter in use)
		+ Night mode (Black and White): 0.05 lux at F1.6 while
7. Pan, Tilt and Zoom
	* + Zoom Ratio: Optical 30x, Digital 12x
		+ Pan/Tilt Accuracy: ±0.1°(Preset point), 0.0009765625°(Resolution)
		+ Manual Pan/Tilt Speed: 0.01° ~ 240°/sec
		+ Preset Pan/Tilt Speed: 240°/sec
		+ Range: 360° Endless Rotation (Pan), -5° ~ 185° (Tilt)
8. Audio: 1 x Audio In, 1 x Audio Out
9. External I/O Terminals: 2 x Alarm In, 2 x Alarm Out
10. Analogue Video output
11. IR LED range 150 meter
12. microSD/SDHC memory card slot
	* + The camera shall support up to 32GB SD memory card.

5.3 Supported Encording format shall include:

1. H.264 Baseline, Main, High profile
2. MJPEG (Motion JPEG)

5.4 Video Streaming shall provide:

1. Two separate video streams which are individually configurable (e.g. Alarm event at high quality and Continuous recording at low quality)
2. Configurable range of 1 ~ 30 fps in all resolutions of MJPEG
3. Configurable range of 1 ~ 30 fps in all resolutions of H.264
4. Configurable Group of Pictures (GOP) in H.264
5. Constant Bit Rate (CBR) and Variable Bit Rate (VBR) in H.264
6. Configurable image quality (Highest, High, Normal, Low, Lowest) in VBR mode of H.264
7. Configurable JPEG quality in MJPEG

5.5 Supported video resolution shall include following pixels:

1. 320x180
2. 480x270
3. 640x360
4. 800x450
5. 960x540
6. 1120x630
7. 1280x720
8. 1920x1080

5.5 Image control shall include:

1. Brightness, Contrast, Saturation and Sharpness
2. Image rotation (Vertical flip, Horizontal mirror)
3. Electronic shutter speed (Automatic and Manual, 1/2 ~ 1/1000)
4. Auto Gain Control (AGC)
5. Exposure adjustment (-1.0, -0.6, -0.3, 0, +0.3, +0.6, +1.0 EV)
6. Back Light Compensation (BLC) & HLC & Image stabilizer
7. Digital Slow Shutter (DSS)
8. Wide Dynamic Range (WDR)
9. Automatic and Manual Day (color) and Night (black and white)
10. Automatic and Manual White Balance
11. 2D Digital Noise Reduction (DNR)
12. Defog, Heater & Fan

5.6 The camera shall meet or exceed the following specifications:

1. Two-way full duplex audio
2. Input sources
	* + External microphone
3. External line device
4. Output sources
	* + External line device
5. Encoding
	* + G.711 uLaw at 8/16kHz
	1. The camera shall connect to the network via a RJ-45.

5.8 The camera shall support IP addresses dynamically obtained by a Dynamic Host Control Protocol

 (DHCP)

5.9 IP addresses shall be compliance with the IP version 4 (IPv4/IPV6)

5.10 Supported protocols shall include:

1. QoS Layer 3 DiffServ, TCP/IP, UDP/IP, HTTP, HTTPS, RTSP, RTCP, RTP/UDP, RTP/TCP, mDNS, UPnP™, SMTP, DHCP, DNS, DynDNS, NTP, SNMPv1/v2c/v3(MIB-II), IGMP, ICMP, SSLv2/v3, TLSv1

5.11 Video streaming protocol shall include:

1. HTTP (Unicast)
2. HTTPS (Unicast)
3. RTP over RTSP (Unicast & Multicast, UDP & TCP)

5.12 Web interface shall provide:

1. Live view
2. Local storage management (SD/SDHC card)
3. Configuration page for the camera
4. Provide On screen PTZ functionality which shall allow users to move PTZ camera by clicking a mouse button, mouse dragging and mouse wheeling.

5.13 The camera shall record and store videos into a SD memory card mounted in the camera and into

 an external storage server, such as FTP server.

5.14 Continuous Recording: The camera shall support continuous video recording in SD memory card.

5.15 Event shall be triggered by:

1. External Sensor (DI, Digital Input) which shall programmatically work as a normally open type sensor or a normally close type sensor
2. Motion Detection (MD)
3. Network configuration change

5.16 When an event triggered, it shall Activate an external alarming device (DO, Digital Output)

5.17 The camera shall also provide:

1. At least 128 pre-set positions
2. At least 4 profiles for guard tour functionality which allows camera to move automatically between selected pre-set positions with pre-defined time interval
3. Auto Panning functionality which allows camera to pan 360 degrees with pre-defined angle and speed
4. Auto Run functionality which allows camera to operate automatically pre-selected PTZ functionality (home position, guard tour, pre-set position, auto panning) after the camera has been powered on or after a manual PTZ movement by user

5.18 The camera shall be fully supported by an open API, which shall provide necessary information for

 integration of functionality into third party applications.

5.19 Supported Third Party API shall include: ONVIF Profile S

5.20 The camera shall:

1. Support the use of HTTPS and SSL/TLS, providing the ability to upload signed certificates to encrypt and secure authentication and communication of both administration data and video streams
2. Provide multiple user account with a password protection restricting access to the built-in web interface and video stream
3. Provide authentication procedure which requires users to view video stream using an account ID and a password. The ID and password shall be encrypted by the Digest method (MD5) before being transferred.
4. Be equipped with an LED, indicating the camera’s functional status.
5. Be equipped with a built-in heater & fan

5.21 The camera shall meet or exceed the following specifications:

1. Weatherproof: Rated IP66 or higher
2. Operating Temperature Range
	* + - 40deg to +50 degrees Celsius
3. Relative Humidity Range
	* + Up to 90%, non-condensing

5.22 Power Requirement AC 24V /PoE

### Network Indoor Fish Eye (Panoramic View) Camera

6.1 The camera shall:

1. Be designed to provide H.264 and Motion JPEG (MJPEG) video.
2. Be designed to support resolutions up to 1920 x 1080 pixels.
3. Be designed to provide video at 30 frames per second (fps) for all resolutions.
4. Provide an embedded web-server.
5. Be equipped with a slot for microSD/SDHC memory card.
6. Support Power over Ethernet (PoE) as a power source.
7. Be designed to provide 360° panoramic view.

6.2 The camera mount accessories available shall include:

1. Pole
2. Wall
3. Corner
4. Ceiling

6.3 The camera shall meet or exceed the following specifications:

1. 1/2.7" progressive scan CMOS sensor
2. Fixed focal lens: 1.2mm, F2.0
3. Angle of view
	* + Horizontal: Between 180°
		+ Vertical: Between 160°
4. Minimum Illumination
	* + IR Sensitivity Range: 700-1100 nm
		+ Day mode (Color): 0.5lux at F2.0 (with IR-filter in use)
		+ Night mode (Black and White): 0.001lux at F2.0 (Digital Slow Shutter on)
5. Analogue Video output for installation
6. Audio: 1 x Audio In, 1 x Audio Out
7. External I/O Terminals: 1 x Alarm In, 1 x Alarm Out
8. 256MB Flash memory and 256MB RAM
9. microSD/SDHC memory card slot
	* + The camera shall support up to 64GB SD memory card.
		+ Video

6.4 Supported Encoding format shall include:

1. H.264 Baseline, Main, High profile (MPEG-4 Part 10/ AVC)
2. MJPEG (Motion JPEG)

6.5 Video Streaming shall provide:

1. Two separate video streams which shall be individually configurable (e.g. Alarm event at high quality and Continuous recording at low quality)
2. Configurable range of 1 ~ 30 fps in all resolutions of MJPEG
3. Configurable range of 1 ~ 30 fps in all resolutions of H.264
4. Configurable Group of Pictures (GOP) in H.264
5. Constant Bit Rate (CBR) and Variable Bit Rate (VBR) in H.264
6. Configurable image quality (Highest, High, Normal, Low, Lowest) in VBR mode of H.264
7. Configurable JPEG quality in MJPEG

6.6 Supported video resolution shall include following pixels:

1. 320x180
2. 480x270
3. 640x360
4. 800x450
5. 960x540
6. 1120x630
7. 1280x720
8. 1920x1080

6.7 Image control shall include:

1. Brightness, Contrast, Saturation and Sharpness
2. Image rotation (Vertical flip, Horizontal mirror)
3. Electronic shutter speed (Automatic and Manual, 1/2 ~ 1/5000)
4. Auto Gain Control (AGC)
5. Exposure adjustment (-1.0, -0.6, -0.3, 0, +0.3, +0.6, +1.0 EV)
6. Back Light Compensation (BLC)
7. Digital Slow Shutter (DSS)
8. Wide Dynamic Range (WDR)
9. Automatic and Manual Day (color) and Night (black and white)
10. Automatic and Manual White Balance
11. 2D Digital Noise Reduction (DNR)

6.8 The camera shall meet or exceed the following specifications:

1. Two-way full duplex audio
2. Input sources
	* + External microphone
		+ External line device
3. Output sources
	* + External line device
4. Encoding
	* + G.711 law at 8/16kHz

6.9 The camera shall connect to the network via a RJ-45 with built-in Auto switching 10/100 Mbit/s

 Ethernet interface.

6.10 The camera shall support fixed IP addresses

6.11 The camera shall support IP addresses dynamically obtained by a Dynamic Host Control Protocol

 (DHCP)

6.12 IP addresses shall be compliance with the IP version 4 (IPv4)

6.13 Supported protocols shall include:

1. QoS Layer 3 DiffServ, TCP/IP, UDP/IP, HTTP, HTTPS, RTSP, RTCP, RTP/UDP, RTP/TCP, mDNS, UPnP™, SMTP, DHCP, DNS, DynDNS, NTP, SNMPv1/v2c/v3(MIB-II), IGMP, ICMP, SSLv2/v3, TLSv1

6.14 Video streaming protocol shall include:

1. HTTP (Unicast)
2. HTTPS (Unicast)
3. RTP over RTSP (Unicast & Multicast, UDP & TCP)

6.15 Video streaming protocol shall:

1. Provide Automatic and Manual Bandwidth control
2. Provide Selection for components of video stream (audio and metadata) to reduce required bandwidth
3. Support Quality of Service (QoS) to be able to prioritize network traffic for video, audio and metadata
	* + G Web interface

6.16 Web interface shall provide:

1. Live view
2. Local storage management (SD/SDHC card)
3. Configuration page for the camera
4. ActiveX software installation for specific task

6.17 ActiveX software shall:

1. Be downloaded directly from the camera
2. Display live video images from the camera

6.18 The camera shall record and store videos into a SD memory card mounted in the camera and into

 an external storage server, such as FTP server.

6.19 All video recording files shall be listed and downloaded via web interface.

6.20 The recording in SD memory card shall be instantly started for a pre-defined timeframe by request

 of the user via the web interface, providing so-called Instant Recording.

6.21 Continuous Recording

1. The camera shall support continuous video recording in SD memory card.
2. The camera shall automatically start replacing old video footages with new video recordings when there is not enough space left in the SD memory card.
3. The camera shall allow video recordings to be stored in SD memory card being segmented by pre-defined length or by pre-defined size.

6.22 Event Recording

1. The camera shall support Event alarm based Recording in SD memory card and in an external FTP server.
2. The camera shall provide at least 5 seconds of pre alarm recording and 60 seconds of post alarm recording.
3. The camera shall provide a search interface for recording files in SD memory card, allowing the files to be searched by a specific event with a given time period.
4. The camera shall ensure a reliability of video file transfer into the external FTP server against any incident, such as connection to camera is down or recording FTP server is down. This is done by utilizing SD memory card as a buffer. It will resume the video file transfer after a recovery from system or network failure, providing so-called fail over recording on SD card.

6.23 Event shall be triggered by:

1. External Sensor (DI, Digital Input) which shall programmatically work as a normally open type sensor or a normally close type sensor
2. Motion Detection (MD)
3. Video Content Analytics (VCA)
4. Network configuration change

6.24 When an event triggered, it shall:

1. Activate an external alarming device (DO, Digital Output)
2. Start recording in SD memory card and in an external FTP server
3. Send a notification message with a snapshot via Email
4. Send HTTP notification
5. Send TCP notification
6. Save a notification message and a snapshot in an external FTP server

6.25 The camera shall provide a search interface for events, allowing the events to be searched by a

 specific event type with a given time period. A video recording file for the event, if it is available,

 shall be downloaded via the search interface.

6.26 The camera shall provide a functionality of automatic and manual event log transfer to an external

 FTP server.

6.27 Text Overlay is defined as a function which delivers on-screen embedded texts or drawings over a

 video stream and a snapshot. Supported element of the Text Overlay shall include:

1. Burnt-in Text
2. Burnt-in VCA annotation
3. Privacy mask

6.28 The Burnt-in Text shall:

1. Deliver a customer-specific text of at least 48 ASCII characters.
2. Deliver date and time

6.29 The camera shall provide at least 4 individually configurable privacy masks to conceal defined

 areas in the image as non-viewable.

6.30 The camera shall be fully supported by an open API, which shall provide necessary information

 for integration of functionality into third party applications.

6.31 Supported Third Party API shall include:

1. ONVIF Profile S
2. GENETEC Protocol

6.32 The camera shall:

1. Support the use of HTTPS and SSL/TLS
2. Provide multiple user account with a password protection restricting access to the built-in web interface and video stream
3. Provide authentication procedure which requires users to view video stream using an account ID and a password. The ID and password shall be encrypted by the Digest method (MD5) before being transferred.

6.33 The camera shall:

1. Be supplied with MS Windows-based management software, which discovers the cameras in the same network and allows assignment of IP addresses, firmware update and rebooting the camera.
2. Allow firmware (FW) update over the network via the web interface.
3. Allow backup system logs into an external File Transfer Protocol (FTP) server
4. Allow backup and reload a user-specific configuration data via the web interface.

6.34 The camera shall:

1. Be equipped with an LED, indicating the camera’s functional status.
2. Be monitored by a Watchdog functionality, which shall automatically re-initiate processes, restart the unit if a malfunction is detected or turn on Safe mode providing a simple interface to upload Firmware (FW) if Operating System (OS) is damaged.
3. Provide a heartbeat signal, which continuously transfers a signal over network to a pre-defined destination device with a certain time interval. It may be an indicator of which ensures whether or not the camera is alive.
4. Provide system log file which shall keep at least 10000 records. The camera shall keep records in log file when:
	* + Any event occurs
		+ Any event configuration is changed
		+ Network configuration is changed
		+ CPU is overloaded
		+ System memory is overused

6.35 Environmental

 The camera shall meet or exceed the following specifications:

1. Operating Temperature Range
	* + DC 12V: 32 to 122 degrees Fahrenheit (0 to 50 degrees Celsius)
		+ PoE: 32 to 122 degrees Fahrenheit (0 to 50 degrees Celsius)
2. Relative Humidity Range
	* + Up to 85%, non-condensing
		+ P Power Requirement

6.36 DC 12V

1. Input voltage range: 10.8 ~ 13.2 VDC
2. Consumption: max. 3.96 Watt

6.37 Power Over Ethernet

1. Standard: Class 0 (IEEE 802.3af)

C.4 ACCESS CONTROL SYSTEM

### Specification for 2 Door 2 Reader Controller

|  |  |
| --- | --- |
| Sr. No. | **Technical Specification** |
| 1 | Applications | Access Control System |
| 2 | CPU | ARM 32 Bit RISC Processor |
| 3 | Memory | Up to 4GB (8 MB Flash) |
| 4 | No. of Doors | 2 |
| 5 | No. of Readers | 2 |
| 7 | No. Users | Up to 50000 |
| 8 | Web Server | Available |
| 9 | Door Interlocking/Man Trap | Available |
| 10 | Global APB | Available |
| 11 | SNMP Alerts | Available |
| 12 | MODBUS Protocol Support | Available |
| 13 | AC Fail/Low Battery Alert | Available |
| 14 | Reader Interface | Weigand (26 bit to 56 bit) |
| 15 | Input | 8 inputs (2 Door Status, 2- Egress, 1- Fire & 1- intrusion and 2 Extra input) |
| 16 | Output | 12 outputs (4 - DOTL, 4 – Lock, 4 auxiliary output) |
| 17 | Communications Port | TCP/IP,RS485 |
| 18 | Fire Integration  | Yes |
| 19 | Intrusion Integration | Yes |
| 20 | LCD  | 16X2 LCD Display |
| 21 | Keypad  | 4X3 Key with soft keypad  |
| 22 | Baud Rate | 9600bps (Default) |
| 23 | Controller ID | Up to 10,000 |
| 24 | Language | English |
| 25 | Power Supply  | 12 V DC/ 5A  |
| 26 | Enclosure | Industry Standard Metal Enclosure |
| 27 | Mounting | Din Rail (Without Metal Enclosure) |
| 28 | Wall mount (With Metal Enclosure) |
| 29 | Facility Code | Available |
| 30 | Time Zone / Access Levels | 63 + 1 (Free Time Zone)/Unlimited |
| 31 | Time Zone Slots | 2 slots per Day |
| 32 | Anti-Passback | Hard, Soft, Escort (Reader Wise),Global |
| 33 | Holiday Settings | 32 |

**General Specification**

* Access Control panel should support 2 Wiegand reader to restrict the entry of unauthorized people at 2 Doors & it should also support 2 Exit switch
* Access Control panel should have MODBUS connectivity to integrate the panel with BMS (Building Management System)
* Should have SNMP Alerts to integrate the panel with IT System Administration software for monitoring critical events
* Should have provision of CCTV/IP Camera Integration with Access Events for security audit or to verify/identify tailgating, made effective by alerts based on UDP network protocol.
* Access Control Panel Should have Inbuilt Web Server so device can be managed remotely through inbuilt web Server using any web browser.
* Panel should have inbuilt 4 GB SD Memory Card to take Mirror image of device configuration and data
* Device should have inbuilt configurable door interlocking facility for clean environment so vital in sectors such as pharma, datacenter, etc.
* Data download should be automatic or extremely User friendly
* The controller must support intrusion i/p & Ethernet networking for communicating on LAN, Intranet and Port Forwarding
* It should work Temperature Range upto 50 deg C
* Should support Nested Antipass Back to restrict the unauthorized one who got access by tail getting
* Facility to set and change the IP address on the device itself. There should be no requirement of PC or laptop to set IP address
* 5,8,10-digit card nos. should be accepted by the system
* Indication on unit for Transaction & Users buffer
* Facility to create 16 different Authority Levels for Supervisor/Administrator/User on the device
* There should be a provision to trigger 3rd party devices like Siren etc. on critical events
* There should be a facility to verify card/finger before admin login
* Device should be highly secured so that it can communicate with the selected IP/Particular PC only
* Device should not accept continuous swipes
* Successive swipes should create a soft alert. This feature should be enabled user wise.
* Employee Name/Emp. code/card no. should be displayed on the LCD screen along with Access granted
* All controller's information should be readable using keypad in offline mode
* Holidays restrictions should be reader wise settable
* Bulk card adding facility through device
* Can be integrated with reader for out entry/exit with Pin + card reader
* There should be a facility to activate- deactivate of cards automatically without any human intervention
* Provision for silent alarms, if any unknown person tries to intrude on gun point.
* The Access decisions should be based solely on site codes
* The controller must support 26/32/34/35 bits card readers. Can be integrated with 13.56 MHz or 125KHz cards technology
* HID, Mifare and EM card Compatible, should support any standard Wiegand readers
* The Controller should function and record in same way even in standalone mode when network fails.
* Provision to integrate with IP cameras, DIS & visitor management software
* Controller must support inputs from fire panels and Intrusion Panel.
* Should support any type of locking devices & remote controlled exit switch
* The controller must have port for connecting egress switch
* The controller must have inputs for door sensor.
* Common message display on the LCD should be possible
* There should be a facility to display company name permanently on the LCD screen
* Opening and closing of the doors should be possible from PC
* If any person is trying to open the device an alarm should be raised
* Ability to respond to access requests/alarm conditions before and during download from the device.
* Access Control panel should have power supply with battery charging facility to smooth operation under diverse power infrastructure conditions, should be a facility to connect external battery for battery backup
* It should allow specific users to specific Doors/Deptt only
* The same Smart Card should be used for Attendance as well as Access Control Systems and should act as ID card as well
* The system should be able to keep records in case of Network or Power Failure and once Network or Power is restored, it should be able to communicate with central server without any data loss
* The machine should have inbuilt RTC. Provision for setting the time of all machines from a single location to maintain uniform time in all locations
* Real time downloading should be supported
* Access Panel should have facility to mounting on Din rail without any metal enclosure so very less space will consume in controller room
* Mounting/un-mounting and maintenance should have very user friendly with Din rail Mounting facility
* Machines to be enclosed in industrial grade heavy duty rugged enclosures at all the locations suitable for all different weather conditions
* The connectivity of the devices should be detected remotely from remote machine
* Alarm monitoring provision should be available in case of any emergency
* There should be a facility to configure the unit in access or attendance mode depending upon the client requirement
* Device Should be CE Certified
* Component level servicing should be possible.
* Total Indian Manufacturing Technology to enable better service and support
* When one door is open all other three doors should be locked
* Should be integrate Analog Camera and IP Camera and record the short clip/Image for every events

