

PROJECT IMPLEMENTATION UNIT GANDHINAGAR



TECHNICAL SPECIFICATIONS
FOR
ELV SYSTEMS

Name of Work :- New Construction of 30 Bedded Community Health Center at.Thangadh, Ta.Thangadh,
Dist.Surendranagar.

Project Implementation Unit

4th Floor, PIU/RDD/NHM Building, Civil Hospital
Compound,
Sector-12,
Gandhinagar –382 012.

Overview & Objectives of Extra Low Voltage System for New Construction of 30 Bedded Community Health Center at.Thangadh, Ta.Thangadh, Dist.Surendranagar.

Overview:

Extra-low Voltage (ELV) is an electricity supply voltage in a range which carries a low risk of dangerous electrical shock. There are various standards that define extra-voltage. The IEC and IET go on to define actual types of extra-low voltage systems. Extra-low voltage system is consisting of all the systems which operates on low voltages like Telecommunication Systems, Enterprise Networking Systems, Audio Visual Systems, Fire Alarm & Detection Systems, Public Addressing Systems, Access Control Systems & Video Surveillance Systems.

Objective:

Structure Cabling Systems:

To build an ELV System an agile, redundant and scalable structure cabling system is required.

Networking Systems:

To achieve highly available and consistence network for various equipment to communicate and seamlessly store or retrieve the data as and when required.

Telecommunication Systems:

To provide a stable and reliable Telephone / Communication network to the users of the organization or campus within or outside the campus.

Fire Alarm & Detection Systems:

To safeguard peoples and property from the risk of fire, timely detection and alarm is the essence of any campus.

Public Addressing Systems:

To help administration by providing Announcement System for General and Emergency Announcements.

Video Surveillance Systems:

To help administration by providing real time monitoring system to maintain discipline, safeguard public and to detect any suspicious activities.

Building Management Solution:

Information comes together at the management level. The management level is the graphical, interactive interface for the operator to the automation station and the integrated plants and plant parts.

Technical Specification of ELV System

General:

- The ELV System (Structure Cabling System, Enterprise Networking Systems, Telecommunication Systems, Audio Visual Systems, Fire Alarm & Detection Systems, Public Addressing Systems, Access Control Systems, Video Surveillance Systems) shall be seamlessly integrated.
- The rates quoted by bidder shall include such costs to ensure compatibility and seamless integration.
- The OEM should submit the authorization letter covering below mentioned points, before commencing the work by the Bidder:
 - OEM should confirm that the items quoted by the bidder are in production and would be serviceable for at least Five Years.
 - OEM should confirm that the quoted items are not obsolete products.
 - OEM should confirm that the quoted items are produced within One Year before the date of Supply.
- 1. Structure Cabling System – UTP Copper (Cat6) Cables and Components, Fiber Optics Cable and Components, Network Enclosures:
 - Installation, identification and termination of cables between information outlets and network rack shall be considered as a part of bidder's work.
 - Cabling utilized for Voice and Data Nodes shall originate from Network Racks and terminated at Information Outlets at Wall.
 - All cables and IOs shall be identified at both the ends (IO & Rack side) with appropriate ferruling.
 - All balanced twisted pair cables laying and termination shall comply and be tested as per TIA/EIA 568-B series standard for Cat5, Cat5E and Cat6 installations.
 - UTP Cabling system conforming to ANSI/TIA/EIA 568-B series and ISO/IEC 11801 2nd edition, EN-50173-1.
 - The bidder carrying out the SITC work shall make the system entirely operational for its intended use, by addition of components specific to its make/model even if not specifically

TECHNICAL SPECIFICATIONS FOR ELV WORKS

mentioned in the BOQ.

- It shall be the responsibility of the installer and OEM to ensure that the Passive Components of structured cabling system will be free from manufacturing defects in material and workmanship under normal and proper use.
- The site should be duly certified by OEM for a period of 20 years from the date of installation or issuance of the registration certificate, whichever is earlier.
- 20-year systems performance guarantee by the OEM along with actual test results conducted at site such as attenuation, return loss, NEXT & ACR. Permanent link shall be tested for minimum guaranteed performance as per standards at 500 MHZ operation as minimum.
- The final branch connections with single cables in conduit & the maximum no. of cables in each conduit shall be as per given in below table:

Sr. No.	Conduit Diameter		Max. Cables per Conduit
	Inch	mm	
1.	1"	25	3 Nos. x Cat 6 Cables.
2.	1 ½"	40	6 Nos. x Cat 6 Cables.
3.	1"	25	Single Cable per Loop Public Addressing Systems.
4.	1 ¼"	32	Two runs of Fiber Cable.