### Specification of Web Based Access Control + Attendance Software

* Cloud Compatible enterprise level Web based Modular Access Management and Time Attendance software with SQL Database especially designed to cater small, medium and large organizations.
* Single GUI Platform with complete modular software with provision to integrate with different application ie; Access Control, VMS, Canteen, Alarm Management, etc.
* It comprises with all masters, basic access control software, and basic attendance software and enrollment module.
* Advance access control management software module with all the access control features i.e.; Time Zone, Access Level, Anti passback, Holiday restrictions, employee black list, etc.
* Attendance management software module with all-time attendance features i.e. Shift management, leave management, attendance policy e.g. late coming, early going, continues absent, Overtime, Compensatory off, outdoor entry, etc.
* Employee Self Service - login module for Employee/HOD/MANAGER where they can view their attendance; they can apply for leave/manual punch/tour entry/outdoor entry though internet with their login ID & password. Same way manager can online approve all application sent by employee.
* User Enrollment interface module for finger/card enrollment of users. BIO mini & smart PERSONALIZER can be connected to this module for user enrollment.
* Comprehensive Email and SMS module for smart COMMANDCONTROL to send various SMS & Email on the base of different events in Access Control & Time Attendance system.
* Role wise module i.e.; Employee Self-service - for View Attendance, for applying Leave, Manual Punch, outdoor entry, tour entry, Condone entry, compensation off & Overtime
* HOD Login for view their attendance and apply for leave, manual punch, etc. apart from provision to approve all the application of their team mate
* HR/Admin/Location Admin/Company Login for all the configuration/settings of attendance rules, leave management, shift management and others parameters
* Should have complete shift management ie; auto shift, flexi shift, night shift with advance level of automatic shift roaster which will take care of complex shift management
* Should have complete Leave management ie; Leave definition, define leave rules, set leave opening balance, leave carryforward & leave application/approval
* Should have provision to make mass attendance entry/ application/approval in case of most of the employees are coming late or, going early ie; Train Strike, Bus Strike, etc.
* Should support maker & checker facility - the local administrator should able to add the users but he should not able to authenticate/approve the User, Approval right of the added user should be with main Administrator
* Different type of Anti pass back - Hard, Soft, user wise & controller wise
* Holiday restriction (Reader Wise)
* Blacklist of employee
* Duress Authentications
* Dual Authentications
* Configurable delay time for two successive punch from same
* Controller communication status display with indication of Green/Red button denotes device is online or, offline
* Displaying Short Messages setting to display on device
* Centralize fingerprint Template Management
* Bulk upload of cards
* Support Maximum 9,999 controller
* Configurable Auto/Manual/Scheduled Data Downloading
* Controller Reset command
* Block Admin/User of controller
* Device Configuration – Push/Pull
* Door Open Time Configuration
* Door Auto Relock configuration
* Reader open Time can be define
* Facility Code supported
* Audit Log
* Event Wise mail and SMS can be sent
* Central Date & time Synchronization
* User wise/Controller wise Latest swipe display
* 100+ Useful different type of MIS reports
* Master data import facility & data export facility
* Dedicated output reports for Payroll integration
* In 20+ format reports should be generated ie; PDF, MS Xps, MS Power point, HTML, Mht Web, Archive, Text, rich Text, Word 2007, Open document Writer, Excel, Excel Xml, Excel 2007, Open Document Calc, CSV, Dbase, Xml, BMP, Gif,Jpeg, Pcx, Png, Tiff, Metafile
* Email & SMS can be sent on every configured event ie; Leave Application/approval, Manual Punch Application/Approval,Outdoor Application/Approval, Tour Application/Approval, Condone Application/Approval
* Software should have Android based Mobile apps for Employee Self Service module
* Employee Self Service module on Android based Smart Phone
* Easy Employee tracking as outdoor Employee Attendance should be marked with their GPS Location
* Leave Application, Manual Punch, Outdoor/Tour entry through Mobile Apps
* Condone Entry through Android based mobile Apps
* Employee can mark Offline attendance (If No Network) through Mobile Apps

### Proximity Readers - Mifare smart Card Reader Technical Specifications: -

|  |  |
| --- | --- |
| Sr No. | **Technical Specification** |
| 1 | Read Range | 4 -9 cms |
| 2 | Data Read | CSN/Sector |
| 3 | Type | Smart Card (Mifare Classic) |
| 4 | Transmit Frequency | 13.56 MHz |
| 5 | Card (Transponder ) | Mifare® Series (ISO14443-A) |
| 6 | Card Read Time | 0.1 sec |
| 7 | Output Interface | Wiegand Format( 32 bits) |
| 8 | LED Indicator | Bi color LED |
| 9 | Power supply | 12 V DC @ 100mA |
| 10 | Dimensions | 80W X 83 H X 21 D |
| 11 | Material | ABS Plastic |
| 12 | Color | Black |
| 13 | Cable Specs (Recommended) | 5 core, 7/36 shielded cable |
| 14 | Cable Distance from Controller: | 80m (Wiegand) |
| 15 | Card should be read in1 sec |
| 16 | A Wiegand output that easily interfaces with most existing Wiegand protocol access control panels.  |
| 17 | Compact and Elegant. Easily installed on walls and doors. |

### Biometric Readers

Biometric Fingerprint + Card + Pin Based Attendance Terminal Technical Specifications: -

|  |  |
| --- | --- |
| Sr No. | **Technical Specification** |
| 1 | **Applications** | **Access Control System & Time Attendance**  |
| 2 | **CPU** | **ARM 32 Bit RISC Processor** |
| 3 | **Memory** | Up to 8 MB (Flash) |
| 4 | **Events/Transactions** | **100,000** |
| 5 | **No. Of Finger Template** | **Up to 19000 (1:N)** |
| 6 | **Operation Mode** | Card Only, UID+Finger, Card+Finger, Finger Only |
| 7 | **Sensor** | **High Quality Scratch Resistance Optical Sensor** |
| 8 | **Finger Score**  | **Display Finger quality Score @time of finger Registration** |
| 9 | **Communications Port** | **TCP/IP & Wiegand , POE & GPRS (Optional)** |
| 10 | **Display**  | **128 X 64 Graphical Display** |
| 11 | **Keypad**  | **Capacitive Touch Sense 12 Numeric Keypad** |
| 12 | **Baud Rate** | 9600bps (Default) |
| 13 | **Controller ID** | **Up to 10,000** |
| 14 | **Language** | English |
| 15 | **LED** | Tri Color LED Bar |
| 16 | **Sound** | Various Beep Indication |
| 17 | **Power Supply**  | 12 V DC/ 5A , POE (Optional) |
| 18 | **Enclosure** | ABS Plastic |
| 19 | **Color**  | Silver & Black |
| 20 | **Dimension (H X W X D ) in mm** | 167 X 105 X 45 |
| 21 | **Mounting** | Wall Mounting |
| 22 | **Temprature** | 0 to 50 Degree Centigrade |
| 23 | **Humidity** | 20% to 90% |
| 24 | **Sensor Specification** |   |
| 25 | **Image Resolution** | **500 DPI** |
| 26 | **Template Size** | **384 Bytes** |
| 27 | **Image Size (Pixel)** | **272 X 320** |
| 28 | **Sensing Area (mm)** | **16 X 19** |
| 29 | **EER/FAR/FRR** | <0.1% / 0.001% / 0.1% |
| 30 | **Enrollment time & verification**  | < 1 Sec |

**General Specification**

* Device should be having Matching Mode 1:N as well as 1:1
* Device should have provision of POE & GPRS options to make the device existing infrastructure friendly
* Most efficient Push Mechanism, for Multi Location Application, to push data from multiple locations to the central location almost in real time.
* Device should have facility to integrate with CCTV/IP camera to take the photograph of user when user swipe his card/Finger
* Should have Random attendance paging to ensure continuous Attendance during the day. It ensures employee will not left the premises during the working hour
* Device should be accessible with OTP (One Time Password) for fingerprint enrollment & Changing of Date and Time. User Enrollment & changes of date and time should not happen with normal User ID & Password.
* Data download should be automatic & extremely User friendly
* Facility to set and change the IP address on the device itself. There should be no requirement of PC or laptop to set IP address
* 26,32,34,35 bit wiegand format supported
* Indication on unit for Transaction & Users buffer
* Facility to create 16 different Authority Levels for Supervisor/Administrator/User on the device
* There should be a facility to verify card or Finger before admin login
* All the events/Status massages should display on LCD
* Device should be highly secured so that it can communicate with the selected the IP only
* Reader shall flash the green LED and emit a short beep indicating that a card was read
* Should work with 5,8,10 digit card no
* Employee Name/Emp code/card no should be displayed on the LCD screen along with Access granted
* There should be facility to adjust the Finger Rejection ratio as per the client needs/environment.
* All controller's information should be readable using keypad in offline mode
* Bulk card adding through device
* Time based Scheduler for automatic activate- deactivate of cards.
* The reader should function and record attendance even in standalone mode when network fails.
* Common message display on the LCD should be possible
* If any person is trying to open the device an alarm should be raised
* Device should work on Dynamic IP in case of multiplication/multi devices, no need of Static IP at every location
* Ability to respond to access requests/alarm conditions before and during download from the device.
* Template size 384 bytes Capacity to store up to 8 templates per user to avoid finger rejection
* The device shall be fitted with automatic restart facilities to enable them to resume processing following a power and backup failure. Device should have inbuilt Watchdog feature
* The machine should have inbuilt RTC. Provision for setting the time of all machines from a single location to maintain uniform time in all locations
* The connectivity of the devices should be detected remotely from remote machine, should have inbuilt capability for online firmware up gradation.
* The outer coating should be noncorrosive
* Component level servicing should be possible in India
* Total Indian Manufacturing Technology to enable better service and support
* provision for at least 2 fingers per employee should be accepted on the card memory
* The Finger scan scanner shall be of High Protection from Scratch i.e Upper surface shall be scratch resistant and Protection from ESD
* Scalable System to support GPRS and Template on card if required.
* Real time auto update of finger impressions
* Finger sensor should have award winner algorithm

C.5 TELECOMMUNICATIONS SYSTEM &LOCAL AREA NETWORKING (LAN)SYSTEM

|  |  |
| --- | --- |
| S.No. | **Technical Specifications** |
| 1 | **IP Telephony System Architecture** |
|   | The IP telephony system must be based on a pure IP technology that is a software-only solution. PCM-TDM based telephone system should not be quoted. The IP telephony system should be designed with IP at the core, allowing fully distributed IP solutions across data networks.  |
|   | The IP telephony system must support unified communication (UC) server & gateways architecture for SIP, Digital and Analog trunks connectivity. |
|   | The system must have Analog, Digital, IP Telephones, and SIP based video desk phones. |
|   | The communication servers must work in an Active/Active redundancy mode. server working in Active/ Standby mode is not acceptable.  |
|   | These 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). |
|   | The telephony system must be able to register SIP phones/SIP video phones and MGCP phones directly to it  |
|   | System should have Distributed Architecture |
|   | All Data (Numbers, COS, Routing, Applications) should reside in all the Servers |
|   | Database replication in both servers should be automatic |
|   | Should support N+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 |
|   | Hot Standby for Gateway Phones |
|   | 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 signaling 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). It should be possible to have minimum 5 servers in cluster and all servers should work in Active-Avtive mode means all servers should be able to work together with some end points registered on each server in load sharing mode. |
|   | 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) |
| 2 | **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 3000 endpoints |
|   | The call signalling server must handle traffic at a minimum of 100K BHCC. |
|   | The system must be modular, scalable and distributable |
| 3 | **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. |
|   | Replacement of gateway cards without switching Exchange (Hot Swappable). |
|   | The life cycle of the entire system being provided must be at least Seven (7) 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. |
| 4 | **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 must be installed using an image of the application an easily implemented on the Cloud Service Provider servers. |
| 5 | **Quality of Service (QOS)** |
|   | The voice and signalling frames must be marked [tagged] in order to be recognized.  |
| 6 | **Server – Physical Attributes** |
|   | COTS – Commercial Off-the-Shelf servers must be used. Server make should be DELL, IBM, HP only.  |
|   | 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 Hot-Swap Redundant power supply. |
|   | The server must support Dual Power Supply drawing power from two different sources. |
|   | 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 5500 or 5600 series or higher |
|   | The server must have at least 4GB RAM  |
|   | The server must have Hot-plug Hard Drives (300GB each) of storage |
|   | The server must have a Dual 1GB network interface. |
|   | The server must have two hot plugs power supplies  |
|   | Form Factor for physical server (Not Virtual Machine) should be 1 U |
| 7 | **Gateways** |
|   | The media gateways shall be capable of being centrally managed via the telephony management application. The gateway should support upto 4000 ports. |
|   | The system gateway should be able to restart automatically without human intervention when the external ac power supply is resumed after complete power failure  |
|   | Gateway should have redundant power supply so that in case one power supply fails another should take care. |
|   | Gateway should have AC/DC power supply.  |
|   | **The system gateway 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 |
| 8 | **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.  |
| 9 | **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. |
| 10 | **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 |
| 11 | **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 |
| 12 | **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 250.  |
| 13 | **Audio Conferencing - Pre-set Conference Calls** |
|   | The Conference System should be the same OEM make and have the facility to automatic dial out to connect up to 250 participants in a single meet-me conference. |
|   | The managed conference should run on a SIP phone. |
|   | The conference must be able to be controlled by a user defined as Group Operator. |
|   |  The Group Operator should have the option to execute the following commands using a SIP phone:  |
|   | 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 key on the digital or SIP IP phone.  |
|   | 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. |
| 14 | **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 |
| 15 | **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 |
| 16 | **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 |
|   | Loop Key |
|   | Message Waiting Indication |
|   | Multi Appearance (Call Waiting) |
|   | Multilingual Display Support for Phones |
|   | Multiple Line Appearance |
|   | Mute Microphone |
|   | On-Hook Dialing |
|   | Placing Multiple Calls on Hold |
|   | Port Gain – Individual |
|   | Privacy – ANI Restriction |
|   | Reminder/ wakeup Call |
|   | Restrictions – Station |
|   | Ringing Cadence, Frequency and Volume Control of Digital Phones |
|   | System Non-Exclusive Hold |
|   | Transfer with Consultation |
|   | Transfer without Consultation (Blind) |
|   | Trunk Group Termination (Pooling) with Indication |
|   | Voice Page |
|   | Dynamic Feature Activation |
|   | Emergency Preemption |
|   | Listen to Paging while in a call (Busy Condition) |
|   | Headset |
|   | Ringer Tone Selection |
|   | VIP Ring |
|   | ULA - User Line Appearance (ULA) |
|   |   |
| 17 | **PC based operator Console specification** |
|   | The PC operator console must support an IP telephone interface. Digital phone with interface cable to PC should not be used. |
|   | Using the operator console application buttons and menus, operator should be able to activate the below mentioned telephony features, including: |
|   | Placing calls (dialing) and answering calls |
|   | Putting calls on hold and retrieving held calls |
|   | Call transfer to a specified destination, or to the voice mailbox |
|   | Consultation calls (switching between held parties) |
|   | 3-way conference calls |
|   | Call muting |
|   | Voice paging |
|   | Camp-on |
|   | Do Not Disturb (DND) |
|   | The User interface client of the PC operator console must be based on Window XP or higher.  |
|   | **PC Operator console should have following call handling fields:** |
|   | The Operator console must contain the Calls on hold field. |
|   | The Operator console must contain the Calls are sorted by time in queue field. |
|   | The Operator console must contain the Waiting queues field. |
|   | The Operator console must contain the Last ten usersdialled field. |
|   | The Operator console must contain the Missed calls field. |
|   | The Operator console must contain the One touch dialing field |
|   | The Operator console must contain the Extension status in real-time (busy/free etc.) fields. |
|   | The Operator console must contain at least 120 one touch virtual keys fields. |
|   | The Operator console must contain the Presence of system users field |
|   | The Operator console must contain the Integration with Outlook for contacts field. |
|   | The Operator console must contain the More than 5 i/c call display and selective pickup of any i/c call fields. |
|   | The Operator console must contain the Call Log field. |
|   | The Operator console must provide Directory with Outlook contacts, telephone system extensions and private directory. |
|   | The Operator console must be able to set hot keys for keyboard access to various call control functions. |
|   | The Operator console must be able to support Instant Messaging between logged-in operators |
|   | Operators must be able to manage their contacts, the complete telephone system directory and personal telephone lists in a single place, so names can be quickly and easily found. |
|   | The Operator console must be able to indicate their presence to the other operators |
|   | The Operator console must be able to change status (i.e. On Line, Do Not Disturb or In a Meeting).  |
|   | The operator must be able to search the history of call activities via pull-down menus that show incoming and outgoing calls |
|   | The operator must be able to sort and export the call history to an Excel spread sheet. |
|   | The Real-Time Monitoring application should be there to obtain online statistical and graphical reports concerning operator activity ( login, logout, busy etc.) on supervisor PC. |
|   | The operator activity reports should be displayed in tables, forms or graphical formats in real time on supervisor's computer screen. |
|   | The supervisor should be able to change the working mode of operator to release or resume mode. |
|   | The Historical Reports application should be there so that supervisor can generate historical statistical reports for evaluating performance of operator on 15 min, hourly or daily or monthly basis. |
|   | There should be a variety of predefined historical report templates that may be generated. |
|   | It should enable free creation of reports based on an opened report generator using simple drag and drop operations. |
| 18 | **Voice Mail specification** |
|   | Voice mail should be integral part of IP telephony server. It should not be on separate appliance server. Voice mail should be from same OEM. Voice mail should not consume any port from IP telephony server. |
|   | The user should be able to review voice message and fax information directly from your email inbox including caller ID, duration of voicemail, fax sender, and number of pages |
|   | User should be able to listen to voice messages with any audio player or review messages over the phone while having a full control over the played media |
|   | Should support to view fax messages with any TIFF or PDF image viewer |
|   | User should be able to forward voice and fax messages to any email address directly from your email inbox |
|   | Should support to archive voice and fax messages to any local folder |
|   | User should be able to listen to, delete, save, reply to, and forward emails through the phone  |
|   | Should be able to forward emails to a fax machine |
|   | Should support redirect fax messages from your voicemail box to any fax machine when email inbox is not available for fax viewing |
|   | Should support below mentioned Unified Messaging Features: |
|   | Fax-to-Mail |
|   | Messages to email |
|   | MWI – Message Waiting Indication |
|   | Voicemail Activation via Soft Keys |
|   | Users should be able to check and handle voice messages from all devices, including the email client, Webmail client, PDA and telephone. |
|   | **Voicemail should support the following:** |
|   | Microsoft Exchange – 2007 and higher  |
|   | IBM Lotus Dominos  |
|   | IMAP4 Synchronization Agent  |
| 18 | **Centralized Call Billing System:** |
|   | The system must have call billing software that is able to log all calls made and received by an extension (either internal or external).  |
|   | High Availability in a Server Cluster –  |
|   |  In case of server failure and the call passed to another server, the CDR record must continue on the other server with all the information |
|   | If the call was disconnected due to server failure, the CDR record for the call must be closed and saved |
|   |  All CDR (Call Detail Records) must be sent on-line for immediate update and to external Windows based Billing system for complete recording of Internal, External and Network calls to generate various types of traffic reports |
|   | The following details must be provided: |
|   | Reports must indicate the record ID |
|   | Reports must indicate the call start date  |
|   | Reports must indicate the call start time  |
|   | Reports must indicate the elapsed time  |
|   | Reports must indicate the trunk group ID  |
|   | Reports must indicate the trunk ID  |
|   | Reports must indicate the charged user ID  |
|   | Reports must indicate the caller ID  |
|   | **1.**          Reports must indicate the call type |
|   | **2.**        Reports must indicate the destination dial number  |
|   | **3.**        Reports must indicate the caller dial number  |
|   | **4.**        Reports must indicate the caller call type name |
|   | **5.**       Reports must indicate the caller presentation ID |
|   | **6.**       Reports must indicate the caller presentation name |
|   | **7.**       Reports must indicate the QoS, received + sent + lost packets, bandwidth |
|   | **8.**       Reports must indicate the ring time duration  |
|   | **9.**       Reports must indicate the Hold / Page\_Q / Park time duration |
|   | **10.**    Reports must indicate the charged user display name  |
|   | **11.**     Reports must indicate the charged EP location name  |
|   | **12.**       Reports must indicate the charged time zone |
|   | **13.**       Reports must indicate the originator user display name  |
|   | **14.**       Reports must indicate the originator EP location name |
|   | **15.**       Reports must indicate the originator IP |
|   | **16.**       Reports must indicate the originator device (for emergency calls in logout)  |
|   | **17.**       Reports must indicate the originator trunk group dials number / name  |
|   | **18.**       Reports must indicate the originator time zone |
|   | **19.**       Reports must indicate the destination user display name |
|   | **20.**     Reports must indicate the destination EP location name  |
|   | **21.**      Reports must indicate the destination IP  |
|   | **22.**      Reports must indicate the destination device  |
|   | **23.**       Reports must indicate the destination time zone |
|   | **24.**       Reports must indicate the call reason answered or missed name  |
|   | **25.**       Reports must indicate the last call redirect reason name: – as above |
|   | **27.**       Reports must indicate the original destination user display name  |
|   | **28.**       Reports must indicate the original destination EP location name  |
|   | **29.**       Reports must indicate the original destination device  |
|   | **30.**       Reports must indicate the media security name |
|   | **31.**       Reports must indicate the call priority ID |
|   | **23.**       Reports must indicate the call priority name |
| 19 | **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. |
| 21 | **Specification of IP phone for Executive level (Type – 1)** |
|   | 2.7" 192x64-pixel graphical LCD with backlight |
|   | LED for call and message waiting indication |
|   | 6 line keys including up to 15 programmable features |
|   | HD Voice: HD Handset, HD Speaker |
|   | 4 context-sensitive "soft" keys |
|   | 5 features keys: message, headset, mute, redial, hands-free |
|   | Speakerphone |
|   | Local phonebook and XML/LDAP remote phonebook |
|   | FTP/TFTP/HTTP/HTTPS/PnP Auto-provisioning |
|   | Dual-color (red or green) illuminated LEDs for line status |
|   | 3 VoIP accounts |
|   | One-touch speed dial, redial |
|   | Call forward, call waiting, call transfer, call hold |
|   | Call return, group listening |
|   | Mute, auto answer, DND |
|   | Call history: dialed/received/missed/forwarded |
|   | 3-way conference call |
|   | Direct IP call without SIP proxy |
|   | Ring tone selection/import/delete |
|   | Hotline, emergency call |
|   | Set date time manually or automatically |
|   | Dial plan, XML Browser, action URL |
|   | Wideband codec: G.722 |
|   | Narrowband codec: G.711, G.723, G.726, G.729AB, GSM |
|   | VAD, CNG, AEC, PLC, AJB, AGC |
|   | Full-duplex hands-free speakerphone with AEC |
|   | SIP v1 (RFC2543), v2 (RFC3261) |
|   | NAT Traversal: STUN mode, Sentinel Pro, or 3rd party SBC |
|   | DTMF: In-Band, Out-of-band (RFC2833), and SIP Info |
|   | Proxy mode and peer-to-peer SIP link mode |
|   | IP Assignment: Static/DHCP |
|   | HTTP/HTTPS web server |
|   | UDP/TCP/DNS-SRV (RFC 3263) and IPV6 |
|   | Time and date synchronization using SNTP |
|   | AES encryption for configuration file |
|   | OpenVPN, IEEE802.1X |
|   | HTTPS certificate manager |
|   | SRTP (RFC3711) for voice |
|   | Transport Layer Security (TLS) |
|   | 1xRJ9 (4P4C) handset port / 1xRJ9 (4P4C) headset port |
|   | Dual-port Gigabit Ethernet |
|   | Stand with 2 adjustable angles |
|   | Power over Ethernet (IEEE 802.3af), Class 2 |
|   |   |
| 22 | **Specification of IP phone for Manager level (Type – 2)** |
|   | 3-line LCD (2 x 15 characters and an icon line) |
|   | 2 VoIP accounts |
|   | HD Voice: HD Codec, HD Handset, HD Speaker |
|   | 31 keys including 9 function keys |
|   | Voicemail, Intercom |
|   | Local phonebook |
|   | FTP/TFTP/HTTP, PnP Auto-provisioning |
|   | SRTP/HTTPS/TLS, VLAN, QoS |
|   | PoE, Headset, Wall-Mounted |
|   | Hotline, emergency call waiting, call transfer, call forward |
|   | Hold, mute, flash, auto-answer, redial, 3-way conference, |
|   | DND, speed dial |
|   | Phonebook import/export, call history |
|   | Volume adjustment, ring tone selection |
|   | Voicemail, MWI |
|   | Intercom, Paging |
|   | Call park, call pickup |
|   | Distinctive ringtone |
|   | Wideband codec: G.722 |
|   | Narrowband codec: G.711, G.723.1, G.726, G.729AB |
|   | VAD, CNG, AEC, PLC, AJB, AGC |
|   | Full-duplex hands-free speakerphone with AEC |
|   | SIP v1 (RFC2543), v2 (RFC3261) |
|   | NAT Traversal: STUN mode or 3rd party SBC |
|   | DTMF: In-Band, RFC2833, SIP Info |
|   | Proxy mode and peer-to-peer SIP link mode |
|   | IP Assignment: Static/DHCP/PPPoE |
|   | TFTP/DHCP/PPPoE client |
|   | Telnet/HTTP/HTTPS server |
|   | DNS client |
|   | NAT/DHCP server |
|   | HTTPS (server/client) |
|   | SRTP (RFC3711) |
|   | Transport Layer Security (TLS) |
|   | 4 LEDs: 1xpower, 2xline, 1xmessage |
|   | 1xRJ9 handset port / 1xRJ9 headset port |
|   | 2xRJ45 10/100M Ethernet ports |
|   | Power over Ethernet (IEEE 802.3af) |
|   |   |