- The SITC job includes Supply, installation, testing and commissioning of UTP Cat6 cables in existing conduit either on flooring / wall / ceiling / slab etc.
- The bidder has to furnish working drawings and commence work after approval of end user or consultant. The successful bidder has to submit as-built drawings.
- The structure cabling system should support various applications but not limited to Voice, Video and ISDN Applications, Ethernet Applications, IEEE802.3af PoE and IEEE802.3at PoE+, Fiber Channel Applications, IEEE802.11a/b/g/n/ac Wireless LAN Applications, DSL Applications, Various Audio & Video Streaming Applications.
- The structure cabling system as per the references and standards but not limited to TIA/EIA, International Electro-technical Commission (IEC), European Committee for Electro- technical Standardization (CENELEC), National Fire Protection Association (NFPA), UL Listed.
- The structure cabling system compliant channels will meet or exceed the guaranteed channel performance as per relevant standards in the structure cabling system performance specifications in effect at the time of installation.

TECHNICAL SPECIFICATIONS FOR ELV WORKS

1104.	Fire Alarm Panel		
Sr. No.	Description	Specification	Compliance
1.	General	This section of the specification includes the furnishing, installation, and connection of a microprocessor controlled; addressable fire alarm equipment required to form a complete coordinated system ready for operation. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, control panels, auxiliary control devices, annunciator, power supplies, and wiring as per shop drawings and specified herein.	
2.		The system shall be designed such that each loop shall limited to only 80% of its total capacity at initial installation	
3.		All equipment/components shall be new & 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 protected premises protective signaling (fire alarm) system. The authorized representative of the manufacturer of the major equipment, such as control panels, shall be responsible for the satisfactory installation of the complete system.	
4.		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.	
5.	Submittals and Shop Drawings	Sufficient information shall be clearly presented and shall include manufacturer's name, model numbers, power requirements, equipment layout, device arrangement and complete wiring.	
6.		Sequence and description of operation	
7.		Product Data for each type of equipment, initiating device, signal device, peripheral device and cable provided on the project.	
8.		Shop drawings shall include battery calculations, floor plans and wiring diagrams.	
9.	Operation Manual	Installation instructions for use by installing contractor	
10.		Operational instructions or manual for use by building personnel, including Name and phone number of service representative	
11.		Maintenance instructions as required for use by building personnel.	
12.		Copy of approved shop drawings.	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

13.	Basic System	The system shall be a complete, electrically supervised fire detection with microprocessor-based operating system having the following; capabilities, features and capacities:	
14.		<p>The local system shall provide status indicators and control switches for all of the following functions</p> <ol style="list-style-type: none"> a. Audible and visual notification alarm circuit zone control b. Status indicators for sprinkling system water-flow and valve supervisory devices. (if any) c. Any additional status or control functions as indicated on the drawings, including but not limited to; emergency generator functions, fire pump functions, door unlocking and security with bypass capabilities 	
15.		Each intelligent addressable device or conventional zone on the system shall be displayed at the fire alarm control panel by a unique alphanumeric label identifying its location	
16.	Specification	This specification is intended to set out in general outline the minimum requirements and standards of installation for the various units of equipment and works it covers. Provision set out, or claim made in the successful tender which are in excess of, or improved upon the basic requirements of the specification shall unless otherwise determined by the client become part of the requirements of the specification whether or not they are subsequently incorporated in addenda to the specification	
17.		The client shall be the sole judge of what constitute an improvement upon or exceeds the requirements of the specification	
18.		The specification shall be read in conjunction with the tender drawings (as per schedule of drawings) and are intended to be mutually explanatory and complementary to one another. All works and specification called for by one, i.e. specification or drawings even if not by the other shall be fully executed and complied with in total.	
19.		The entire system shall be engineered by the contractor based on the guidelines furnished in the specification, various codes / standards, with good engineering practice.	
20.		Supplies and services to be covered under this tender specification and the conditions thereof are detailed in the subsequent sections of the specifications. In case of	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