C.6 STRUCTURED CABLING FIBER FOR LAN SYSTEMS TO INTERCONNECTIVITY BUILDING TO BUILDING

### Optical Fiber Cable Armored Multi Mode 6 Core

|  |  |
| --- | --- |
| **S.No** | **Specifications** |
| 1 |  No of Cores :6 |
| 2 | Number of elements : 5 |
| 3 | Tube Identification : Single tube |
| 4 | Fiber protection(Tube) : Polybutylene Terephthalate (PBT) |
| 5 | Water Blocking : Thyrotrophic Gel (Tube) and Petroleum Jelly (Interstices) |
| 6 | Strength member : 2 steel wires |
| 7 | Armoring : Corrugated Steel Tape Armor (ECCS Tape) |
| 8 | Sheath : LSZH Sheath Black ;IEC 60332-1 Complied LSZH with fire retardant properties |
| 9 | Max. Tensile Strength-Short Term : 1500N |
| 10 | Max. Crush Resistance-Short Term : 2000N/10 cm |
| 11 | Mass : 95 kg/km minimum |
| 12 | Attenuation at 850 nm-3.5 dB/km and at 1300 nm: 1.5 dB/km |
| 13 | Specifications: ISO.IEC 11801 - 2nd Edition, type OM4; AS/ACIF S008;AS/NZS 3080; LSZH specifications. |

### Fiber Patch Panels – Rack Mount 6 / 24 Port for Building to Server Room to Interconnectivity Building to Building

|  |  |
| --- | --- |
| **S.No** | **Specifications** |
| 1 | Have sufficient slots accommodate duplex SC adapters individually. |
| 2 | Should have fiber management provision inside. |
| 3 | Have earthing lugs and other accessories. |
| 4 | Provide self-adhesive, clear label holders (transparent plastic window type) and white designation labels with the panel, for front panel labeling. |
| 5 | Fiber panel should be capable of both Rack as well as wall mountable |

### Face Plate, UK Style, Almond Color, Square with Shutters –User Desktop

|  |  |
| --- | --- |
| **Details** | **Specification** |
| Type | Simplex/Duplex |
| Material | Fire -retardant Plastic, ABS, Almond color, UK Style. |
| Acceptability  | Should be able to accept Cat6A, Cat6 and Cat5e information outlets |
| Approvals | UL94V0 |
| No. of plates | 2 Plates/Pieces Face Plate for better aesthetic look (Premium Type) |
| Mounting screws | 2 pcs, M3.5 x 25mm, with covers |
| Compliant | RoHS |
| Dimensions | (H x W x D) 86 x 86 x 14.42 mm |

### CAT6A U/UTP 4 Pair Cable, IEC 60332-3-22 (Cat AA) Flame Retardant –User End to Hub Room

|  |  |
| --- | --- |
| **Details** | **Specification** |
| Type | 23 AWG Solid Bare Copper, Unshielded Twisted 4 Pair, Category 6A, TIA / EIA 568 C.2, ISO/IEC 11801& UL 444 standard. NEMA WC-63.1 Category 6 |
| Conductors | Solid bare copper |
| Insulation | Polyethylene/Polyolefin Nominal Diameter of 1.0 mm |
| Pair Separator | Cross-member (+) fluted Spline. |
| Approvals | UL & Third Party verified to ANSI/TIA Cat 6A, ISO 11801 for Class E  |
| Frequency tested up to 250 Mhz ONLY | 500 MHz; Third Party Verified channel performance upto 500 MHz to be provided.  |
| Packing | Box of 305 meters |
| Cable Outer Diameter | 7.2 mm |
| Delay Skew | 45 ns @ 100Mhz |
| Bend Radius | 29 / 58 mm |
| Maximum Conductor DC Resistance: | DCR @ 20°C (Ohm/100 m) = 9.5 |
| Maximum Delay: | Delay (ns/100 m) = 537 @ 100MHz |
| Conductor Resistance | 9.38 Ohms Max /100 mtr |
| Velocity of Propagation Delay | 67% |
| Performance characteristics @ 500 MHz | Max. Attenuation: 45.4dB/100mMin. NEXT : 34.8 dBMin. PS NEXT : 31.8 dB Min. Return Loss: 17.3 dB Min. ACR : -10.4 dBMin. PSACR : -13.4 dBMin. PS ANEXT: 52.0 dB Min. PS AACRF: 24.2 dB |
| PoE Compatibility | PoE Type 1 (15 W), Type 2 (30 W), Type 3 (60 W) |
| ELV | EU Directive 2000/53/EC |

### 24 Port, 1U Jack Panel, loaded – To Interconnectivity with Building to Server Room

|  |
| --- |
| 24 PORT ANGLEDLOADED JACK PANEL Cat6A, 1U |
| Parameters | Specifications |
| Type | -24 Port 1U loaded Straight Patch Panel with Discrete Angled Modules-Patch panels IDC (IDC of Information Outlet) Connectivity should be at rear end & RJ-45 jack on front panel, 19" rack mountable.-Patch panels Ports should be individually replaceable & Consistent port-to-port performance. |
| Availability | Patch Panel should be available with 24 Ports in 1U and 48 ports in 2U. |
| Cable management | -The modules in Patch panel should have sideways orientation of Information Outlet that makes patch cord routing easier and eliminate the need for Horizontal Cable Management.-Patch Panel to be supplied with four removable Inserts/modules with 6 no. of IO slot per Module |
| Compatibility | Patch Panel should be able to accept Cat6A, Cat6 and Cat5e information outlets for backward and forward compatibility |
| Height | 1U (1.75”) |
| Storage Temperature Range | -40Deg C to +70 Deg C |
| Operating Temperature range | -10Deg C to +60 Deg C |
| Applicable Standards & Environmental Programs | RoHS complied with ACA safety  |

### CAT6+ Unshielded Modular Jack, Keyconnect Style- User Desktop for Lan Connectivity

|  |  |
| --- | --- |
| Parameters | Specifications |
| Type | Cat6A UTP Field Mount Plug, TIA Category 6A, ISO Class E |
| Front Connection | RJ 45 : Copper Clad Flexible PCB, Gold plated contacts over Palladium/Nickel (for UTP PLUG)RJ 45 : Ethylene Propylene (for Shielded Plug) |
| Rear Connection | IDC: Copper Allow with Nickel Plating |
| Connector Body | Plastic: UL940V-0 |
| Housing | Encapsulated Lead Frame technology |
| Accessories | -Jack should support uniform hassle free termination technology and be able to ensure performance in each termination without dependency on expertise of technician.-Integrated bend-limiting strain-relief unit for cable entry with locking facility at IDC contact point-Support cable pair termination process on the jacks at 90 degree angle. |
| Termination Interface | Front Mated Connection: 750 Cycles |
| Rear Mated Connection: 20 Cycles (Gas Tight IDC Connection) |
| Jack Details | Connector/hardware retention of at least 88.5 NPlug /connector retention of at least 50NStorage temperature range of -40 Deg C to +70 Deg C. |
| IEEE Specification (PoE) | IEEE 802.3at type 1 and 2 (up to 30W). CoC to be provided. |
| Termination Pattern | Category 6A - TIA 568.C.2, Category 6A - ISO/IEC 11801:2002 Ed.2 |
| Performance | 4.8 Gbps support for 100 MT Channel Link |
| Approvals (Proof to be provided along with Bid) | UL Listed |
| ETL verified to TIA / EIA Cat 6. Should be part of the registered 4 connector channel as per Intertek / ETL report |
| UL Rating | UL 94V-0 |
| Other Specifications  | UL 1863, IEC 60603-7, FCC part 68-F |
| RoHS | Compliant |
| Safety listing | ACA and Bi-national standard listed. |
| Operating Temperature | -10° to 60°C |
| Dielectric Strength | 1,000 V RMS @ 60 Hz for 1 minute (Signals to Ground) |
| Performance Characteristics to be provided with bid for 1 – 300 MHz | Technical Datasheet should have Worst Case Performance parameters for IL, NEXT, FEXT, Return Loss and Balanced TCL |
| Electrical Performance @ 300Mhz | Insertion Loss: Max. 0.48 dBNEXT: Min. 37.1 dBFEXT: Min. 31.1 dBRL: Min. 18.5 dBBalanced TCL: Min 19.0 dB |
| Termination Process | Termination of cable on IO through Universal Termination Tool to minimize any manual termination like punch down. All the four pairs should get crimped and cut together with the help of the tool.Pairs should be separated via T-Bar in termination process to avoid any cross talk issue at Jack. |
| Cat6A Jack | Should be covered under 25 year warranted solution from OEM. All the four pairs should get crimped and cut together with the help of the tool.  |

### Cat6AUnshielded Patch Cords, 2 MT & 3 MT, Dark Blue - For Using Desktop & Jack Panel to Lan Switch

|  |  |
| --- | --- |
| Details | Specification |
| Type | Unshielded Twisted Pair, Category 6A, TIA / EIA 568-C.2 &ISO/IEC 11801, IEC 60603-7, FCC Part 68 Subpart F Specifications. |
| Conductor | Cat6 Patch Cord should be 4 Twisted Pair, 24 AWG Stranded Bare Copper Conductors. Contact Blade should be Phosphor bronze plated with 50u’’ gold over 100u’’ nickel undercoat. |
| Length | 2 MT , 3 MT |
| Plug Protection | Factory fitted Strain relief boots on either side |
| Performance Characteristics  | Max. Current Rating should be 1.5 AmpMin. Insulation Resistance should be 100MOhmMax. Contact Resistance should be 20mOhmDielectric Strength should be 1000 VAC (RMS)Voltage Rating should be 30 VAC Maximum. |
| Color | Dark Blue |
| Operating Environment Range | The patch cord should have Insertion Life of 750 mating cyclesPull force of min. 89 Newton, Humidity 10% to 90% R.H., Temperature range of -10 Deg C to +60 Deg C |
| Boot | Injection Molding Technology for better strength |

### Core Switch –Layer 3

|  |  |
| --- | --- |
| **Item** | **Technical Specifications** |
| Type | Modular Switch with atleast 6 service slots other than control card slots |
| Ports | 30-ports (SFP+) with 10 Gbps speed provided on the dedicated card polutated with 20 nos. of 10G singlemode SFP modules. |
|   | 40 x 10/100/1000 BaseT RJ 45 ports provided on the dedicated card( separate from 10G card). |
|   | 12 x 40G SFP ports distributed across the cards to have redundancy populated with 10 nos. of 40G singlemode QSFP modules. |
| Switching capacity | Aggregate capacity of 9 Tbps or more and performance of minimum of 5 Bpps |
| Per slot bandwidth |  480 Gbps full duplex |
| Architecture | The Switch should have a Truly Distributed Architecture. All Interface Modules should have all the resources for switching and Routing and should offer True Local Processing. |
|  | The chassis should be ready with all fabric cards (max supported) to provide full throughput of the System from day 1. |
|  | Redundant CPU from Day 1 |
|  | Redundant Power Supplies from Day 1 |
|  | 100% passive backplane/midplane |
|  | Fully decoupled control plane and data plane |
|  | Support for 40G and 100G ports from Day 1 |
|  | Support up to 144 10 Gigabit Ethernet or 144 Gigabit Ethernet ports |
| High Availability features | There should not be any single point of failure in the switch. All the main components like CPU module, switching fabric, power supplies and fans etc should be in redundant configuration. Components, like modules/power supplies/fan tray should be Hot Swappable |
|  | The switch should have redundant Switch Fabric. |
|  | Support for Hot Swap of all redundant components: Line Cards, Fabric, power supply, and fan trays |
|  | Should support Multi-Chassis Link Aggregation Group for providing redundancy in the event of one of the chassis failed. |
|  | Should Support software upgrades with minimal traffic disruption during the upgrade |
|  | Switch should support processes to be run in protected memory space and independent of each other and the kernel, providing fault containment and enabling modular patching and upgrading and rapid restarting. Individual processes should be restarted independently without loss of state information and without affecting data forwarding.  |
| Memory | 16 GB DRAM  |
| Logical Systems | Should support multiple logical devices that perform independent routing tasks and having its own configuration. It should allow switches to be virtualized at the device level. |
| Layer 2 features | Should support Industry Standard Port/Link Aggregation for All Ports. Also Cross Module Link aggregation should be supported |
|  | Jumbo Frames support up to 9K Bytes  |
|  | Should support  port, subnet based 802.1Q VLANs. The switch should support 4,000 vlans |
|  | The switch should support 512K MAC addresses. |
|  | The switch should support IEEE 802.1w RSTP and IEEE 802.1s MSTP |
| Routing Protocols | Should support RIP v1/v2, OSPF v1/v2 from Day 1 |
|  | Should support BGPv4, IS-IS |
|  | Should support IPv6 packet switching and routing using OSPFv3, RIPng in hardware from day 1. |
|  | Should support minimum 512K Route entries for IPv4 and IPv6  |
| Security features | Should support Access Control Lists |
|  | Should support various type of ACLs like port based/vlan based. |
|  | Should support integrated security features like DHCP relay with option-82, Dynamic Arp Inspection |
|  | Should Support MAC Address Filtering based on source and destination address |
|  | Should have support for RADIUS and TACACS+ |
|  | The switch should support Port-security. |
| Network protocols | Should Support VRRP Protocol or equivalent from Day 1 |
|  | Should support MPLS. In case these features are nor supported in the chassis, vendor need to propose the equivalent functionality on separate device to ensure compliance and interoperability |
|  | The Switch should support GRE tunneling protocol |
| Traffic policing | Should support Ingress/Egress Queuing |
|  | Should be able to filter, mark and limit traffic flows  |
|  | Should support minimum 8 queues per port |
|  | Should support policy based traffic classification based on Type of Service (ToS), IP Precedence mapping, Layer 2/3/4 defined traffic flows, MAC address, VLANs |
| Multicast | Should support H/W based IPv4 and IPv6 Multicasting |
|  | Should Support IGMP v1, v2 , v3, IGMP Snooping |
|  | Should support 128K IPv4/IPv6 multicast routes |
|  | Should support Protocol Independent Multicast - Sparse Mode and PIM - SSM, MSDP |
| Network monitoring /management | Switch should be manageable through NMS on per port/switch basis with common interface for all manageable devices on the network. Should Support SNMP, RMON/RMON-II, SSH, telnet, web management through network management software. |
|  | Should support port mirroring feature for monitoring network traffic. |
|  | The switch should support role based access control to limit access to switch operations. |
|  | Should have modular OS and should support configuration roll back to recover mis-configured switch to last known good configuration |
| IEEE Standards | IEEE 802.1AB |
|  | IEEE 802.1D |
|  | IEEE 802.1p |
|  | IEEE 802.1Q |
|  | IEEE 802.1s |
|  | IEEE 802.1w |
|  | IEEE 802.3ae |
|  | IEEE 802.3ba |
|  | IEEE 802.3ah |
|  | IEEE 802.3ad |
| Certification | EAL3/ NDPP or above Certified |
|   | OEM should have atleast 8 spare depot in India. |
| NMS | The switch shall support command line and NMS based configuration management. |
|   | a) The Network Management System (NMS) shall provide full featured management and control of all the offered network elements (for the switches). |
|   | b) The NMS shall include the functionality of system configuration, network monitoring, alarm management, data acquisition for analog monitoring, performance monitoring, reporting, housekeeping etc. |
|   | c) The offered NMS system shall support management of up to at least 200 switches, as the network grows and expands in the future. |
|   | d) Proposed NMS should be from the same OEM |

### 24 Port Distribution Switch Every Building Block /KU/Office

|  |  |
| --- | --- |
| **Sl. No.** | **Technical Specifications** |
|  | **Architecture** |
| **1** | With Minimum 24 1G/10G ports from day 1 and scalable to 40 x 1/10G fiber ports |
| **2** | Should have 4x 40G Uplink interface. |
| 3 | Switch capacity - 1.4 Tbps or higher |
| 4 | Switch forwarding rates – 1Bpps or higher |
| **5** | Non-blocking switch architecture and modular operating system |
|  | **Switching features** |
| 6 | 802.3ad based standard port/link aggregation, Jumbo frames, storm control |
| Support at least 4000 VLAN and 280,000 MAC Address |
| 7 | FIP snooping ,Datacenter bridging exchange (DCBX) and IEEE 802.1Qbb (PFC) from day1 |
|  | **Security** |
| 8 | 802.1X Network Security and Radius/TACACS AAA authentication |
| MAC Address filtering based on source and destination address |
| 9 | support for various ACLs like port based, vlan based and L2- L4 ACL's |
| 10 | Should have Control plane (DoS) protection |
| 11 | The switch should support MACsec, SSH v1 & v2 and Dynamic ARP inspection |
| Port ACL, VLAN ACL, Router ACL |
| 12 | ACL entries: 1500 |
| 13 | Proxy ARP |
|  | **Network Protocols** |
| 14 | Layer3 routing protocols like Static, RIP, OSPF, RIPnG, OSPFv3 from day 1 for the solution. |
| 15 | IPv4 unicast routes: 128,000 prefixes |
| 16 | IPv6 unicast routes: 60,000 prefixes |
| 17 | Should support Address Resolution Protocol (ARP) entries: 48,000  |
| 18 | The switch should support MPLS, L2 and L3 VPN and IPv6 Tunneling |
|  | **Quality of Service** |
| 19 | 8 number of hardware queues per port |
| 20 | DSCP, 802.1p and FCoE |
|  | **Multicast** |
| 21 | IGMP v1,v2,v3, IGMP snooping, PIM SM and MSDP |
| 22 | IPv4 multicast routes: 100,000 and IPv6 multicast routes: 48,000 |
|  | **High Availability** |
| 23 |  The switch should support Non-stop bridging and Non-stop routing |
| 24 | The switch should support ISSU and BFD |
|  | **Management** |
| 25 | SNMP v1, v2, v3, RMON/RMON-II enabled, SSH, telnet, GUI, Web management and should have dedicated Management port |
|
| 26 | The switch should support CLI via console, telnet, or SSH and should have image rollback option.  |
| 27 | Should have Out-of-band management port |
| 28 | Switch should support port mirroring feature for monitoring network traffic of a particular port/VLAN. |
| Switch should support Link Aggregation on two different switches |
| 29 | Built-in real-time performance monitoring capabilities |
| 30 | Power Supply: Switch should have internal Hot Swappable Redundant Power supply  |
| 31 | Cooling Fans: Should have redundant cooling FANS |
| The switch should support NEBS |
| 32 | Switch should be stackable/VPC/Equivalent (All accessories to be provided from day 1) |
| 33 | The Switch should be EAL3/ NDPP certified |
| 34 | Should have modular OS and should support configuration roll back to recover mis-configured switch to last known good configuration |
|  | OEM should have atleast 8 spare depot in India. |
|  | **NMS** |
| 35 | The switch shall support command line and NMS based configuration management. |
|  | a) The Network Management System (NMS) shall provide full featured management and control of all the offered network elements (for the switches). |
|  | b) The NMS shall include the functionality of system configuration, network monitoring, alarm management, data acquisition for analog monitoring, performance monitoring, reporting, housekeeping etc. |
|  | c) The offered NMS system shall support management of up to at least 200 switches, as the network grows and expands in the future. |
|  | d) Proposed NMS should be from the same OEM |

###  48 Port POE+ Access Switch Every Floor

|  |  |
| --- | --- |
| **Item** | **TECHNICAL SPECIFICATIONS** |
| 1 | Minimum 48 ports of 10/100/1000 base-T POE/POE+ and 4 SFP+ 1G/10G uplink ports from day 1 (populated with required modules). |
| 2 | 1 U Rack mountable and should provide stacking of minimum 9 switches with 40Gbps of dedicated stacking bandwidth (All required accessories, licenses to be provided). |
| 3 | 176 Gbps or higher Backplane capacity and minimum 130 Mpps of forwarding rate |
| 4 | Should support Non-blocking and distributed forwarding hardware architecture |
| 5 | All interfaces should provide wire speed forwarding for both Fiber and copper modules |
| 6 | Should have support for internal/external redundant power supply |
| 7 | Memory: 1GB DRAM, 1GB Flash |
| 8 | Switch should have min of POE/POE+ power budget of 740W. |
| 9 | Support for at least 4000 VLANs & 16k MAC address |
| 10 | It should support IGMP snooping v1 & v2 |
| 11 | Should support IPv4 unicast routes: 6000 |
| 12 | It should have static IP routing and RIP from day 1 |
| 13 | Should be upgradable to OSPF, OSPFv3, RIPnG, PIM, MLD |
| 14 | Should support Address Resolution Protocol (ARP) entries: 4,000  |
| 15 | Switch should support 8 hardware queues per port |
| 16 | Dynamic Host Configuration Protocol (DHCP) snooping |
| 17 | Switch should support LLDP and LLDP-MED capabilities |
| 18 | Should support IP source guard &DAI |
| 19 | Should have proxy ARP  |
| 20 | Should support Port ACL, VLAN ACL, Router ACL |
| 21 | Should support ACL entries: 1500 |
| 22 | Should support MAC limiting |
| 23 | Should support Secure Shell (SSH) Protocol and telnet |
| 24 | Switch needs to have console port for administration & management |
| 25 | Should have Out-of-band management port |
| 26 | Management using CLI, GUI using Web interface should be supported |
| 27 | FTP/TFTP for upgrading the operating System |
| 28 | IEEE 802.1x support |
| 29 | IEEE 802.1D Spanning-Tree Protocol |
| IEEE 802.1p class-of-service (CoS) prioritization |
| IEEE 802.1Q VLAN |
| IEEE 802.3 10BASE-T specification |
| IEEE 802.3u 100BASE-TX specification |
| 30 | Operating temperature: 32° to 113° F (0° to 45° C)  |
| 31 | SNMP v1,v2,v3 |
| Switch should be manageable through both IPv4 & IPv6. |
| Switch should be FCC Part 15, ICES-003, VCCI Class A, EN 55022, EN 55024, EN 300386, CAN/CSA 22.2 No.60950-1, IEC60950-1, Reduction of Hazardous Substances (ROHS) 6 certified |
| Switch Should have NDPP or EAL3 certified |
| Should have modular OS and should support configuration roll back to recover mis-configured switch to last known good configuration |
| 32 | OEM should have atleast 8 spare depot in India. |
|   | **NMS** |
| 33 | The switch shall support command line and NMS based configuration management. |
|   | a) The Network Management System (NMS) shall provide full featured management and control of all the offered network elements (for the switches). |
|   | b) The NMS shall include the functionality of system configuration, network monitoring, alarm management, data acquisition for analog monitoring, performance monitoring, reporting, housekeeping etc. |
|   | c) The offered NMS system shall support management of up to at least 200 switches, as the network grows and expands in the future. |
|   | d) Proposed NMS should be from the same OEM |

### Steel Wire Rope Hangers& Supports

1. Wire Hangers shall be used to suspend all static LV services.

Wire Hangers should consist of a pre-formed wire rope sling with a range of end fixings to fit various substrates and service fixings, these include a ferruled loop, permanently fixed threaded M6 (or M8, M10) stud, permanently fixed nipple end with toggle, at one end or hook or eyelet, cladding hook, barrel, wedge anchor, eyebolt anchor or any other end fixture type or size as per manufacturers recommendation and design. The end fixings and the wire must be of the same manufacturer with several options available. The system should be secured and tensioned with a Hanger self-locking lock at the other end comprising of a single piece housing; the wedge inside the lock housing should be having serrated teeth & made up of sintered steel and springs used, if any, should be made up of stainless-steel. Once the grip is locked for safety purpose unlocking should only be done by using a separate setting key and should not be an integral part of the self-locking grip for safety purpose. Only wire and/or supports supplied and/or approved, shall be used with the system.

* Wire Hangers should have been independently tested by Lloyds Register. APAVE, TUV, CSA, Chiltern International fire, ADCAS, Intertek, ECA, and SMACNA, approved by ULC and CSA and comply with the requirements of DW/144 and BSRIA – wire Rope Suspension systems. Wire rope should be manufactured to BSEN 12385: 2002
* The contractor shall select the correct specification of wire hanger to use for supporting each particular service from table 1 below. Each size is designated with a maximum safe working load limit (which incorporates a 5:1 safety factor).

The correct specification of wire hanger required is determined using the following formula.

Weight per meter of object suspended (kg) X distance between suspension points (m) = weight loading per Hanger suspension point (kg).

Where the installed wire rope is not vertical then the working load limit shall be reduced in accordance with the recommendations give in the manufacturer’s handbook.

The contractor shall select the correct length of wire rope required to support the service. Lengths from 1-10m lengths. Specials can be made, check with manufacturer. No in–line joints should be made in the rope.

Table. 1



The standard range of Hanger Kits should contain galvanized high tensile steel wire rope or stainless-steel wire rope as per the application, the minimum specification is as above and should be manufactured to BS 302 (1987), BSEN12385. Comply with manufacturer's load ratings and recommended installation procedures. Note the testing is done to the minimum breaking load of the wire thus giving a minimum safety factor of 5: 1.

1. Supports can be provided for: Busbar, Cable Ladder, Cable Tray, Cable Basket, Channel, Trunking, Light Rafts, Luminaires, Secondary Supports, Safety Lines, High Bay/Low Bay Lights, Electrical Cables, CCTV and Catenary Supports: Y-Fit solution shall be used to a maximum width of 500mm Cable Tray. For Tray over 500mm cradle support method or independent supports must be taken as appropriate based on load. Any other solution can be used based on manufacturer’s recommendation on site conditions after prior approval.
2. Catenary Supports: Refer to manufacturer’s recommendations on Catenary supports with C-clip, special care should be taken with tensioning of the wire and angles at which the installation of services are made.
3. Stainless Steel Supports should be available for food, chemical and High Corrosion areas near coastlines.

Refer to manufacturers catalogue and installation guide for further technical information. Comply with manufacturer's load ratings and recommended installation procedures.

All supporting system to be provided by same manufacturer.

C.7 VIDEO CONFERENCING & AUDIO VISUAL SYSTEM

### Conference Room

**1.1 Display and Video System**

* Input Source: 3 Nos. of Pop up box with Connectivity for VGA + Audio and HDMI and universal power outlet mounted on the conference table.
* 98 Inch Diagonal Ultra High Definition D- lit LED Display.
* Wireless Presentation device has been considered for presentation from smart phones and tablets as well ( Ios and Android only ).
* The same can also be used for sharing the content through laptops as well (Windows and Mac only)
* Note: Playback of videos is not recommended through the wireless presentation device. There may be latency. Video Frame rate supported is Maximum 1080p @ 15 Fps
* An intermediate HDCP Compliant presentation switcher manages the AV signal flow.

**1.2 Audio System**

* The system is designed to provide program audio playback, and audio output of VC session through fixed install ceiling speakers.
* Chairman Delegate system has been considered for local speech reinforcement purpose.
* The same system can also be used for audio interaction with the far end audience during VC session. Provision has been kept in the backend for future integration of the same.
* Multichannel Audio DSP with manages the audio signal flow.

**1.3 Control System**

* A Wireless Touch panel IPAD has been incorporated with intuitive GUI for easy control of the AV equipments at the touch of a button.
* Control processor with 2-Way RS-232, 1 Way RS-232, IR and Relay ports has been incorporated for achieving the desired AV equipment control like signal routing, On/Off application of the AV devices, VC Camera control , Volume control etc.

**1.4 Installation System**

* Industry standard modular equipment rack 17U has been considered for storage of the proposed AV equipments and provides ease of access for future servicing requirements.
* It is recommended that the equipment rack be opened or operated under the instructions of trained personnel.

### Video Conference Room

**2.1 Display and Video System**

* Input Source: 3 Nos. of Pop up box with Connectivity for VGA + Audio and HDMI and universal power outlet mounted on the conference table.
* Output Device: The system has been designed for local presentation & VC Application on a 98 Inch Diagonal Ultra High Definition LED Display.
* Note: Its assumed that the ambient light is suitably controlled in site with proper drapes/blackout shades provided by client/other vendor sufficient enough for obtaining appropriate lux level on the screen surface.
* Wireless Presentation device has been considered for presentation from smart phones and tablets as well (IOS and Android only).
* The same can also be used for sharing the content through laptops as well (Windows and Mac only)
* Note: Playback of videos is not recommended through the wireless presentation device. There may be latency. Video Frame rate supported is Maximum 1080p @ 15 Fps
* An intermediate HDCP Compliant presentation switcher manages the AV signal flow.

**2.2 Audio System**

* The system is designed to provide program audio playback, and audio output of VC session through fixed install ceiling speakers.
* Audio interaction with the far end audience during VC session will happen with the
* microphones of the VC end point itself.
* Multichannel Audio DSP with manages the audio signal flow.

**2.3 Video Conferencing System**

* The system has been designed to enable to establish a multiparty video call with far end participants at high level Full HD 1080p resolution. The transmission medium for video conferencing will be IP.
* Video capture of near end participants will be performed through a PAN/TILT/ZOOMHD camera, mounted beneath the display at a height of approximately 3.5 feet from the floor.
* Audio interaction with the far end audience during VC session will happen with the microphones of the VC end point itself.
* The room should be properly acoustically treated and no lighting fixtures and AC vents should be there in the direct proximity of the microphone
* All backend LAN Network /IT infrastructure for VC application will be provided by client.

**2.4 Control System**

* A Wireless Touch panel IPAD has been incorporated with intuitive GUI for easy control of the AV equipments at the touch of a button.
* Control processor with 2-Way RS-232, 1 Way RS-232, IR and Relay ports has been incorporated for achieving the desired AV equipment control like signal routing , On/Off application of the AV devices , VC Camera control , Volume control etc.

**2.5 Installation System**

* Industry standard modular equipment rack 17U has been considered for storage of the proposed AV equipments and provides ease of access for future servicing requirements.
* It is recommended that the equipment rack be opened or operated under the instructions of trained personnel.

**2.5 Schematic Diagram for Video Conference Room: -**



### Board Room

**3.1 Display and Video System**

* Input Source: 3 Nos. of Cable Cubby with Pass through connectivity for VGA + Audio and HDMI and universal power outlet mounted on the conference table.
* Output Device: The system has been designed for local presentation on a 98 Inch Ultra High Definition LED Display.
* 4 Nos. of 65 Inch LED Display has been considered on the side walls for the rear seated audience.
* A 43 Inch Full HD LED Display has been considered as a preview monitor for the chairman
* Wireless Presentation device has been considered for presentation from smart phones and tablets as well ( Ios and Android only ).
* The same can also be used for sharing the content through laptops as well (Windows and Mac only)
* Note: Playback of videos is not recommended through the wireless presentation device. There may be latency. Video Frame rate supported is Maximum 1080p @ 15 Fps
* Note: Its assumed that the ambient light is suitably controlled in site with proper drapes/blackout shades provided by client/other vendor sufficient enough for obtaining appropriate lux level on the screen surface.
* Note: Suitable reinforcement for mounting the LED display on the front wall if needed will be in the client scope.
* An intermediate HDCP Compliant presentation switcher manages the AV signal flow.

**3.2 Audio System**

* The system is designed to provide program audio playback and speech reinforcement through fixed install ceiling speakers and FOH speakers
* Chairman Delegate system has been considered for local speech reinforcement purpose.
* Wireless Handheld & Lapel microphones have also been considered as a provision for speech reinforcement.
* Multichannel Audio DSP with manages the audio signal flow.
* Provision has been kept for future integration with VC application.

**3.3 Control System**

* A Wireless Touch panel IPAD has been incorporated with intuitive GUI for easy control of the AV equipments at the touch of a button.
* Control processor with 2-Way RS-232, 1 Way RS-232, IR and Relay ports has been incorporated for achieving the desired AV equipment control like signal routing , On/Off application of the AV devices , VC Camera control , Volume control etc.