		conflict among various sections, subsections, documents, drawings the same shall be referred to purchaser whose decision shall be final and binding to the Bidder	
21.	Materials and Workmanship	Unless expressed to the contrary, all materials, and equipment supplied by the contractor shall comply with the applicable Indian standards (I.S) or various codes or specifications with good practice as approved by the Indian standards.	
22.		Where a standard is referred to, that standard shall be the latest published edition thereof, unless otherwise stated	
23.		All materials and equipment supplied shall be new and of the best type for each particular purpose and of the first quality with regard to design, manufacture and performance	
24.		The equipment and materials shall be suitably designed and constructed for safe, proper and continuous operation under all conditions described or implied in this specification without undue heat, strain, vibration, corrosion or other operating difficulties.	
25.		Unless otherwise specified, the equipment and material within the scope of this specification shall be of a standard proven design. Design incorporating components which may be considered prototype in	
26.		nature will not be accepted.	
27.		Unless otherwise specified, the equipment and material within the scope of this specification shall be of a standard proven design. Design incorporating components which may be considered prototype in nature will not be accepted.	
28.		Equipment and equipment components shall be designed and supported to permit free expansion and contraction without causing excessive strains, distortion or leakage	
29.		Parts subject to wear, corrosion or other deterioration, or requiring adjustment, inspection or repair shall be accessible and capable of reasonably convenient removal, replacement and repair. All such parts shall be of suitable material for keeping maintenance to a minimum	
30.		The equipment shall be designed to permit replacement of parts and ease of access during inspection, maintenance and repair.	
31.	Approvals	The system shall have proper listing and/or approval from the internationally recognized UL-Underwriters Laboratories Inc/ FM Factory Mutual	
32.		The Fire Alarm Control Panel and all modules/devices shall meet the modular listing requirements of Underwriters Laboratories, Inc./ FM Factory Mutual Each subassembly,	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

		including all printed circuits, shall include the appropriate UL/ FM label. This includes all printed circuit board assemblies, power supplies, and enclosure parts. Systems that do not include modular labels are not acceptable.	
33.	Quality Assurance	The manufacturer of the detection components shall have experience in the design and manufacture of similar types of detection systems and who refer to similar installations providing satisfactory service.	
34.		The name of the manufacturer, part numbers and serial numbers shall appear on all major components.	
35.		All detection devices, components and equipment shall be the products of the same manufacturer	
36.		All devices, components and equipment shall be new, standard products of the manufacturer's latest design and suitable to perform the functions intended	
37.		All products ranging from PANEL to Detectors & Devices should be manufactured under single source of manufacturer to usher continuous line of support round the year	
38.	Operation & Maintenance:	The contractor shall train the employer's operating personnel in the operation and maintenance of the plants	
39.	Scope of work	This section of the specification includes the furnishing, installation, and connection of a microprocessor controlled; addressable fire alarm equipment required to form a complete coordinated system ready for operation. It shall include, but not be limited to, alarm initiating devices, alarm notification appliances, control panels, auxiliary control devices, annunciator, power supplies, and wiring as per shop drawings and specified herein.	
40.		The system shall be designed such that each loop shall limited to only 80% of its total capacity at initial installation	
41.		All equipment/components shall be new & the manufacturer's current model. The materials, appliances, equipment and devices shall be tested and listed by a nationally recognized approvals agency for	
42.		use as part of a protected premises protective signaling (fire alarm) system. The authorized representative of the manufacturer of the major equipment, such as control panels, shall be responsible for the satisfactory installation of the complete system.	
43.		All equipment and components shall be installed in strict compliance with each manufacturer's recommendations. Consult the manufacturer's installation manuals for all wiring diagrams, schematics, physical equipment sizes, etc. before beginning system installation. Refer to the riser/connection diagram for all specific	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

		system installation/termination/wiring data	
44.		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	
45.	Operation Manual:	<p>Operation manual shall include:</p> <ol style="list-style-type: none"> Installation instructions for use by installing contractor Operational instructions or manual for use by building personnel, including Name and phone number of service representative Maintenance instructions as required for use by building personnel Copy of approved shop drawings 	
46.	Fire Alarm Condition:	Sound an audible alarm and display a custom screen/message defining the building in alarm and the specific alarm point initiating the alarm in a graphic display. The display shall provide standard NFPA graphical symbols indicating hazardous materials and personnel situations critical to situation management. Hazmat ICONs must conform to NFPA standard 170 formats. The system shall supply a simple building floor plan and icons representing alarm devices in off, normal or alarm condition.	
47.		Log to the system history archives all activity pertaining to the alarm condition	
48.		Sound a pre announce tone followed by a field programmable digitized custom message as required for the system. The visual signals operate in a similar pattern	
49.		An automatic announcement or tone evacuation signal shall be capable of interruption by the operation of the local system microphone to give voice evacuation instructions overriding the preprogrammed sequences	
50.		Status lights next to speaker selection switches on the control panel shall indicate speaker circuit selection	
51.		Print to system printer (where required) alarm condition information.	
52.		Sound the ANSI 117-1 signal with synchronized audible and synchronized strobes	
53.		Audible signals shall be silenced from the fire alarm control panel by an alarm silence switch. Visual signals shall be programmable to flash until system reset or alarm silencing, as required	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