**3.4 Installation System**

* Industry standard modular equipment rack 24U has been considered for storage of the proposed AV equipments and provides ease of access for future servicing requirements.
* It is recommended that the equipment rack be opened or operated under the instructions of trained personnel

**3.5 Schematic Diagram For Board Room :- **

C.8 TECHNICAL COMPLIANCE / DATA SHEET FOR AUDIO & VIDEO SOLUTION FOR CONFERENCE & BOARD ROOM

**MINIMUM SPECIFICATION OF 98” ULTRA HD LED DISPLAY**

|  |  |
| --- | --- |
| Sr. No. | description |
| 1 | Screen Size | 98" Or Higher Led Back Lit Panel |
| Native Resolution | 3840 X 2160 (Uhd) |
| Brightness | 500cd/M2 Maximum |
| Viewing Angle(H X V) | 178 X 178 |
| Connectivity |   |
| Input Ports |   |
| Digital | Hdmi(2), Display Port(1), VGA(1)  |
| External Control | Rs232c(1), Ir(1, Internal) |
| Bezel Size | 16.1 mm |
| Output Ports |   |
| External Control | Main : Rs232c(1),  |
| Audio |   |
| Audio Power | 20w (10w X 2)  |
| Warranty  | 1 Years  |
| Run Time | 24/7 operation |

**VIDEO CONFERENCING ENDPOINT**

|  |  |  |
| --- | --- | --- |
| **Sr. No.** | **Product** | **Description** |
|  2 |  **VIDEO CONFERENCING ENDPOINT** | Package-Full HD 1080p camera, Full HD 1080p Codec, Microphone, Cables, and Wireless Remote Control |
| Protocols- H.323 and SIP Compliant, H.261, H.263, H.264. The system should support higher Video Compression protocols such as H.264 SVC/H.265, H.239 , BFCP, H.263 & H.264 Video error concealment, G.711, G.722, G.722.1 audio protocols, H.281 far end camera control |
| Video Inputs -It should have 1 x HD Camera Interface. It should have another inbuilt 2 x HDMI/DVI/VGA port for PC, Document Camera etc. |
| Video Outputs- It should have atleast 2 x HDMI/DVI ports to connect displays. |
| Main Video Resolutions- Shall work in high definition video resolution of 1080p60fps for live video for both Transmit and receive |
| Content Resolutions-The system should support 1080p30fps content along with 1080p30fps Main Video |
| Camera-Full HD 1080p 60 fps, 1280 x 1080p CCD imager, Zoom - 12X or more, Field of View - 250 Degrees or Higher Horizantal FOV, Camera should be supplied with cable of min. 3 mts, It should be capable of enhancing video conferencing experience (by adding additional hardware/software in future) with advanced speaker-tracking technology such that it automatically scans the room and seamlessly commands the main camera to appropriately frame the speaker during a call without any manual intervention. |
| Audio Inputs-It should support 3 nos of Omni Directional Microphones either directly or through array. Three Mic should be supplied from day one. All Mic should be operate from Single Remote, It should have additional Audio Input for PC Audio. |
| Audio Outputs-It should have atleast 1 x HDMI port, It should have atleast 1 x 3.5mm/RCA Stereo Line-Out port |
| Network-Should have 100/1000 Mbps auto speed Ethernet port, Support Data Rate of 6 Mbps or more on IP (H.323 and SIP) |
| Multipoint-The system should have capability to connect to 3 more locations all with Full HD 1080p resolution (1+4) using the inbuit capability |
| Other Ports-Serial/Ethernet control port for integrating with external control system |
| Other Features- Should work with IPv4 and IPv6 addressing schemes, Should support QOS (Quality of Service) definitions, Should support H.460.X Firewall traversal protocol, Global Directory / Centralized directory support |
| Power- Should operate on 230v, 50 Hz Power supply |
|  |  |  |
| **Ceiling Microphone for VC System** |
|  |  |  |
| **Sr. No.** | **Product** | **Description** |
| 3  | Ceiling Microphone for VC System  | VC System Should be supplied with three nos ceiling Microphone |
| It should have 360° voice pickup |
| Each Ceiling microphone array should covers a 20' diameter |
| It should include three cardioid elements per microphone-elements spaced 120 degrees apart |

**Control Processor**

| **Sr. No.** | **Product** | **Description** |
| --- | --- | --- |
|  |  |  |
| 4 | Control ProcessorControl Processor | Should have minimum 3 RS-232 ports |
| Should have minimum 8 IR Ports |
| IR Port should be able to handle 1-way serial TTL/RS-232 (0-5 Volts) up to 115.2k baud |
| Should have minimum 8 Low Voltage Relay Ports |
| Relay Port should be Rated minimum 1 Amp, 30 Volts AC/DC |
| Should have MOV arc suppression across contacts |
| Should have minimum 8 I/O Versiports |
| (1) 9-pin 3.5mm detachable terminal block comprising (8) “Versiport” digital input/output or analog input ports (referenced to GND);Digital Input: Rated for 0-24 Volts DC, input impedance 20k Ohms, logic threshold >3.125V low/0 and <1.875V high/1;Digital Output: 250mA sink from maximum 24 Volts DC, catch diodes for use with “real world” loads;Analog Input: Rated for 0-10 Volts DC, protected to 24 Volts DC maximum, input impedance 21k ohms with pull-up resistor disabled;Programmable 5 Volts, 2k ohms pull-up resistor per pin |
| Should have minimum 512MB SD RAM |
| Should have minimum 4GB Flash memory |
| Should support Expandable storage up to 1TB |
| Should have minimum (1) High-speed USB 2.0 host port to support Mass Storage |
| Should support ethernet with 10/100BaseT, auto-negotiating, full/half duplex, static IP or DHCP/DNS, SSL, TCP/IP, UDP/IP, CIP, SMTP, SNMP, built-in Web server and e-mail client |
| It should support SSL (Secure Sockets Layer) |
| It should have Built-in SNMP support |
| Should support IIS v.6.0 Web Server |
| Should have IPv6 Support |
| Should have Native BACnet®/IP support |
| Should support FAT32 file system with long names |
| Should be controllable thru PC thru browser or application file |
| Should be able to be controlled thru Mobile Devices like Ipad, Iphone, Android without the need of any additional hardware |
| Appropriate power supply for the controller should be included in the BOQ. |
|  |  |  |
| **Mobile Application** |
| **Sr. No.** | **Product** | **Description** |
| 5 | Mobile Application | Should be a supported control app for Apple® iOS® and Android™ devices with the control processor |
| Should have extensively customizable user interface |
| Should support full system control with real-time status feedback |
| Should utilizes SSL secured communication over Wi-Fi |
| Should support SIP Intercom natively |
| Should support H.264 Video streaming |
| Should be through in-app purchase / free as per respective application store for iPad or Android tablet |
|  |  |  |
| **Tablet with Docking Station** |
| **Sr. No.** | **Product** | **Description** |
| 6 | Touch Screen |  Multi Touch Touch Screen |
| LED Backlit Technology |
| Type Min 9.7" or bigger capacitive |
| Resolution 2048 x 1536 or better |
| Storage Min 32 GB |
| Flash Memory 32 GB |
| IPS TFT Technology |
| 264 Pixel Density |
| 64 bit computing |
| Interfaces 1x Headphones Mini Jack (3.5 mm), 1 X ligtning |
| Should have form fitting sleeve which provide safe home to tablet |
| Wireless Protocol 802.11a/b/g/n/ac, Bluetooth 4.2 technology |
| Docking Station Should have wireless inductive charging, Magnetic table top Mounting station, 360° rotation and tablet functioning during charging. |
|  |  |
| **12 U Equipment Rack** |
| **Sr. No.** | **Product** | **Description** |
| 7 | Rack | Size 12U |
| Cabinet MS Steel powder coated with front Glass lockable door |
| Feature Rear lockable door, 4 nos Cooling fans, tray & power strips with 12 nos Power sockets of 15/5 amp with fuse. |
|  |  |  |
|  |  |  |
| **24 U Equipment Rack** |
| **Sr. No.** | **Product** | **Description** |
| 8 | Rack | Size 24U |
| Cabinet MS Steel powder coated with front Glass lockable door |
| Feature Rear lockable door, 4 nos Cooling fans, tray & power strips with 12 nos Power sockets of 15/5 amp with fuse. |

**4K Digital Media Receiver & Room Controller**

| **Sr. No.** | **Product** | **Description** |
| --- | --- | --- |
|  |  |  |
| 9 | 4K Digital Media Receiver & Room Controller with Scaler | Should be a HDBaseT or STP/UTP Receiver compatible with matrix switcher of same OEM and HDBaseT Transmitter |
| Should have built in scaler. |
| Should have 1 HDBaseT Input and 1 HDMI Ouput, 1 RS232, 1 IR |
| Should have 1 10/100 Mbps, auto-switching, auto-negotiating, auto-discovery, full/half duplex, DHCP ethernet port |
| Should handle input video resolutions interlaced resolutions : Upto 1920x1080 HD 1080i@30Hz |
| Should support 3D Video for 3D Display |
| Should be able to handle Dolby Digital®, Dolby Digital EX, Dolby Digital Plus, Dolby® TrueHD, Dolby Atmos®, DTS®, DTS-ES, DTS 96/24, DTS-HD High Res, DTS-HD Master Audio™, LPCM up to 8 channels audio |
| Should be HDCP 2.2 Compliant |
| Should Support management of HDCP and EDID also with management of CEC between the connected HDMI and/or HDBaseT device(s) using a control system |
| Should be able to handle 4K video resolutions up to 330feet(100Meter) using specialized ultra high bandwidth cable or of same OEM make Ultra Cable |
| Should have atleast 1 serial port which supports 2-way device control and monitoring up to 115.2k baud with hardware and software handshaking (via control system) |
| Should have minimum of 2 Infrared ports which supports 1-way device control via infrared up to 1.1 MHz or serial TTL/RS-232 (0-5 Volts) up to 19.2k baud (via control system) |
| Should support and pass HDCP 2.2, EDID, CEC, & Ethernet |
| Should have front LEDs and indicators to show signal presence, Power and active status link with pushbuttons for Reset and setup of device |
|   |   |   |

**Multi format Scaler & Extender**

| **Sr. No.** | **Product** | **Description** |
| --- | --- | --- |
| 10 | Multiformat Scaler & Extender | Should be a multiformat scaler with transmitter receiever pair extender on a single CAT Type cable |
| Should have atleast 2 HDMI inputs and 1 VGA with Audio Inputs |
| For Each HDMI Input: it should support the following resolutions on Progressive:-640x480@60Hz, 720x480@60Hz (480p), 720x576@50Hz (576p), 800x600@60Hz, 848x480@60Hz, 852x480@60Hz, 854x480@60Hz, 1024x768@60Hz, 1024x852@60Hz, 1024x1024@60Hz, 1280x720@50Hz (720p50), 1280x720@60Hz (720p60), 1280x768@60Hz, 1280x800@60Hz, 1280x960@60Hz, 1280x1024@60Hz, 1360x768@60Hz, 1365x1024@60Hz, 1366x768@60Hz, 1400x1050@60Hz, 1440x900@60Hz, 1600x900@60Hz, 1600x1200@60Hz, 1680x1050@60Hz, 1920x1080@24Hz (1080p24), 1920x1080@25Hz (1080p25), 1920x1080@50Hz (1080p50), 1920x1080@60Hz (1080p60), 1920x1200@60Hz, plus any other resolution allowed by HDMI up to 165MHz pixel clock |
| It should support the following resolutions on Interlaced :- 720x480@30Hz (480i), 720x576@25Hz (576i), 1920x1080@25/30Hz (1080i25/30), plus any other resolution up to 165MHz pixel clock |
| The VGA input should support 640x480@60/72/75/85Hz, 720x480@60Hz (480p), 720x576@50Hz (576p), 800x600@56/60/72/75/85Hz, 848x480@60Hz, 1024x768@60/70/75/85Hz, 1280x720@50/60Hz (720p50/60), 1280x768@60Hz, 1280x800@60Hz, 1280x960@60Hz, 1280x1024@60/75/85Hz, 1360x768@60Hz, 1366x768@60Hz, 1400x1050@60Hz, 1440x900@60Hz, 1600x1200@60Hz, 1680x1050@50/60Hz, 1920x1080@50/60Hz (1080p50/60), 1920x1200@60Hz [12], plus any other resolution up to 165MHz pixel clock |
| Should have scaled output resolutions support as 640x480@60Hz, 720x480@60Hz (480p), 720x576@50Hz (576p), 800x600@60Hz, 840x480@60Hz, 1024x768@60Hz, 1280x720@50/60Hz (720p50/60), 1280x768@60Hz, 1280x800@60Hz , 1280x960@60Hz, 1280x1024@60Hz, 1360x768@60Hz, 1366x768@60Hz, 1400x1050@60Hz, 1440x900@60Hz, 1600x900@60Hz, 1600x1200@60Hz, 1680x1050@60Hz, 1920x1080@24/50/60Hz (1080p24/50/60), 1920x1200@60Hz |
| Should be an autoswitcher selecting last connected input |
| Should aslo have a HDMI port at the receeiver and should be included in auto-switching of inputs |
| Should also pass Dolby® TrueHD, Dolby Atmos®, DTS-HD®, and 7.1 linear PCM audio signals through the HDMI input to output |
| It should have extensive EDID Management |
| It should enable HDCP sources to be switched |
| Should have LEDs to indicate the active input and output signal presence |
| Should have a 10/100 Mbps, auto-switching, auto-negotiating, auto-discovery, full/half duplex, DHCP, Web browser setup and control, with control system integration |
| Should be rack-mountable or freestanding with proper Metal enclosure as per standards and vented sides |
|   |   |   |
| **Wireless Presentation Gateway** |
|   |   |   |
| **Sr. No.** | **Product** | **Description** |
| 11 | Wireless Presentation Gateway | Should be a BYOD Wireless Presentation devices |
| Provides a presentation on the room display from their personal iOS or Android mobile device, MacBook and PC laptops via wirelessly |
| Should be able to work out-of-the box |
| Should provide an application support for IOS or iOS Mirroring with Apple Airplay Support and Android Devices through which device can be connected. |
| Should support up to 4 Simultaneous Users |
| Should allow the control of presentation content when many users connected, this feature can also be done with mobile app or touch panel of same manufacturer. |
| Should allow simultaneous display of up to four presentation sources in a quad window  |
| Should allow the users to view the onscreen Presentation content as static images on their own web browser as remote view |
| Software should provide the scanning of wireless presentation gateway on the network when multiple wireless presentation available on the network. |
| Should guide the user from Display to connect their Device via wireless. |
| Should support SNMP in order to manage multiple wireless presenter or can experience the power of smart building with the same OEM enterprise management software  |
| Should support Output Signal Types: HDMI (DVI Compatible), RGB and supported format HDMI, DVI, HD video up to 1080p60, computer up to UXGA  |
| Should have audio Output Signal Types: HDMI, analog stereo Formats, Analog: Stereo 2-channel |
|   |   |   |
| **Presentation Switcher**  |
|   |   |   |
| **Sr. No.** | **Product** | **Description** |
| 12 | **Presentation Switcher** | Should be an Ultra high-definition, 8X1 multi-format presentation switcher, scaler. |
| Should have builitn configurationto perform auto-switching and run out-of-the box without programming |
|  Should Include four auto-switching HDMI®, VGA, and stereo analog audio inputs with HDMI w/Deep Color, 3D, & 4K (DVI & Dual-Mode DisplayPort compatible); & HDBaseT w/Deep Color, 3D, & 4K; RGB/VGA (RGBHV, RGBS, RGsB); component (YPbPr); S-Video (Y/C); composite (NTSC, PAL) compatible with use of appropriate adaptors |
| Should handle input video resolutions interlaced resolutions : Upto 4096x2160 4K @24Hz |
| Should have a minimum of 4 HDMI and 4 VGA with audio inputs  |
| Should support Multi-channel PCM, Dolby®, and DTS® audio signals at the HDMI and STP/UTP outputs |
|  Should have the latest technology to manage HDCP keys for fast, reliable switching |
| Should perform automatic AV signal format management via EDID |
| Should includes a single microphone input with EQ, gating, and compression |
| Should provide a HDMI output and a parallel DM 8G+ outputs for one or more display devices |
| Should have a high-performance 4K video scalers with motion-adaptive deinterlacing, intelligent frame rate conversion, Deep Color support, 3D to 2D conversion, content-adaptive noise reduction, and widescreen format selection (zoom, stretch, maintain aspect-ratio, or 1:1) at each HDMI output |
| Should be capable to upscale input signals to match the native resolution of any screen — including 4K and Ultra HD displays! |
| Should be capable to downscale 4K, UHD, and ultra high-resolution computer signals to fit 1080p and other lower-resolution displays |
| Should provides 3D to 2D signal conversion, and passes 3D video (without scaling) to 3D displays[7] |
| Should handle output video resolutions Progressive resolutions upto 4K DCI, 4K UHD & custom resolution at pixcel clock rate upto 300 Mhz. |
| Should provide a balanced stereo audio output with graphic EQ, limiting, and delay |
| Should include onboard IR, RS-232, digital input, and control ports to report to automation controller |
|  |  |  |
| **Cable Cubby** |  |
|  |  |  |
| **Sr. No.** | **Product** | **Description** |
| 13 |   | Type Attractive Design- Flush mountable into a table or flat surface, Powder Coated/ Anodized and metal enclosure |
| Connectivity Minimum One (1) HDMI, One(1) VGA,One (1) Audio, One (1) LAN (RJ-45) |
| Power Socket 2x universal power outlet |

**12 Input 8 Output Digital Signal Processor**

| **Sr. No.** | **Product** | **Description** |
| --- | --- | --- |
| 14 |  12x8 DSP Matrix , USB Audio, AEC, & AudioConferencing Interface | Should be able to deliver exceptional pro audio performance with faster, easier implementation. |
| Should have atleast twelve balanced microphone/line-level audio inputs with 66 dB gain range |
| Should have Input Level: +24 dBu maximum & Input Impedance: 10k Ohms balanced |
| Should support +48 Volts DC, 12 mA, software enabled/disabled per channel Phantom power |
| Should have atleast eight balanced/unbalanced line-level audio outputs; with output levels: +24 dBu maximum & Output Impedance: 150 Ohms Balanced |
| Should have a dynamic range : 110 dB, 22 Hz to 22 kHz, 0 dB gain |
| Should have a -85 dB, 1 kHz, +4 dBu input, channel to channel;-75 dB, 1 kHz, -50 dBu input, channel to channel Crosstalk support |
| Should support 8x8 USB 2.0 Audio interface 2 channels in & out or 8 channels in & out, 16 or 24 bit, 48 kHz |
| Should support SIP or POTS audio conferencing interface with 10Base-T/100Base-TX/1000Base-T Ethernet SIP VoIP network port & POTS (RJ11 wired interface) supporting DTMF & Caller ID, SIP (via Ethernet) supporting SIP server mode. |
|  Should have a dedicated 10/100/1000 Mbps, auto-switching, auto-negotiating, auto-discovery, full/half duplex, TCP/IP, UDP/IP, CIP, DHCP, SSL, SSH, SFTP (SSH File Transfer Protocol) ethernet port. |
| Should support AEC on each Analog inputs as Bandwidth: 20 Hz to 20 kHz; THD+N: 0.001%, +4 dBu input; Convergence Rate: 100 dB/s; Tail Length: 300 ms |
| Should have front panel LEDs indicating operating power supplied from AC line power and status indicators for its operation modes |
| Should support real time configuration and adjustment |
| Should be able to work offline or live Ethernet or USB |
| Should be able to work as a standalone or native integration of Control System with rapid programming support |
| Should elimates complicated UI Programming for Touch screen, IPAD/Android App for adjusting audio levels |
|  |  |  |
|  |  |  |
|  **Dual Channel Audio Power Amplifier** |
|  |  |  |
| **Sr. No.** | **Product** | **Description** |
|  |  | Energy Star Certified Power Amplifier |
| 15 |  | High-output power, low noise, low distortion performance |
| Each channel selectable for 4/8Ω, 70V, or 100V operation |
| Two channels each rated 100W@4Ω, 100W@8Ω, and 100W@70/100V |
| Transformer isolated 70 and 100 Volt outputs |
| Frequency Response: 20Hz – 20KHz |
| THD: <0.1% |
| S/N Ratio: 100dBA |
| Crosstalk: -75 dB |
| Low Noise, Low distortion, High headroom |
| It should have Convection cooling |
| Surface or Rack Mountable |
|  |  |  |
| **Multi Channel Audio Amplifier** |
| **Sr. No.** | **Product** | **Description** |
| 16 | Audio Amplifier | ENERGY STAR® qualified power amplifier |
| Ultra-efficient space-saving design |
| Low total cost of ownership |
| High-output power, low noise, low distortion performance |
| Each channel selectable for 4/8Ω, 70V, or 100V operation |
| Three channels each rated 210W@4Ω, 120W@8Ω, and 120W@70/100V |
| Transformer isolated 70 and 100 Volt outputs |
| Channels 1 and 2 bridgeable for 420W@8Ω |
| Individual channel power control via jumper or remote contact |
| Auto power-down after 30 minutes of no signal |
| Instant auto power-on when an input signal is detected |
| No inrush current during power-up |
| Over current and DC offset protection per output |
| Thermal protection on the power supply and each channel |
| Front panel signal, clip, and fault indicators per channel |
| Professional balanced inputs |
| Detachable terminal block connectors |
| Rear panel ±10dB input level controls |
| Convection cooled - no noisy fans |
| Single-space 1U rack mountable |
| Under 15 inches deep |
| Universal power supply with active power factor correction |
| **Compact 6.5" Ceiling Speakers** |
| 17 | Ceiling Speakers | 6.5" two way In Ceiling Speaker |
| Built-in 30 Watt 70/100 Volt or better Muti-tap transformer |
| Frequency response 95Hz to 15KHz |
| Program Power Handling 50 Watt at 8 Ohm or better |
| Coverage pattern 110° or better |
| Speaker Sensitivity 91 db or better |
|  |  |  |
| **Compact 4" Ceiling Speakers** |
| 18 | Ceiling Speakers | 4" two way In Ceiling Speaker |
| Built-in 30 Watt 70/100 Volt or better Muti-tap transformer |
| Frequency response 85Hz to 18KHz |
| Program Power Handling 40 Watt at 8 Ohm or better |
| Coverage pattern 90° or better |
| Speaker Sensitivity 89 db or better |
|  |  |  |
| **Compact 6.5" Surface Mount Speakers** |
| **Sr. No.** | **Product** | **Description** |
| 19 | Surface Mount Speakers | 6.5" two way Surface Mount Speaker |
| Built-in 60 Watt 70/100 Volt or better Muti-tap transformer |
| Frequency response 85Hz to 18KHz |
| Program Power Handling 150 Watt at 8 Ohm or better |
| Speaker Sensitivity 90 db or better |

**DIGITAL CENTRAL CONTROL UNIT**

| **Sr. No.** | **Product** | **Description** |
| --- | --- | --- |
| 20 | CENTRAL CONTROL UNIT | Central Control unit for powering, configuring and Controlling connected Chairman, Delegate units, and option to Connect and control without redundancy: max. 60 microphone units (30 per line) |
| The system should have in built digital processing and control/ transmission of the Digital audio signals. |
| Controller must have Inbuilt Recording through SD or USB Device, REC button to record audio signals. |
| NOM function – max. Number of open Microphones, up to 8 microphone units can be allocated simultaneously |
| RS232/RJ45 interface for control and configuration of the system |
| Operating modes: Normal – each participant can turn the microphone on or off |
| Voice activation – the microphone is activated when someone speaks into it |
| FiFo – when the number of open microphones is exceeded, the microphone which was activated first, will be deactivated |
| 1x unbal. audio input via RCA phono |
| 1x unbal. audio master output via RCA phono |
| 1x bal. audio master output via 3-pin XLR/ RCA phono |
| 2 x microphone/Chairman-delegate connections via RJ45/ with CAT5e cables |
| Internal/External feedback suppressor |
| **DIGITAL TABLE TOP WIRED CHAIRMAN UNIT** |
|  |  |  |
| 21 |   | Digital Chairman unit with Loudspeaker and Priority button along with fixed/Detachable gooseneck microphonewith GSM immunity and LED illuminated ring ,High quality loudspeaker ,Microphone on/off button ,Headphone volume control , RJ 45 or D9 or 6 Pole connector connectors for separate loop through cabling, Microphone length should not be less than 400 mm,3.5 mm jack socket for headphone. |
| Frequency Response: Close miking - 40 - 13,000 Hz or better. Distant miking (distance 1 m) -200 - 13,000 Hz or better. |
| SN Ratio with Mic: 62 dB or better |
| Transducer Type: Condenser (electret) or better |
| Pollar Pattern: Cardioid or better |
| Microphone Length: minimum 400 mm or better |
| System Connection: 2XRJ 45 Socket, Cat 5 cable |
| Volume Control: Yes |
| Temprature Range ( Humidity < 90%): 10 0C to 40 0C or better |
|  |  |  |
|  |  |  |
| **Sr. No.** | **Product** | **Description** |
|    22 |   | Digital delegate unit with Loudspeaker along with fixed/Detachable gooseneck microphone with GSM immunity and LED illuminated ring ,High quality loudspeaker ,Microphone on/off button ,Headphone volume control , RJ 45 or D9 or 6 Pole connector connectors for separate loop through cabling, Microphone length should not be less than 400 mm,3.5 mm jack socket for headphone. |
| Frequency Response : Close miking - 40 - 13,000 Hz or better. Distant miking (distance 1 m) - 200 - 12,000 Hz or better. |
| SN Ratio with Mic: 62 dB or better |
| Transducer Type: Condenser (electret) |
| Pollar Pattern: Cardioid or better |
| System Connection: 2XRJ 45 Socket/As per OEM, Cat 5 cable |
| Volume Control: Yes |
| Temprature Range ( Humidity < 90%): 10 0C to 40 0C or better |
| Headphone Output: Mini Jack Socket (3.5 mm Stereo) or better |
|  microphone should be programmed to track the camera during video conferencing etc. as reqd. |
|  |  |  |
| **WIRELESS HANDHELD MICROPHONE** |
|  23 |   | It shall be UHF Diversity Handheld wireless microphone. |
| LCD display for battery and frequency status and information. |
| One-Touch ClearScan and Ezsynch transmitter. |
| Rugged metal transmitters with backlit LCD display and battery gauge. |
| 32 preset channels, with compatible groups of 8 channels for simultanious use. |
| 14 hour battery life from two AA alkaline batteries. |
| Image Rejection > 55 dB |
| Frequency Response : 80 Hz – 18 kHz ± 2 dB |
| Balanced Output : 20 dBV (max @ 40 kHz deviation) |
| Unbalanced Output : Adjustable 8 mV to 0.755V RMS |
| Distortion : < 1.0%. |
| Signal-to-Noise Ratio: > 100 dB A-Weighted. |
| Dynamic Range > 95 dB |
| Balanced Output : 20 dBV (max @ 40 kHz deviation) |
| Unbalanced Output : Adjustable 8 mV to 0.755V RMS |
| Distortion : < 1.0%. |
| switching bandwidth Minimum 30Mhz Or better.  |
|  |  |  |
| **WIRELESS HEADWORN MICROPHONE** |
|  |  |  |
| **Sr. No.** | **Product** | **Description** |
| 24 |   | It shall be UHF Diversity Collar wireless microphone. |
| LCD display for battery and frequency status and information. |
| One-Touch ClearScan and Ezsynch transmitter. |
| Rugged metal transmitters with backlit LCD display and battery gauge. |
| 32 preset channels, with compatible groups of 8 channels for simultaneous use. |
| 14 hour battery life from two AA alkaline batteries. |
| Image Rejection > 55 dB |
| Frequency Response : 80 Hz – 18 kHz ± 2 dB |
| Balanced Output : 20 dBV (max @ 40 kHz deviation) |
| Unbalanced Output : Adjustable 8 mV to 0.755V RMS |
| Distortion : < 1.0%. |
| Signal-to-Noise Ratio: > 100 dB A-Weighted. |
| Dynamic Range > 95 dB |

**RECORDING AND STREAMING SERVER**

| **S. No.** | **Product** | **Description** |
| --- | --- | --- |
| 25 | Recording and Streaming Server | General | The recording and media streaming system should be an Appliance- based non Windows architecture (software based solution are not acceptable) having ability to : |
| a. Record minimum 4simultaneous video calls (expandable to 10or more recordings on the same box) up to 1080p at 4 Mbps on H.323 or SIP, with full video, audio and H.239 content for each recording session |
| b. Live stream and archive at 1080p, 30fps with at least minimum of two live streaming at 1080p, 30fps video. |
| The system should be compatible and inter-operable with the offered Endpoint and the total VC solution. All inter-connecting cables, hardware and software required shall be supplied along with the system. |
| Features | The system should have a minimum recording capacity of at least500hours / 600GB. Should have the capability to connect to the external storage also. |
| The system should have the feature to record and stream video, audio and H.239 dual-stream presentations from any H.323 or SIP videoconferencing unit or MCU |
| Trans-coding or re-encoding of video content |
| The system shall support synchronized streaming of video and presentation in live and on-demand modes. It should provide 720p HD and / 1080p live streaming capabilities options. |
| The system should support Unicast and Multicast streaming **of bothvideo and content.** |
| Recording | Flexible recording environments either initiated from an H.323 MCU or video endpoint (Record single point or multipoint conferences) |
| Record video at varying bit rates - HD 720p from 512Kbps and 1080p at 1024Kbps |
| Support minimum**4** concurrent video conferencing recording sessions |
| Should support recording of both Video and content without losing the recording ports |
| Streaming | Flexible access to video content live (live streaming) or on demand(VOD) |
| View content from video endpoint or Servers ; View content in recorded format, even in HD |
| The streaming should include audio, video and data (H.239) of the conference |
| Should support streaming for at least 250 Unicast Live & VODviewers, Multicast Live .wmv & mp4 |
| Interoperate with the additional server for expanded streamingscalability |
| Should support download of content to PC and portable media devices. |
| Streamingclients | Should be compatible with all major streaming formats like Windows**Media player ,RealPlayer/Flash® / QuickTime®, or equivalent etc**. |
| ExternalServers | Support for external streaming servers (Microsoft Windows Media™Server, Wowza Media Server, Apple QuickTime™ Streaming Server, or equivalent). |
| Management | Protect content with access controls |
| Should integrate with Central VC management & scheduling application |
| Security | Password protected streaming and content playback |
| DTMF passwords for H.323 endpoints -The device should supportrecordings "play back on an endpoint" to be secured via pin code for security so that only the authorised person is able to view the recorded content. |
| NetworkInterface | 10/100/1000 Ethernet full duplex |

**MINIMUM SPECIFICATION OF 65” LED DISPLAY**

| **S. No** | **Product** | **Description** | **Compliance****(Y/N)** |
| --- | --- | --- | --- |
|  26 | 65 inch LED Display | Screen Size | 65" or Higher LED Back Lit Panel |   |
| Native Resolution | 3840 x 1260 (16:9) |   |
| Brightness | 400cd/m2 |   |
| Viewing Angle(H x V) | 178 x 178 |   |
| **Connectivity** |  |  |
| **Input Ports** |   |   |
| Digital | HDMI(2), Display Port(1), VGA(1)  |   |
| External Control | RS232C(1), RJ45(1), IR(1, Internal) |   |
| **Output Ports** |   |   |
| External Control | Main : RS232C(1),  |   |
| **AUDIO** |   |   |
| Audio Power | 20W (10W x 2)  |   |
| Warranty  | 1 years  |   |
| Wall mount | Required |   |

**MINIMUM SPECIFICATION OF 43” LED DISPLAY**

|  |  |  |  |
| --- | --- | --- | --- |
| **S. No** | **Product** | **Description** | **Compliance****(Y/N)** |
|  27 | 43 inch LED Display | Screen Size | 43" or Higher LED Back Lit Panel |   |
| Native Resolution | 3840 x 1260 (16:9) |   |
| Brightness | 400cd/m2 |   |
| Viewing Angle(H x V) | 178 x 178 |   |
| **Connectivity** |  |  |
| **Input Ports** |   |   |
| Digital | HDMI(2), Display Port(1), VGA(1) |   |
| External Control | RS232C(1), RJ45(1), IR(1, Internal) |   |
| **Output Ports** |   |   |
| External Control | Main : RS232C(1),  |   |
| **AUDIO** |   |   |
| Audio Power | 20W (10W x 2)  |   |
| Warranty  | 1 years |   |
| Wall mount | Required |   |

C.9 AUDITORIUM AUDIO VISUAL SYSTEM

**TECHNICAL SPECIFICATION FOR AUDITORIUM AUDIO VISUAL SYSTEM: -**

1 Digital Projector, DLP Laser phosphor, 1920X1200 native resolution, Brightness 13,000 lumens or more, Contrast Ratio : up to 700000 : 1, Lamp life 20000 hours or more, Motorized horizontal and vertical lens offset , 3D ready, Inputs: HDMI x 2, DVI-D, Display Port , HD15, HD base T , Controls: RS232 in/out, RS422 in, Ethernet (10/100), USB, device, should be complete with lens etc. all complete.

2 Motorised Projection Screen, Diagonal size 278", Matt White Projection Surface, Aspect Ratio 16:10, builtin motor system with IR/RF receiver, high gain & viewing angle , Noise less Up/Down operation, Iamge Size: Min. 278" Diagonal etc. all complete.

3 55" 4K UHD LED display with 400 Cd/m2 brightess, HDMI , DVI-D, DP, LAN, RS232 Control, 20W in built speakers, input HDMI, VGA, DVI, and USB, Landscape and Protrait Installation Option etc. all complete.

4 Standrad Wall Mount kit with angular adjustment with all required accessories etc. all complete.

5 Wooden Lectern with wired microphone and Presenataion connectivity, 25" table top, with reading lamps, Cable management, Large reading surface as required, 15" Interactive Display (Make: Wacom / Polyvision / Sharp) with 1366 x 768 resolution, widescreen LCD, cordless, battery-free pen technology, space for backend PC and accessories with cables & connectors as required etc. all complete.

6 Wireless Presentation and Collaboration Solution, Enables wireless presentation of HD content using laptops, tablets, and smartphones, Compatible with Windows, OS X, Apple iOS, and Android, Displays up to four presentation sources at once in Quad View, Supports up to 32 or more simultaneous presenter connections, Supports display resolutions up to Full HD 1080p and UXGA/WUXGA, Provides HDMI, VGA with all required accessories etc. all complete.

7 Active Wall Plate / Multiformat Transmitter: VGA, HDMI, DisplayPort and Audio Input, 4K/UHD (30Hz RGB 4:4:4, 60Hz YCbCr 4:2:0) support and 3D capabilities, VGA, YPrPb, HDMI1.4 and DP 1.1 signal support, Autoselect mode, HDCP compliant, CEC, EDID transparent, HDBaseT compatibility, Extends HDMI, DisplayPort, VGA, Audio, Ethernet, RS-232, IR over a single CATx cable up to 100 m distance etc. all complete

8 Digital Madular Matrix Switcher, Modular Design, 8 Input & 8 Output frame, Pixel Accurate Reclocking, Frame Detector and Input Signal Analysis, Zero frame Delay, Combine non-HDCP and HDCP capable, 1 Preveiw input & Output Port (Video Signals) with all require accessories etc. all complete.

9 Input Cards: Combine / Combination of 4 HD Base T & 4 HDMI input port, HDMI 1.4; DVI and HDCP compliant, support 4K, UHD (30Hz RGB 4:4:4, 60Hz YCbCr 4:2:0), Supports all HDMI audio formats, PoE add- on option with all required accessories etc. all complete

10 Output Cards: Combine / Combination of 4 HD Base T & 4 HDMI output port, HDMI 1.4; DVI and HDCP compliant, support 4K, UHD (30Hz RGB 4:4:4, 60Hz YCbCr 4:2:0), Supports all HDMI audio formats, Audio De-Embedding output, PoE add- on option with all required accessories

11 HDMI Transmitter, 1 HD Base T output and 1 HDMI input, HDMI extension supporting 4K/UHD (30Hz RGB 4:4:4, 60Hz YCbCr 4:2:0) and 3D capabilities over one CATx cable up to 170 m distance, Bi-directional RS-232 and IR, HDCP 2.2 compliant, CEC, EDID transparent etc. all complete.

12 HDMI Reciver, 1 HD Base T input and 1 HDMI Output, HDMI extension supporting 4K/UHD (30Hz RGB 4:4:4, 60Hz YCbCr 4:2:0) and 3D capabilities over one CATx cable up to 170 m distance, Bi-directional RS-232 and IR, HDCP 2.2 compliant, CEC, EDID transparent etc. all complete.

13 Sound Reinforcement System - Column Active Digital Steerable array speakers with minimum 14 x minimum 3" drivers or better, minimum 14 x 1" HF or better, Class D Amplification with minimum 24 nos. Amplfiiers, Frequency response - 130 - 18k Hz . Max SPL - 100 dBSPL (at 30 m) or better, Horizontal Coverage - 120 degree or more, Vertical Dispersion - Variable Asymmetrical or symmetrical (-30 degree to +30 degrees), single or multiple beams, Typical throw - upto 50 meters.Integrated DSP. LF beam control upto 400Hz. Sampling Rate - 48/96 KHZ. complete with Wall / Ceiling mount arrangment / bracket installation as per the site requirement

16 Sound Reinforcement System - Stage Front Fill Speaker , Passive 8" rated power 130 W rms or better, 8 Ohms , Frequency Response 80 Hz - 20 kHz, 91 dB or better System Sensitivity, 90 degrees Horizontal , 60 degree or better vertical dispersion, Maximum SPL 119 dB Peak or better, Birch Plywood Construction complete with mouting Bracket. installation as per the site requirement etc. all complete.

17 Sound Reinforcement System - Subwoofer, Dual 18" , rated power 2000 Watts rms or better ,impedance 4 ohms, Frequency Response 30 Hz - 400 Hz, , Maximum SPL 141 dB Peak or better, Birch Plywood Construction, Integrated flying inserts complete with mounting accessories etc. all complete.

18 Sound Reinforcement System - Active Stage Monitor System - 2000 Watt Peak power handling or better, 2 Way Full Range Powered Loudspeaker or better with DSP including, compressor, limiter, dely, crossover, EQ, etc. ;1x12" LF driver,1 x 1" HF driver,Frequency Range 50 Hz–18 kHz (±3 dB) ,45 Hz–20 kHz (-10 dB) ; 80° H x 60° V Dispersion;Max SPL 130 dB peak.

19 Sound Reinforcement System - Control Room/Green Room Speaker Compact 4" Coaxial Surface Mount Loudspeaker with RMS power handling capacity of 40 W , 4/8 Ohms, 90 degree or better Horizontal, 60 degree or better vertical dispersion ,Frequency Range 70 Hz - 18 kHz,Sensitivity 84 dB,Maximum Peak SPL 103 dB or better etc all complete with mounting accessories etc. all complete,

21 Sound Reinforcement System 4-Channel Class D/TD Network Power Amplifier delivering 4 x 2000 W @ 4 Ohms or better,4200 W @ 4 ohms bridged, THD 20 Hz - 20 kHz at 1W <0.1%,Signal to Noise Ratio >110 dBA,Frequency Response 20 Hz - 20 kHz etc. all complete (If OEM giving Dual channel amplifier then the quantity shall be double to match the amplifier channel)

23 Sound Reinforcement System of 8-Channel 2000 Watts Class D/TD Network power amplifier,delivering 8 × 250 W @ 4 ohms, 8 ohms, 16 ohms , Class D, THD 20Hz-20kHz at 1 W <0.1%,Signal-to-noise ratio>110 dBA,Frequency Response 20Hz - 20 kHz etc. all complete

25 Sound Reinforcement System - Digital Signal Processor DSP processor with 10 input, 6 line output, RS232 Interface, GPIO contacts, etc. all complete with installation as per the site requirement.

27 Sound Reinforcement System : Condenser gooseneck microphone with Base , Length :- 450mm or better , Frequency range :- 30Hz to 20Khz , Type :- Condenser , Polar pattern Cardioid or supercardioid, Nominal impedance 200 Ω or better, LED ring , Microphone Base should have Mute On/Off Button and logic inputs, Microphone Base and Gooseneck should be from Same manufacturer etc complete with installation as per site requirement etc. all complete,

28 Sound Reinforcement System UHF Wireless Handheld Microphone System True diversity receiver (UHF),16 selectable frequencies per band, Display on Transmitter and Receiver , RF Power output 50mW or Better , Polar Pattern :- Cardiod , Carrier frequency range 500Mhz to 865Mhz , Frequency response 20Hz to 20Khz , Mute Button on Transmitter , Battery Operation time Minimum 8hr , Should have Charging Contact in Transmitter , Receiver dynamic range 100 dB (A-weighted) Or better , switching bandwidth Minimum 40Mhz Or better etc complete

29 UHF Wireless Lapel Microphone System, True diversity receiver (UHF),16 selectable frequencies per band, Display on Transmitter and Receiver , RF Power output 50mW or Better , Polar Pattern :- Omnidirectional , Carrier frequency range 500Mhz to 865Mhz , Frequency response 20Hz to 20Khz , Mute Button on Transmitter , Battery Operation time Minimum 8hr , Should have Charging Contact in Body pack Transmitter . Receiver dynamic range 100 dB (A-weighted) switching bandwidth Minimum 40Mhz Or better etc complete etc. all complete.