54.		Activation of any detector in a single elevator lobby or an elevator equipment room shall indicate at fire alarm control panel, cause the recall of that bank of elevators to the ground/stilt floor and the lockout of controls.	
55.		HVAC shut down shall, be accomplished by system operated duct detectors as per local requirements. PAC units will be shut down by control relay modules in the loop	
56.		Door closure devices shall operate by floor	
57.		Activation of stairwell pressurization fans, smoke purge and damper control shall be as required	
58.		<p>Supervisory Condition</p> <ol style="list-style-type: none"> Display the origin of the supervisory condition report at the fire alarm control panel graphic LCD display Activate supervisory audible and dedicated visual signal Audible signals shall be silenced from the control panel by the supervisory acknowledge switch Record within system history the initiating device and time of occurrence of the event Print to the system printer (where required) the supervisory condition. 	
59.		<p>Trouble Condition</p> <ol style="list-style-type: none"> Display at the Fire alarm control panel graphic LCD display, the origin of the trouble condition report. Activate trouble audible and visual signals at the control panel and as indicated on the drawings. 	
60.		<ol style="list-style-type: none"> Audible signals shall be silenced from the fire alarm control panel by a trouble acknowledge switch Trouble conditions that have been restored to normal shall be automatically removed from the trouble display queue and nor require operator intervention. This feature shall be software selectable and shall not preclude the logging of trouble events to the historical file. Record within system history, the occurrence of the event, the time of occurrence and the device initiating the event. Print to the system printer (where required) the trouble condition 	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

61.		<p>Security Condition</p> <ol style="list-style-type: none"> Display at the fire alarm control panel graphic LCD display, the origin of the security condition report. A dedicated security LED shall flash until the alarm has been acknowledged, then revert to a steady "ON" state The control system shall be capable of bypassing the alarms from an individual security system installed within selected areas. The pass code allowing this function shall be assignable to individual security personnel and each bypass action shall be logged to system history. Intrusion alarms occurring during a bypass period shall be logged to history and displayed but no audible alarm shall occur at the control panel. Print to the system printer (where required) the security condition. The Fire Control Panel shall be "UL" 1076 listed for security purposes 	
62.	General	<p>The fire alarm control panel shall be microprocessor based using the multiple microprocessors throughout the system providing rapid processing of smoke/ heat detector and other initiation device information to control system output functions. There shall be a watchdog circuit, which shall verify the system processors and the software program. Problems with either the processors or the system program shall activate a trouble signal, and reset the panel. The system modules shall communicate with an RS 485 network communications protocol. All module wiring shall be to terminal blocks, which will plug into the system card cage. The blocks shall be color coded to prevent accidental crossing of wiring. The control panel shall be capable of expansion via up to 50 Loops. A single panel / node can be used using remote cabinets and distributing the</p> <p>50 Nos. of addressable loops locally in floor wise architecture. This will save the cost of wiring from floors to Main panel.</p>	
63.		Maximum system capacity shall be at least 2500 intelligent Addressable detectors & devices	
64.		The basic system shall have capabilities for up to 252 intelligent Addressable detectors & devices per loop of any combinations and can be expanded up to 2500 intelligent Addressable detectors & devices. A minimum of 200	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

		intelligent Addressable detectors per loop shall be mandatory. The system shall employ a flexible number of detection input loops to reach maximum system capacity. Systems which, have a fixed number of device addresses per node based on a fixed number of device circuits (loops) shall provide 20% of loop maximum spare capacity on all loops to meet this requirement.	
65.		The Device Loop Card shall be capable of up to 252 intelligent Addressable detectors & devices distributed between two SLC circuits. Any trouble on one circuit shall not affect the other circuit. This module controls the signaling from the initiation devices reporting alarms and troubles to the control panel. This module shall also provide the signaling to the field devices for controlling the output of specific initiation devices.	
66.		The circuit shall be capable of being connected with polarity insensitive intelligent devices. Polarity insensitive wiring allows fire detection devices to operate flawlessly even when detector and devices wiring polarity are inverted on the wrong screw terminals. When wiring polarity doesn't need to be observed, wiring troubleshooting is greatly reduced, this will also save time of installation. The circuits shall have the ability to be wired, Style 4, Style 6. Any of all of the 252 devices on the loop card shall be capable of activating up to two devices (relay base, audible base or remote lamps). These accessories shall not take away from the 252 addresses available per loop. Systems which, require unique addresses for SLC circuit accessories (remote relays, relay bases, audible bases and remote lamps) shall provide 20% spare capacity for each loop to provide for system expansion. The on-board microprocessor provides the loop card with the ability to function even if the main microprocessor fails.	
67.		LEDs on the board shall provide annunciation for the following; Power, Card Failure, Network Failure, Ground. Fault, Alarm, Trouble, Short Zone 1, Short Zone 2, Style 6 Open Zone 1, Style 6 Open Zone 2. This card shall plug into the system card cage.	
68.		The System will consist of 32 bits Central processor with 5000 Event History Logging with	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