30 Sound Reinforcement System : Antena Spliiter Active UHF wideband antenna divider Two antenna inputs, divided into Six outputs each with loop-through connector to connect further splitters etc. all complete.

31 Sound Reinforcement System : UHF transmitting and receiving omnidirectional antenna with interal or external booster amplifer. Compatible with the Antenna Distribution complete with mounting kit etc complete with installation as per site requirementetc. all complete.

32 Sound Reinforcement System : Wired Vocal Microphone , Transducer type Dynamic Polar pattern Supercardioid Frequency response: 30 - 18,000 Hz Nominal impedance 600 Ω Connection 3-pin XLR male etc complete

33 Sound Reinforcement System : Instrumenet Microphone with high-frequency reproduction Polar Pattern: Cardioid, Frequency response : 50-17,000 Hz Open circuit voltage : 2.4 mV/Pa, Nominal impedance : 600 Ω, Load impedance : ≥ 2 kΩ, Connection : 3-pin XLR etc. complete etc complete

34 Sound Reinforcement System: Mixing Console:- 40 channel 48KHz Digital Mixing Console with 32 mic inputs, 24 bus, 16 Aux outs. Main LCR out and Matrix outputs, Built in Stage Box Interface, 192 kHz, 24 bit ADC and DAC converters with minimum 112 dB dynamic range, minimum 24 motorised 100 mm faders, Optional wireless remote control for iPhone\* and iPad\* etc. 32 x 32 channel USB 2.0 audio interface, 8 DCA and 6 mute groups, Built in effect processor, Complete with Built in aur external 100-Band RTA for all Channel/Bus EQ 's, Auto-ranging universal switch-mode power supply, Digital mixer should be supplied with 32 inputs and 16 output stage Box, etc complete with installation as per the site requirement.

35 Sound Reinforcement System-Standing Mic Stand System: MIC STAND HUMAN HEIGHT, POWDER COATED etc. all complete.

36 Sound Reinforcement System-Seating Mic Stand System: Mic Stand of Seating Height, Powder Coated etc. all complete.

37 Touch Panel Control System:Enterprise-class control system, Onboard 512MB RAM & 4GB Flash memory, One RS-232/422/485 COM port with hardware and software handshaking, Two RS-232 COM ports with software handshaking only, Eight IR/serial, eight relay, and eight Versiport I/O ports, Programmable event scheduling with astronomical time clock, Touch Panel: 10" widescreen active-matrix color display, 1280 x 800 WXGA display resolution, TableTop Kit for Touch Panel, an 802.3af compliant Power over Ethernet (PoE) power source designed to support PoE powered devices etc. all complete.

38 Recording & Streaming Server, 3 DVI-I (Analog & Digital Signals), VGA Loop out, Input format HDMI, DVI, RGBHV, YPbPr, CVBS, Full HD Resolution, H.264 High Profile, AAC audio encoding, FIle format MP4 / MPEG4, Picture in picture, Picture by picture, Manegement through App, Webpage, dedicated software, Built in approx 1TB storage, with all mounting Accessories etc. all complete.

39 PTZ Camera, HD CMOS type, 20x Optical Zoom, 16x Digital Zoom, Pelco-D / Pelco-P / Visca protocol support, 2-way HD video output, RS232 / RS485 port control, HDMI / DVI, HD-SDI, CVBS outputs with all mountung arrangements etc. all complete.

40 MS suspender consisting of clamping arrangement undergone through 7tank chemical treatement to keep them rust free and with requisite anchor fastner, duly powder coated in black matt texture finish & stud with 12mm threaded rod & angle to keep the "C" track rigidly held With SWL of 200kg.

41 Extruded MS "C" track size 50x40x3mm, provided with oval slots (14x40mm) undergone through 7tank chemical treatement to keep them rust free & duly powder coated(To create fixed grid at top the stage area to suspend the lighting bars, frill bars, stage drapery etc.

42 Fixed 14Mtr Curved light bar made using 40NB dual barrel arrangement undergone 7Tank chemical treatement to keep them rust free and powder coated and provided with cable trays and adjustable bar arrangements.

43 Fixed 2Mtr straight light bar made using 40NB dual barrel arrangement undergone 7Tank chemical treatement to keep them rust free and powder coated and provided with cable trays and adjustable bar arrangements.

44 Motorised winch to use as onstage lighting bar , length of 11.5 mtrs made using 40NB dual barrel undergone through various chemical treatement to keep them rust free and powder coated and provided with: (Light bar - 1 & 2)

\* Necessary pulley, guide pulleys

\* GI wire rope with winding drum

\* Specially designed compact gear box

\* 1.5HP AC motor with DC Brake

\* Upper and lower limit controller

\* Motor cable termination box

\* With cable retractor & cable trays

\* With frill bar arrangement

\* Safe working load of 180Kg

45 Motorised winch to use as onstage lighting bar , length of 9.5 mtrs made using 40NB dual barrel undergone through various chemical treatement to keep them rust free and powder coated and provided with: (Cyc Bar)

\* Necessary pulley, guide pulleys

\* GI wire rope with winding drum

\* Specially designed compact gear box

\* 1.5HP AC motor with DC Brake (Make: ABB / Remi / Crompton Greaves)

\* Upper and lower limit controller

\* Motor cable termination box

\* With cable retractor & cable trays

\* With frill bar arrangement

\* Safe working load of 180Kg

46 Motorised winch to use as FOH lighting bar , length of 14 mtrs made using 40NB dual barrel undergone through various chemical treatement to keep them rust free and powder coated and provided with: (Cyc Bar)\* Necessary pulley, guide pulleys\* GI wire rope with winding drum\* Specially designed compact gear box\* 1.5HP AC motor with DC Brake (Make: ABB / Remi / Crompton Greaves)\* Upper and lower limit controller\* Motor cable termination box\* With cable retractor & cable trays\* With frill bar arrangement\* Safe working load of 180Kg

47 Fixed Scallop arrangement of 18Mtrs length made up of 40NB MS pipe duly powder coated with matt black finish along with required suspenders.

48 Motorised Curved Grand Drape system with Center parting overlapping having overall length 20m with 100% gathering, Specially designed heavy duty I track duly powder coated 2 Sets with curtain trolleys and provided with guide pulleys but with out fabric.

49 Motorised Cyc Tab Track system with Center parting overlapping having overall length 16m with 100% gathering, Specially designed heavy duty I track duly powder coated 2 Sets with curtain trolleys and provided with guide pulleys but with out fabric.

50 Cyclorma arrangement using aluminum extruded ''I'' track of 40 x 70mm duly powder coated in black texture finish to use as straight cyclorama track with MS fabricated wall mount bracket constructed of "C" track of dimension 40X50X40mm , MS fabricated Tie down railing cut length 3 mtr duly powder coated to keep the chroma and cyclorama in drum tight arrangement, 2 wheeler trolley placed uniformly at specific interval of 200mm throughout the track, MS powder coated Leading edge frame to keep the chroma and cyclorama in drum tight arrangement of. Size 9x4.5Mtr.

51 Stage wings made of MS square tubes duly powder coated with matt black finish with trolleys, track arrangements, Base etc. without fabric, Size 2m x 6.5m.

52 MS lighting junction box made up of 22SWG CRCA sheet of jindal make undergone through various chemical treatement to keep them rust free and duly powder coated 16A CEE socket, with suitable glands.

53 MS Junction box made up of 22SWG CRCA sheet of jindal make undergone through various chemical treatement to keep them rust free and duly powder coated 4 way 10A IEC Socket, with suitable glands.

54 MS sheet metal fabricated DMX junction box made up of 22SWG CRCA sheet of jindal make undergone through various chemical treatement to keep them rust free and duly powder coated and fitted with 5 pin XLR DMX out connector.

55 MS sheet metal fabricated DMX junction box made up of 22SWG CRCA sheet of jindal make undergone through various chemical treatement to keep them rust free and duly powder coated and fitted with 5 pin XLR DMX in connector.

56 MS sheet metal fabricated 1-way power junction box undergone through various chemical treatement to keep them rust free and duly powder coated in black matt texture finish and fitted with 2no 10amps IEC socket ON / OFF switch and necessary gland.

57 MS sheet metal fabricated power cable termination Auxillary marshalling box duly powder coated in black matt texture finish (total circuit termination complete with connectors, glands and mounting brackets (Total 9 AMB's)

58 MS sheet metal fabricated 78-way power cable termination Power marshalling box duly powder coated in black matt texture finish (total circuit termination complete with connectors, glands and mounting brackets (PMB-78) For Dimmer Points

59 Well designed and engineered rack mount type power distribution centre panel with necessary metering, outgoing feeders and 250 amps incomer and emergency trip arrangement (PDCP-250) And 30 way MCB Panel rack mount internally wired to control individual light points.

60 40U" Din rack for mounting PDCP and MCBP module and EDP.

61 MS Fabricated duly powder coated power junction box (PJB) for connecting motors.

62 Well designed and engineered Wall mount 2 feeder motor control centre panel with necessary meterings and contactors and relays to control the curtain motors along with 2-way wired remote control panel to control the system (MCCP/RCP-2). For Curtains

63 Well designed and engineered Wall mount 4 feeder motor control centre panel with necessary meterings and contactors.

(MCCP-4).

64 Well designed and engineered Wall mount 4 feeder remote control centre panel wired remote control panel to control the system (RCP-4).

65 MS sheet metal fabricated emergency push button station for emergency trip.

66 Internal earthing network related to work coming under our scope.

67 Installation hardwares such as clamps, connectors, glands, lugs, ferruels, welding rods etc.

68 MS perforated cable trays with lid undergone through 7tank chemical treatement to keep them rust free to keep them rust free and duly powder coated in black matt texture finish of Size 75x40mm.

69 MS perforated cable trays with lid undergone through 7tank chemical treatement to keep them rust free to keep them rust free and duly powder coated in black matt texture finish of Size 150x40mm.

70 MS perforated cable trays with lid undergone through 7tank chemical treatement to keep them rust free to keep them rust free and duly powder coated in black matt texture finish of Size 300x40mm.

71 Grid mount photo isolator DMX splitter unit 1 DMX input and 8 isolated output with following specifications:Power Supply: 90-240V AC, 45-63Hz. Control: DMX 512 protocol,Control Signal input: 5 pin XLR female,Size: 482 x 44 x 128mm Weight: 2Kg.

72 Rack mount 12 channel (12chx2.5KW) Dimmer pack with following features and Specifications: Features:Automatic frequency sensor can detect power frequency (45Hz – 63Hz) in different areas and stabilizes the dimming output.Output can be limited from 50% to 100% for over load protection.Each channel can be set as dimming or non-dimming. Specifications:Power Supply: 100-240V AC, 45-63Hz.Output: Maximal 20A per channel. Control: DMX 512 protocolSize: 482 x 132 x 316mm Weight: 13.5Kg.

73 Digital lighting controller DmX 512 protocol with

• 4 universes for 512 x 4 DmX outputs,

• 5/3pin XLR, 60 Faders x 4 Pages,

• Scroll wheel for page change,

• 450 direct accessible saving faders,

• Master, Key operated Program,

• Run & Setup modes,

• Reset button

• Key pads for direct access

• Moving light menu with control buttons

• Display for the monitoring the channels

• Contrast and backlight control

• Chase option

• Light to sound input through Audio input

• Presets save for the scenes

• In built fixture library.

74 5 pin XLR male / female connectors

75 5 Pin XLR Termination plug

76 PVC Copper unarmoured flexible FRLS insulated multicore cable 1100V grade confirming to IS694 size 3cx2.5 sq mm.

77 PVC copper unarmoured flexible FRLS insulated multicore cable confirming to IS694 Size 12core x 2.5sq.mm.

78 PVC Copper armoured flexible FRLS insulated multicore cable 1100V grade confirming to IS694 size 4cx4 sq mm.

79 PVC copper unarmoured flexible FRLS insulated multicore cable confirming to IS694 Size 24core x 0.5sq.mm.

80 PVC copper unarmoured flexible FRLS insulated multicore cable confirming to IS694 Size 7core x 1.5sq.mm.

81 5core DMX signal cable for DMX network.

82 Fire retardant velvette fabric with lining 100%(2 times of the finished dimension) gathering for main valance with approved color duly stitched.

83 Fire retardant Velvette fabric for Grand Drape, 100% (double) gathering, with approved color duly stitched and with eyelets.

84 Fire retardant cotton fabric for Cyc Tab Track curtain, 100% (double) gathering, with approved color duly stitched with eyelets.

85 Fire retardant cotton fabric for frill duly stiched with 100% (double) gathering of approved color.

86 Fire retardant cotton fabric for frill duly stiched with 100% (double) gathering of approved color.

87 Fire retardant cotton fabric for wing duly stiched with 0% gathering.

88 Perforated plastic cyclorama screen of size

89 1000W CE Certified halogen Fresnel spot light providing illumination of 28000 lix at 2 mt in spot at 10° beam angle while 4600 lix at 2 mt when operated in flood at 48° beam angle , dimension as 290 x 405 x 290mm, 150mm aid German lens, weight of 4.6Kg, Gx9.5 base lamp socket,power cord with 16amps 3 pin CE plug and normal yoke but without lamp and accessories. Lamp - 1000W 230V single ended lamp Power supply - 230-240V AC,Lamp Socket - Gx9.5Power cable - 3 core 1.5 sq. mm. copper PVC insulated,Housing - Light weight, rugged and reliable both indoor and outdoor,Robust per-treated fabricated housing with die cast component and epoxy polyester powder coated,Distribution - Delivers smooth uniform field across the entire spread from spot to flood focusing,Switching options - Local control and Digital DMX control through Dimmer,Dimming option - Digital DMX control through Dimmer,Reflector - Spherical high reflective aluminum anodized,Yoke - Fabricated using MS flat-accepts mounting on 16mm spud,Focus - controlled by front & rear thermoplastic knob.

90 1000W 230V single ended halogen lamp CP24 / CP70 Base Gx9.5.

91 1000W spun aluminum PARCAN made out of spun aluminum 16 SWG in 2 piece cylindrical construction with punched slot on Par can housing for natural ventilation and floating ceramic GX16d base lamp socket,copper flexible PVC insulated power cable with 3 pin CPL plug, Yoke made of MS flat 25 X 3mm with 13mm free mounting hole to fit the adapter, spigot with 28mm and filter frame but without lamp. "Lamp: 1000W 240V PAR-64,Lamp Socket: Ceramic type GX 16D.Power Cable: 3 core,1 Squirm copper PVC insulated flexible cable with 10 amps double pole toggle switch,Housing: Aluminum sheet cylindrical construction with black epoxy polyester powder coated","Switching options: Local control and Digital DMX control through Dimmer,Dimming option: Digital DMX control through Dimmer,Yoke: Fabricated using MS flat-accepts mounting on 28mm spud Focus: Sealed beam angle,Accessories: Filter frame.

92 1000W 230V Par-64 narrow / medium / wide lamps with base Gx16d for 1kW Halogen parcans.

93 4x500W halogen cyclorama light complete with safety wire mesh for each compartment and filter frame with 3mtr cable but without any accessories and lamp. with below specification:- • Housing : MS fabricated construction with black epoxy polyester powder coat. • Lamp : 500W tungsten halogen lamp, base R7S. • Lamp socket : Brass tubular holder Chromium plated. • Reflector : Aluminium reflector , sand blast anodised aluminium finish. • Electrical Specifications : Power input AC 230V, 50Hz

94 500W 240V R7s base 117mm + or - 2mm long tungsten lenier halogen lamp.

95 54x3W CE certified LED Par with CCT 3200K,12310 lux level at 2mtr, 54 LED's each should be at warm color temperature of 3200K, back LED display, CRI Value above 85, Self dimming option from 0-100%, 5 Pin Dmx XLR for mix dimming operation but without any accessories, loop in loop out option undergone through 7 Tank chemical treatement to keep them rust free and, duly powder coated in black matt texture finish and technical specifications as below.

• Lamp - 54 x 3W 3200K LED,

• Power consumption – 160W, Power supply - 230/240V AC,

• Power cable - 3 core 1.5 sq. mm. copper PVC insulated,

• Channels - 1 Channel DMX-512, Beam angle - 25° (15°, 45° optional)

• Lux level – 12310 at 2 mtr

• Control mode - DMX through 5 pin male and female, Manual. Function - Manual dimming, DmX modes of operation.

96 3x54W LED par light complete with 8-channel DMX 512, high brightness mixing color evenly, stable performance with sound active auto, DMX, and power and DMX loop in and out option, undergone through 7 Tank chemical treatement to keep them rust free and, duly powder coated in black matt texture finish and technical specifications as below.• Lamp - 54 X 3W RGB LED (12R+18G+18B+6W)• Power consumpsion - 150W• Power supply - 230/240V AC• Power cable - 3 core 1.5 sq. mm. copper PVC insulated• Channels - 8 Channel DMX-512• Beam angle - 45° (15°, 45° optional)• Control mode - DMX, and Manual.• Function - strobe, Dimming, sound active..

97 300 W LED Profile light 19 degree with Voltage : AC90 - 260 V 50 -60Hz,dimmer:0-100% linearly adjustable manualy focusable,high quality optical system,glass reflector,Control protocaol:DMX 512,Control system:DMX,Auto run and master/slave,working temp:30-40 degree celcius,No noise fan of pccooler,IP20,Net Weight:7Kg

98 Canara 2x2 blinder matrix fixture with advanced COB LED technology light with below specifications:-

- Frequency : 50-60Hz

- Power Consumption: 240W

- LEDs Qty : 4 pieces

- Light Color: Single color warm white (3200K)

- Lifetime: Over 50,000 hours

- Dimmer: 0~100% linearly adjustable

- Beam Angle: 30 degree

- Control mode: DMX512,Master/Slave, Auto Run, Sound active.

- IP Grade: IP20

- Net Weight: 5kgs

99 4- leaf barndoor with scrims for 1KW fresnel spot light, undergone through 7 Tank chemical treatement to keep them rust free and, duly powder coated in black matt texture finish.

100 4- leaf barndoor for LED PAR spot light, undergone through 7 Tank chemical treatement to keep them rust free and, duly powder coated in black matt texture finish.

101 Diecast aluminum "C" clamp with safety locking chain, duly powder coated in black matt texture finish and technical specifications as below.

• Lock - MS threaded Galvanized lock key, Plastic Glass filled nylon moulded M6 key.

• Receptacle - 28mm standard TV spigot.

• Safety - MS Galvanized chain with pin.

• Finish - Pretreated and black epoxy polyester powder coated.

• Self weight - 0.54Kg

• Safe working load – 150Kg.

102 1.5mtr long safety bond with lock clip to be fixed around the grid and each lighting fixture to avoid fall of the fixture in case if the "C" clamp is not locked properly . SWL 100Kgs..

103 Sound Reinforcement System-Architectural XLR Floor Box with 2 x XLR For Microphone Connectivity etc. all complete.

104 Sound Reinforcement System-Architectural XLR Floor Box with 2 x XLR/Speakon For Stage Monitor Connectivity etc. all complete.

105 Sound Reinforcement System-Speaker Cable 2.5 Sqmm x 2 core(13/14AWG) ATC copper Conductor, Insulated Cores,PVC Sheathed Speaker Cables complete etc as required etc. all complete. etc. all complete.

106 Sound Reinforcement System- Speaker Cable 4 Sqmm x 2 core(10/12AWG) ATC copper Conductor, Insulated Cores,PVC Sheathed Speaker Cables complete etc as required

107 Sound Reinforcement System-20 AWG-24/0.20mmx 2 core ATC Copper Conductor, PVC Insulated, 90% ATC Copper Braid Shielded, PVC Sheathed Microphone Cable complete etc. as required etc. all complete.

108 Sound Reinforcement System-50 Ohm Low-Impedance Co-axial cable complete etc. as required.

109 CAT-6 STP 4pair cable ATC Copper Braid Shielded, PVC Sheathed overall complete etc. as required

110 Projection and Display System: Audio Video Specialist Cable and Connector (HDMI, VGA, & Audio) etc. all complete.

111 Rack Structure 20 U Air Cooled AV Equipment Rack with Two Nos. of Vertical Power Strips, Cantilever Selves, Cable routing perforations, 4 No. of Spin Wheels etc. all complete.

112 Rack Structure 42 U Air Cooled AV Equipment Rack with Two Nos. of Vertical Power Strips, Cantilever Selves, Cable routing perforations, 4 No. of Spin Wheels etc. all complete.

C.10 WI-FI SOLUTIONS

### Wi-Fi LAN Controller FOR MANAGE TO ALL ACCESS POINT

|  |  |
| --- | --- |
| **S.No** | **Specifications** |
| 1 |  **Supports up to 50 Access Points**  |
| 2 | Supports up to 100 APs in High availability mode |
| 3 | 2x 1Gbps Interfaces for data plane |
| 4 | 1x 1Gbps Interfaces admin port |
|   | **Architecture** |
| 5 |   The system architecture should provide all of these topologies |
|   | ·   - a) Routed at controller: The WLAN controller acts like a L3 router forwarding the WLAN traffic into the LAN |
|   |  - b) Bridged at controller: The WLAN controller acts as a L2 Switch forwarding the WLAN traffic into the LAN using specific VLANs |
|   |  - c) Bridged at Access Point: WLAN traffic is forwarded directly at the LAN Entry port of the AP using specific VLANs.  |
| 6 | All offered access point models must be able to support these topologies simultaneously.  |
| 7 | The system must be abe to change the topologies for each client after authorization |
| 8 | Each authentication session must be controlled by: |
|   | - individual access rule sets |
|   | - VLAN Assignment |
| 9 | Qos per User or application with bandwidth limitation in and outbound |
| 10 | Security architecture compliant to |
| 11 | IEEE 802.1x for WLAN Clients |
| 12 | Radius-Support with PreAuthentication and Pairwise Master Key (PMK) Caching providing roaming transition < 50 ms |
| 13 | Support of X.509 Certificates |
| 14 | The controller architecture allows meshing of multiple controllers. |
| 15 | VPN, Video and VoIP support with Fast Roaming and minimum five Qos Profiles for L2/L3 |
| 16 | Call Admission Control (CAC) controlled approval of new voice streams  |
| 17 | Loadbalancing for Autocell™ capable Clients |
| 18 | Multicast limitation per Wi-Fi service set, Bonjour support |
| 19 | Supports also 3rd part Security to quarantine WLAN clients violating predefined Access policies (Patchlevel, undesirable applications, virus signatures) |
| 20 | Supports QBSS (Providing actual load situations to the client to enable intelligent roaming)  |
| 21 | Supports UAPSD (Unscheduled Automatic Power Save Delivery) |
| 22 | Flexible Client Access to enhance throughput of 802.11n clients |
| 23 | Supports Location-Based-Services (EKAHAU , Aeroscout) |
| 24 | Supports Access Point Load-Balancing for optimized client distribution. |
| 25 | Supports Energy Save Mode to reduce the AP's power consumption while no client is associated  |
| 26 | Supports Band Preference to move clients into the less used 5GHz band.  |
| 27 | Supports Link Aggregation for load balancing and redundancy |
| 28 | **Guest portal** |
| 29 | Integrated Guest access System: |
| 30 | customizable log in page |
| 21 | Ticket-Templates |
| 32 | local account management |
| 33 | Ticket adminstration portal |
| 34 | Guest access via Captive Portal authentication and limited access for unauthorized clients - Walled Garden |
| 35 | HTML-Editor for portal customization |
|   | **Configuration** |
| 36 | Wizard for guided basci setup, high availability and WLAN services |
| 37 | AP configuration and operation in L2 and L3 topologies |
| 38 | Support of Rulesets per User,SSID, Interface and AP in all topology variations. |
| 39 | Opportunistic Key Caching (OKC) for secure and fast roaming |
| 40 | Supports Wireless Distribution System (WDS) |
| 41 | Supports Dynamic Meshing to establish load balanced WDS structures |
| 42 | Diagnostic Tools: |
| 43 | Network Use statistics |
| 44 | Client Association, client statistics |
| 45 | WLAN and LAN interface statistics  |
| 46 | Reports can be accessed via GUI and exported via HTML and accessed via SNMPv2 |
| 47 | Administrative access must be secured via RADIUS.  |
| 48 | Controller independant management of Interference detection per channel, automatic channel switch , interference reaction and channel release after interference situation is cleared |
| 49 |  Detection and compensation of insufficient coverage or AP failure by automatic power control. |
| 50 | MAC-Blacklist/Whitelist |
|   |   |
|   | **Management** |
| 51 | Full management of all featurs via: |
|   |  - Webinterface (HTTP/HTTPs) |
|   | - SNMP V1, V2.c,V3 |
|   | - CLI (Telnet / SSH) |
| 52 |   IPv4 and v6 support |
| 53 | Supports encrypted communication between AP and controller using IPSEC, IKEv2, AES and Diffie-Hellman protocols.  |
| 54 |   Packet Encapsulation via CAPWAP Tunnelling Protocol |
| 55 |  Automatic initial configuration (Zero Touch)  |
| 56 | New APs must be approved by the admin before integration.  |
| 57 | Suport definition of virtual network services with several RADIUS based authentication methods and rule sets |
| 58 | Site specific assignment of APs, network services ans rulesets  |
| 59 | Inter WLAN-Client Traffic blocking option.  |
| 60 | Supports autonomous routed IP subnet with separate DHCP service  |
| 61 | Optional support of 3rd party AP via dedicated port.  |
| 62 | Rogue Accesspoint Detection and Prevention |
| 63 | Integration in unified LAN/WAN Management with patch management, automatic config backup/restore and ruleset roll-out |
| 64 | Supports 802.11 real time capture in wireshark format |
| 65 | Supports RFC-3580 tunnel-id adaption into filter rule sets |
|   |   |
|   | **Availability** |
| 66 | High availability by controller pairing redundancy with short poll cycles  |
| 67 | High availability with LAN using OSPF dynamic routing |
| 68 | If one controller fails, the backup must be capable of covering all Aps |
| 69 | Fast Failover without loss of voice- or data connections |
| 70 | Access Points are capable to operate without controller (local L2-Bridging) |
| 71 | Without controller, an AP can redirect authenticating requests to a local RADIUS Server.  |
| 72 | Should be from the same OEM as wired vendor  |

###  Wi-Fi AP (Access Point) FOR USER END IN CORRIDOR

|  |  |
| --- | --- |
| **S.No** | **Specifications** |
| 1 | High performance enterprise class AP |
| 2 | Should have two nos of radios |
| 3 | 3X3 MIMO for high performance implementation |
| 4 | 3 Nos of spatioal streams |
| 5 | Maximum Throughput Per Radio - 450Mbps/ Total - 900Mbps |
| 6 | Wired performance in packets per second (pps) -60,000 pps |
| 7 | Number of SSIDs supported per radio-8 / total - 16  |
| 8 | Simultaneous Voice calls (802.11b, G711, R>80) - 12 or greater |
| 9 | Semi autonomous mode of operation |
| 10 | Security and Standards :WPA, WPA2 (AES), 802.11i, 802.1x, IPSec, IKEv2, PKCS #10, X509 DER / PKCS #12 |
| 11 | VPN Support :IPSec, PPTP, L2TP |
| 12 | Clients serving access points |
| 13 | Intelligent thin AP :Encryption, Security, QoS and RF management done on AP |
| 14 | Distributed and centralized data paths within same SSID  |
| 15 | Application based distributed and centralized data paths within same session |
| 16 | Simultaneous RF monitoring and client services |
| 17 | Integrated in-channel WIDS |
| 18 | Integrated in-channel WIPS |
| 19 | Dedicated multi-channel WIDS (Guardian mode) |
| 20 | Dedicated multi-channel WIPS (Guardian mode) |
| 21 | Dedicated multi-channel RF spectrum analysis and fingerprinting |
| 22 | Locates devices and threats via RF triangulation |
| 23 | Self-forming and self-healing meshing |
| 24 | Remote access point |
| 25 | Hardware-based, end-to-end data and control plane encryption |
| 26 | Private and public cloud deployments |
| 27 | Security scanning and serve clients on same radio  |
| 28 | Security scanning and spectrum analysis on same radio |
| 29 | Spectrum analysis and serve clients on same radio |
| 30 | Multi-channel dedicated security scanning and spectrum analysis |
| 31 | **Max transmit power :** Radio 1 (5GHz) :26 dBm , Radio 2 (2.4GHz) :26 dBm |
| 32 | **Dynamic Channel Control :**802.11h: DFS & TPC support (ETSI)  |
| 33 | Efficient use of the spectrum with a multi-channel architecture |
| 34 | Automatic transmit power and channel control |
| 35 | Self-healing with coverage gap detection |
| 36 | Band steering with multiple steering modes |
| 37 | Spectrum load balancing of clients |
| 38 | Airtime fairness  |
| 39 | Performance protection in congested RF environments |
| 40 | Mitigates co-channel interference with coordinated access |
| 41 | Mitigates adjacent channel interference with optimized receive sensitivity |
| 42 | Efficient reuse of channels at shorter intervals |
| 43 | Mitigates non 802.11 inference without dedicated radios |
| 44 | Call Admission Control (TSPEC) |
| 45 | Power Save (U-APSD) |
| 46 | Fast secure roaming and handover between APs |
| 47 | Pre-Authentication (Pre-Auth) |
| 48 | Opportunistic Key Caching (OKC) |
| 49 | Bonjour/LLMNR/UPnP identification, containment and control  |
| 50 | Support voice, video and data using the same SSID |
| 51 | Prioritize voice over data for both tagged and untagged traffic |
| 52 | Rate limiting (rule and user-based) |
| 53 | Rule and role based QoS processing |
| 54 | Multicast to Unicast Conversion |
| 55 | Power save mode optimization for multicast  |
| 56 |  2 Nos of 10/100/1000 Base T Ethernet autosensing link  |
| 57 | Console port for the ease of installation and management |

C.11 WEB SECURITY SOLUTION

|  |  |
| --- | --- |
| **Sl. No.** | **Technical Specification / Requirement** |
| **A** | **Sizing**  |
| 1 | The solution shall support minimum of 1000 users from day 1 with three years subscription license / support and should have flexibility to scale up to 10000 users in future with additional software / subscription license. In case of hardware based solution, scalability needs to be provisioned from day 1. |
| 2 | The proposed solution may have more than one hardware’s / software to cater the below mentioned services without any feature, scale, reliability and specification deviation. |
| **B** | **Deployment & Reliability** |
| 3 | The solution must not have a single point of failure at each level from day 1. |
| 4 | The solution must have at least 99.9% service availability.  |
| 5 | The solution shall support multiple traffic-forwarding/ingestion options as like Explicit proxy, GRE & IPsec tunnel or inline / tap mode for in-premise solutions. |
| **C** | **Reporting & Logging** |
| 6 | The solution must provide a single pane of unified admin console / interface in case of multi-locations environment (HQ and Branches) configuring all services. |
| 7 | The solution should support immediate enforced policy changes applied in the unified admin console for all applicable locations and services. |
| 8 | The software upgrade should be seamless without interruption of services and must be transparent for users and do not require service windows. |
| 9 | The solution shall have flexibility to define policy based on User, Group, Locations and time schedule etc. |
| 10 | Time based policies should automatically be applied based on the time zones of the end users connecting to the service. Duplication of rules to support multiple time zones should not be required. |
| 11 | The solution shall provide a single integrated logging for all services. |
| 12 | The solution shall have the ability to integrate multiple sub-reports into a composite summary report. |
| 13 | The solution shall have transaction log retention for all HTTP & HTTPS transactions. The minimum retention window should be 6 months, with options to expand for longer duration. |
| 14 | The solution must have the ability to obfuscate user names to protect individual identity and can be decrypted only in the presence of an auditor. |
| 15 | The solution shall allow for a role-based administrative model based on different user groups |
| 16 | The solution shall provide audit trail to keep track on the authorized changes made by users and Administrators. |
| **D** | **Authentication** |
| 17 | The solution shall support but not limited to: Active Directory (AD), SAML 2.0, Secure LDAP and internal Database etc. |
| 18 | The solution must support direct AD/LDAP directory synchronization |
| 19 | The solution must support authentication methods that are fully transparent to the user and integrate with ID Federation systems |
| 20 | The solution must cache credentials for a user to minimize number of times a user go to the ID Provider. |
| 21 | User identification and directory synchronization must be done only once and applied to all engines including Malware detection for both inbound and outbound as well as Data Loss Prevention etc. |
| **E** | **Web Security** |
| 22 | The solution shall inspect every byte both inbound and outbound internet traffic each passing through the proxy and performance shall not be degraded with full content inspection including SSL inspection. |
| 23 | The solution must support self-signed SSL certificate for SSL decryption. In addition, it should have option to support custom intermediate root certificate signed by customer organizations.  |
| 24 | The solution shall have multiple Anti-Malware and Anti-Spyware engines to protect users against websites containing malicious code or malware. |
| 25 | The solution should be able to categorize requested web pages in real-time using contextual analysis. |
| 26 | The solution shall be capable of dynamically blocking a legitimate website which has become infected and unblock the temporary site restriction when the threat has been removed. |
| 27 | The solution must detect and block outbound Botnet and Trojan malware communications from infected systems. System must log and provide detailed information on the originating system sufficient to enable identification of infected units for mitigation |
| 28 | The solution must provide zero day protections for Microsoft Patch Tuesday vulnerabilities relation to Web & Internet traffic |
| 29 | The solution must detect and block known and unknown fraudulent / phishing application |
| 30 | The solution must provide granular control over instant messaging for example and instant messenger allow chat but block file transfers.  |
| 31 | The solution must be able to restrict or control bandwidth of streaming media as appropriate. |
| 32 | The solution must be capable of blocking traffic to specific regions / countries. |
| 33 | The solution shall support granular Web 2.0 filtering as like allow Gmail read-only access for some users & others allow Gmail to send email but no attachments. |
| 34 | The solution shall be able to detect and block various file types, both inbound and outbound. |
| 35 | The solution must dynamically block content that may cause legal liability even if the site is not pre-categorized. |
| 36 | The solution must support compressed files scanning. |
| 37 | The solution should be able to filter based on specific words in either the URL string and the page content including source code. |
| 38 | The solution must be able to enforce search engine restriction filters such as Google, Yahoo, Bing, Ask and YouTube etc to safe search options. |
| 39 | The solution must have a customizable block page and able to redirect requested sites to specified sites. |
| 40 | The solution must inspect full SSL traffic across all ports and protocols. |
| 41 | The solution should be able identity & block 4 times zipped archive files. |
| 42 | The solution shall allow custom whitelist and blacklist definition.  |
| 43 | The solution shall detect & protection against Cross Site Scripting attacks. |
| 44 | The solution must identify & block P2P clients and Anonymizers |
| 45 | The solution must be able to dynamically block the use of anonymous proxies in real-time. |
| 46 | The solution shall support identification and blocking of command & control communications. |
| 47 | The solution shall support identification and blocking of data exfiltration for all internet traffic including SSL. |
| **F** | **Data loss prevention (DLP)** |
| 48 | The solution should provide web DLP for all users regardless whether they are on a corporate network or public network |
| 49 | The solution must support DLP to prevent sensitive information being posted to the internet as like credit card numbers, source code, financial data, medical information, data exported from Salesforce etc. |
| 50 | The solution must support an option to integrate with external DLP engine. |
| 51 | The solution must support compliance regulations as like HIPPA and PCI etc. |
| 52 | The solution shall have flexibility to define DLP policies based on Users, Group, File Types, URL’s, Geography, custom or pre-defined dictionaries. |
| 53 | The solution must support full SSL MITM inspection and it can be turned on or off only for specific URL lists or categories. |
| 54 | Besides scanning and blocking DLP violations, the solution also provides notification through a customizable email containing the following fields:User Accessing the URL, User's IP Address, Access Time, URL Accessed, Posting Type, Violated DLP Dictionaries and Attachment |
| **G** | **Next Generation Firewall** |
| 55 | The solution should support Deep Packet Inspection (DPI) for application level policy controls for outbound traffic. |
| 56 | The solution shall have flexibility to define policy based on User, Group and location and time schedule. |
| 57 | The solution should support applications usage visibility per user basis. |
| 58 | The solution should support any amount of Office 365 traffic for considering scalable users (10000) without impacting user experience, session, throughput limitations on Firewall. |
| 59 | The solution should support identical security posture across multi-locations, regardless of users at each site. |
| 60 | The software upgrade should be seamless without interruption of services and must be transparent for users and do not require service windows. |
| 61 | The solution should support integration with proxy to log and apply policies based on original client source IP address instead of the proxy IP. |
| **H** | **Sandbox** |
| 62 | The solution provides sandboxing for all users regardless whether they are on a corporate network or public network. |
| 63 | The solution shall perform sandbox analysis (execution) of binaries to detect true Zero Day attacks for SSL as well as non-SSL traffic. |
| 64 | The sandbox solution should be in-line. |
| 65 | The solution shall support signature less method to detect and block zero-day and APT malware. |
| 66 | The solution will provide patient zero protection for Flash, Java, MS Office, dll, pdf, exe, ZIP and RAR. |
| 67 | The solution must be able to quarantine first time request and users will be notified if a file isn’t instantly available for download and being scanned in a sandbox |
| **I** | **Bandwidth Control** |
| 68 | The solution shall inspect full inbound and outbound cloud applications as like Office 365, Salesforce, Box, Google Apps to provide secure access and should support single sign-on functionality to access these applications.  |
| 69 | The solution must provide a mechanism for prioritizing bandwidth for business-critical web & cloud applications (e.g. Salesforce, Outlook) over non-critical apps (e.g. Facebook). |
| 70 | The solution shall have flexibility to define policy based on minimum bandwidth, maximum bandwidth, large downloads, limiting concurrent sessions, time schedule, location and URL’s etc. |
| 71 | The solution shall provide bandwidth control for all locations (HQ, Branches) from a unified single management console |
| 72 | The solution should be capable of allowing policy creation based on:* Specific IP/IP subnet
* Specific Location
* Access Time
* URL Accessed
* URL Category Accessed
* Cloud Application accessed
 |
| 73 | The solution should be capable of allowing policy based on percentages of overall bandwidth |
| 74 | The solution should perform bandwidth shaping based control to avoid packet drops for better user experience |
| 75 | The solution should be capable of performing bandwidth throttling in Uplink and Downlink direction |
| **J** | **Mobility** |
| 76 | The solution shall support web mobile agent for mobile (android and iOS) users and laptop (windows and mac) users . |
| 77 | The web mobile agent shall adaptively provide web security protection based on the changing location of mobile users. |
| 78 | The solution shall capable to identify mobile user’s credential and affiliated group regardless of changing location.  |
| 79 | The web mobile agent shall not require manual user intervention, which would be annoying to non-technical users.  |
| 80 | The solution must report based on Mobile Device Application Category (e.g. Google Play, iOS App Store category “Game”, “Productivity”, etc.) |
| 81 | The solution must restrict a list of Mobile app-stores as defined by the administrator. |
| 82 | The solution must restrict and report on Mobile Applications: Leaking Personally Identifiable information, Leaking Location information, Transmitting Device ID’s, With known vulnerabilities, Exhibiting malicious activity |
| 83 | The solution shall notify end-users when Mobile Application traffic is blocked |
| **K** | **OEM Eligibility** |
| 84 | The OEM of the offered solution must feature in the Leaders segment of the Gartner Magic Quadrant published in the last 3 consecutive years (2014, 2015 and 2016 or latest). |
| 85 | The OEM must have well established Research & Development / Engineering Center in India. |
| 86 | The OEM must have Technical Assistance Centre (TAC) support in India. |