69.		On Line & Off Line Reports. Shall have Automatic Environmental Compensation for Smoke Detectors, Multiple Levels of Password Protection, shall supports Pre-Action, Deluge and agent releasing, Built-in strobe synchronization, 200 notification appliance circuits , shall be Modular assembled. Up to 4.0 amps (24VDC) per NAC. Detect the activation of any initiating device and the location of the alarm condition. Degrade mode operation, operate all notification appliances and auxiliary devices as programmed. In the event of CPU failure, all SLC [Signal Line Circuit 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 devices for notification	
70.		The Signal Line Circuits shall be tested for opens, shorts, ground faults, device status and multiple device response (2 devices at same address) and communications with all addressable devices installed before connection to the control panel. Systems without this capability shall have a test panel installed for initial testing to eliminate any possible damage short term or long term to the control panel. After initial testing replace the test panel and proceed with complete testing.	
71.		The Person Machine Interface (PMI) shall provide the system information on of 6" VGA Color LCD display, Touch Screen and LED for displaying system status. The display shall provide floor plans with alarm type and "you are here" indication, a physical as well as a system geographic view. The display shall be navigable by device/module custom message in the system architecture with no need for device address knowledge. Graphic user interface shall	
72.		be menu driven with 4 tabs showing the level and the total events for each tab. The tabs shall be; Alarm, Supervisory, Trouble and Security. Each level shall show 5 events simultaneously. The LED displays shall indicate Power, Audible On or Silenced, and Partial system disabled	
73.		The PMI shall provide a "More Info" button that can display addition device information such as the device type and device address. This More Info button shall also have the ability to display a detailed screen that provides the following a. 200 Character Custom message	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

		<p>associated with the group of Device.</p> <ul style="list-style-type: none"> b. NFPA Symbols representing fire service equipment in the area as per NFPA 170 c. NFPA Symbols representing hazards in the area as per NFPA 170 d. NFPA Symbols representing People in the area as per NFPA 170 e. Number of devices in the associated group that are in Alarm f. Name and Phone number of Emergency contact 	
74.		NFPA 170 provides standard symbols used to communicate fire safety, emergency, and associated hazards information. Using easily understood uniform symbols on labels and signs provides consistency, eliminates confusion, and improves communication. This standard is intended for the general public and the fire service, as well as for architectural and engineering drawings, diagrams, firefighting operations, and pre-incident planning sketches. It includes semiology for emergency management mapping, and emergency evacuation diagrams and plans.	
75.		The Panel display shall also have the ability to display a bitmap of a floor plan showing a "You are Here" symbol to tell the responding person exactly where they are in the building in	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

76.		relation to the event. Systems without this type of display shall supply a UL listed Graphics package with their system. The LCD shall have a keyboard screen to allow the technician ability to enter test and numbers for passwords or text changes. The display shall also have a Context Sensitive Help button. A globally configured display shall have the ability to view events, acknowledge, silence and reset networked Fire alarm systems. A globally configured Person Machine Interface shall also have the ability to arm and disarm input and output points on Fire alarm system. A globally configured control panel shall have the ability to be configured for control of the entire network, control of the local Fire alarm panel, or annunciation only. In a networked configuration, the Partial System Disable LED shall be indicative of all networked Fire alarm panel. A globally configured display in a networked configuration shall have the ability to store 6 maps for every control panel. At least 10 globally configured PMIs shall be supported in a network. The module shall be model number PMI. The LCD screen displays events in colors corresponding to the event type. Alarm events appear in red; Trouble events appear in yellow; Supervisory events in blue, and Security events in magenta. Maintenance menus also use colors to highlight system features and capabilities, such as arming and disarming points, system testing, and system reports	
77.		Systems not having the above LEDs shall provide separate LEDs within the control panel enclosure with appropriate labels. Selection buttons shall be backlit to aid the operator in the selection process. There shall be controls for scrolling throughout the event list. A button shall provide zoom in zoom out for the amount of information desired for a specific entry.	
78.		The display shall be capable of monitoring the power supply loading and show available capacity for future expansion planning. The display LCD shall provide standard NFPA symbols showing Fire Service Equipment, Hazards, compliant with NFPA 170 and People in the area of alarm. Systems without this type of display shall supply a "UL" listed Graphics package with their system. The LCD shall have a keyboard screen to allow the technician ability to enter test and numbers for passwords or text changes.	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

79.		<p>The Network Interface Card shall provide communication between enclosures. The network card supervises the network to insure proper operation. Any faults that are detected shall be reported to the display for annunciation. The network card shall isolate short circuits to each individual segment of the network. If a short occurs only the segment between the network cards will be affected.</p> <p>The card shall have the ability to provide Style 4 or 7 network wiring configurations. The card shall have as the minimum the following diagnostic LED; Reset, Power, Card Fail, CAN Fail, HNET Fail, ZNET Fail, GND Fault, Loop A Fail, Loop B fail, Networks - Style 7, Style 4, GND Fault Enabled, GND Fault Disabled</p>	
80.		<p>The system card cage shall provide the mounting of all system cards, field wiring, and panel's inter-card wiring. The terminal strips for the cards shall be color-coded to eliminate the possibility of making the wrong connection.</p> <p>The terminal blocks maybe disconnected and reconnected while the system is powered up without causing any difficulties. All power limited field wiring shall connect to the top of the card cage. All non-power limited internal wiring shall be connected to the bottom of the card cage. The card cage shall hold the systems</p>	
81.		cards and have capability of connecting multiple card cages to meet system demands	
82.		<p>Where required to monitor a large number of relays, such as monitoring subsystems or normally open contact devices, provide a Supervised Input Module, which will monitor up to 16 inputs. Each input shall be individually programmed for supervised or non-supervised circuits. This module shall be connected to a system network. The module shall contain 2 programmable forms "C" relays for control of the monitored subsystem.</p>	
83.	Power Supply:	<p>The system Power Supply/Charger shall be a 12- amp supply with battery charger. The power supply shall be filtered and regulated. The power supply shall have a minimum of 1 power limited output rated at 4 amps, and a minimum of 1 output rated at 12 amps. The system power supply can be expanded up to 48 amps. The auxiliary power supply module shall share common batteries with the primary power supply. The system power supply shall have 4 relays, 1 for common alarm, one for common trouble and two programmable relays. The power supply shall be rated for 120/240V AC 50/60 Hz</p>	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

84.		The battery charger shall be able to charge the system batteries up to 100 AH batteries. Battery charging shall be microprocessor controlled and programmed with a special software package to select charging rates and battery sizes. An optional Thermistor for monitoring battery temperature to control charging rate shall be available.	
85.		The power supply shall have a plug for an AC adapter cable, which allows a technician to plug in a laptop computer for up or down loading program information or test equipment.	
86.		Transfer from AC to battery power shall be instantaneous when AC voltage drops to a point where it is not sufficient for normal operation.	
87.	System Enclosure	Provide the enclosure needed to hold all the cards and modules as specified with at least spare capacity for two cards. The enclosures shall be black. The outer doors shall be capable of being a left hand open or a right hand open. The inner door shall have a left-hand opening. System enclosure doors shall provide were required ventilation for the modules or cards in the enclosure.	
88.		Provide system enclosure for all amplifiers. Where required by the manufacturer, provide means for venting heat from the enclosure either by having enclosure sides and top vented or the doors vented	
89.	System Printer:	The system printer shall be operated from a Remote Printer Module, which shall be mounts outside the enclosure. This module shall provide a parallel port and 2 serial ports for RS 232 protocol. One of the serial ports shall be able to be programmed for RS485 protocol. Supervised network connection shall be either Style 4 or 7 as directed	
90.		This parallel printer shall be supervised for: On/Off line, out of paper, paper jam, power off, and connection the system. The printer shall be a; high speed, 24 dot matrix, wide carriage, and capable of using tractor or friction fed paper. The printer shall contain diagnostic LEDs for ease in maintenance	

1105.	Photo Electric Detector		
Sr. No.	Description	Specification	Compliance

TECHNICAL SPECIFICATIONS FOR ELV WORKS

1.	General	UL268 6th and 7th edition compliance and FM approved Intelligent Addressable Photoelectric Smoke detector with advanced technology and false alarm resistance complete with standard base, facility to mount in different comprehensive environment, Tri-color detector-status LED with 360 ° view, microprocessor circuitry with error check; detector self-diagnostics, and supervision programs, Sensitivity range of 1.08 - 2.72% / ft obs, Superior EMI and RFI immunity, RoHS compliant	
2.	General	Detector shall have in-built isolator for better reliability, circuit integrity and advanced fault finding. Manufacturers not having in-built Isolator feature in detector shall consider Isolator base in place of standard base	

1106.	Multi Criteria Detector		
Sr. No.	Description	Specification	Compliance
1.	General	The multi-criteria sensor detector shall be an intelligent digital photoelectric detector with a programmable heat detector. The detector must provide up to 11 different environmental algorithms that allow the detector to provide superior false alarm immunity without the need for additional alarm verification delays. The detector shall have a multicolor LED to streamline system maintenance/inspection by plainly indicating detector status as follows: green for normal operation, amber for maintenance required, red for alarm. Detector shall have shock-resistant thermistor to sense temperature changes. The “on-board” Fire technology shall allow the detector to gather smoke and thermal data, and to analyze this information in the detector’s “neural network”.	
2.	General	Detector shall have in-built isolator for better reliability, circuit integrity and advanced fault finding. Manufacturers not having in-built Isolator feature in detector shall consider Isolator base in place of standard base	
3.		Detectors shall be listed for use as open area protective coverage, in duct installation and duct sampling assembly installation and shall be insensitive to air velocity changes. The detector communications shall allow the detector to provide alarm input to the system and alarm output from the system. Detectors shall be programmable as application specific, selected in software for a minimum of eleven environmental fire profiles unique to the installed location. These fire profiles shall eliminate the possibility of false indications caused by dust, moisture, RFI/EMI, chemical fumes and air movement while factoring	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

		<p>in conditions of ambient temperature rise, obscuration rate changes and hot/cold smoke phenomenon into the alarm decision to give the earliest possible real alarm condition report. The intelligent smoke detector shall be capable of providing three distinct outputs from the control panel. The system-controlled output functions shall be from an individual or unique input of smoke obscuration, a thermal condition or a combination of obscuration and thermal conditions. The detector shall be designed to eliminate calibration errors associated with field cleaning of the chamber. The detector shall support the use of a relay and LED remote indicator at the same time. Low profile, white case shall not exceed 2.5 inches of extension</p> <p>below the finish ceiling. Detector wiring shall not require any special shielded cable. It should have a multi detector status LED: Green for normal and red for alarm.</p>	
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1108.	Isolator Module		
Sr. No.	Description	Specification	Compliance
1.	General	Isolator modules shall be provided to automatically isolate wire-to-wire short circuits on a loop Class A. The isolator module shall limit the number of modules or detectors that may be rendered inoperative by a short circuit fault on the loop segment or branch. At least one isolator module shall be provided for each set of detectors (max 19 numbers).	
2.		If a wire-to-wire short occurs, the isolator module shall automatically open-circuit (disconnect) the loop. When the short circuit condition is corrected, the isolator module shall automatically reconnect the isolated section	
3.		The isolator module shall not require any 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 mount in a standard 4-inch (101.6 mm) deep electrical box or in a surface mounted back box. It 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.	

1109.	Thermal Detector		
Sr. No.	Description	Specification	Compliance

TECHNICAL SPECIFICATIONS FOR ELV WORKS

1.	General	Thermal Detectors shall be rated at 135 degrees for fixed temperature. Detectors shall be constructed to compensate for the thermal lag inherent in conventional type detectors due to the thermal mass, and alarm at the set point of 135 degrees Fahrenheit. The choice of alarm reporting as a fixed temperature detector shall be made in system software and be changeable at any time without the necessity of hardware replacement. The detectors shall be installed according to the requirements of NFPA 72 for open area coverage.	
2.	General	Detector shall have in-built isolator for better reliability, circuit integrity and advanced fault finding. Manufacturers not having in-built Isolator feature in detector shall consider Isolator base in place of standard base	

1110./ 1111.	Control Module		
Sr. No.	Description	Specification	Compliance
1.	General	Addressable control modules shall be provided to supervise and control the operation of one conventional device of compatible, 24 VDC powered polarized audio/visual notification appliances. For fan shutdown and other auxiliary control functions, the control module may be set to operate as a dry contract relay.	
2.		The control module shall mount in a standard 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box, or to a surface mounted back box	
3.		The control module shall be wired with up to 1 amp of inductive A/V signal, or 2 amps of resistive A/V signal operation, or as a dry contact relay. The relay coil shall be magnetically latched to reduce wiring connection requirements, and to ensure that 100% of all auxiliary relay may be energized at the same time on the same pair of wires.	
4.		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	
5.		The control module shall be suitable for pilot duty applications and rated for a minimum of 0.6 amps at 30 VDC	
6.	General	Detector shall have in-built isolator for better reliability, circuit integrity and advanced fault finding. Manufacturers not having in-built Isolator feature in detector shall consider Isolator base in place of standard base	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

1112.	Monitor Module		
Sr. No.	Description	Specification	Compliance
1.	General	Addressable monitor modules shall be provided to connect one supervised IDC zone of conventional 2-wire smoke detectors or alarm initiating devices (any N.O. dry contact device).	
2.		The two-wire monitor module shall mount in a 4-inch square (101.6 mm square), 2-1/8 inch (54 mm) deep electrical box or with an optional surface back box	
3.		The IDC zone shall be wired for operation. An LED shall be provided that shall flash under normal conditions, indicating that the monitor module is operational and in regular communication with the control panel.	
4.	General	Detector shall have in-built isolator for better reliability, circuit integrity and advanced fault finding. Manufacturers not having in-built Isolator feature in detector shall consider Isolator base in place of standard base	

1113.	Double Action Manual Call Point		
Sr. No.	Description	Specification	Compliance
1.	General	UL listed and FM approved Intelligent addressable Class X type (Style 7), Manual Pull Station Double Action, Shock and Vibration Resistant, with built in dual isolator, polarity insensitive, Tri color LED for status (Green for Normal, Yellow for Faulty and RED for activation), T-45 Key Reset lockset for easy maintenance, Operating Temp and RH: 0-49degC and <=95%. MCP shall have in-built isolator for better reliability, circuit integrity and advanced fault finding.	
2.	General	Detector shall have in-built isolator for better reliability, circuit integrity and advanced fault finding. Manufacturers not having in-built Isolator feature in detector shall consider Isolator base in place of standard base	

1114.	Fire Fighting Telephone Receiver		
Sr. No.	Description	Specification	Compliance
1.	General	UL Listed Fire Fighter's Telephone Handset for two-way communication between Remote Fire Fighter & Fire Command Center.	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

1115.	Fire Fighting Telephone Jack		
Sr. No.	Description	Specification	Compliance
1.	General	UL Listed Fire Fighter's Telephone Jack with suitable module for two-way communication between Remote Fire Fighter & Fire Command Center.	

1116.	2x1.5 sq.mm. Fire Survival Armored cable		
Sr. No.	Description	Specification	Compliance
1.	Type of Cable	LSZH Fire Survival Armoured.	
2.	No. of Elements x size in mm ²	1Pair (2C) x 1.5	
3.	Voltage Rating	600/1000 V	
4.	Type of Conductor	Annealed Tinned Copper	
5.	Conductor Material	Copper – Multistranded	
6.	Insulation Material	Cross Link LSZH compound	
7.	Nominal Thickness / Minimum Thickness of Insulation (mm)	0.60mm /0.44mm	
8.	Shielding Material	Aluminum Mylar Tape	
9.	Coverage	100%	
10.	Inner Sheath	LSZH Compound	
11.	Armoring Material	Galvanized Steel	
12.	Type of Armoring	Round Wire	
13.	Outer sheath Material	LSZH compound	
14.	Nominal Thickness / Minimum Thickness of Outer Sheath	1.24mm	
15.	Oxygen Index	Minimum 29%	
16.	Temperature Index	Minimum 250 Deg.C	
17.	Smoke Density Rating	Maximum 60%	
18.	Acid Gas Generation	Maximum 20%	
19.	Halogen Acid Gas Emission	<0.5	
20.	Maximum Conductor Temperature Under Normal Operating Conditions (°C)	90 Deg. C	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

21.	Maximum Conductor Temperature during Short Circuit (°C)	250 Deg. C	
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1117.	Repeater Panel		
Sr. No.	Description	Specification	Compliance
1.	General	Should have 4 rows - 40-character alphanumeric LCD screen, backlit upon status change or display toggling	
2.		Should have Audible and event-status light-emitting diodes (LEDs)	
3.		Should have Scroll buttons to view additional events	
4.		Should have local Audible Sounder	
5.		Should support Class B and Class A Wiring	
6.		Should have Built-in transient protection	
7.		Should have Optional local-system control	
8.		Should have UL864 & CAN / ULC-S576 Listed	

1118.	Public Address Controller		
Sr. No.	Description	Specification	Compliance
1.	Max power consumption	600 VA	
2.	Output power (rms/maximum)	240 W	
3.	Frequency response	60 Hz to 18 kHz	
4.	Emergency active relay	NO / COM / NC	
5.	Max power	550 W	
6.	Memory capacity	16 MB Flash ROM	
7.	Member of messages	255 Max	
8.	General	Should have LED power Meter	
9.	General	Should have Zone Status LEDs.	
10.	General	Should have Two emergency state buttons	
11.	General	Should have Six Emergency State Button	
12.	General	Should have master all call button	
13.	General	Should have 12 loudspeaker outputs	
14.	General	Should have 12 trigger inputs	
15.	General	Should have Two call station connectors	
16.	General	Should have LED power Meter	
17.	General	Should have Zone Status LEDs.	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

18.	Operating temperature	0 °C to +55 °C (14 °	
19.	Storage and transport temperature	° 40C to +70 °C	
20.	Relative humidity	<95%	

1119.	Public Address Router		
Sr. No.	Description	Specification	Compliance
1.	Zone Support	6	
2.	Input Contact	12	
3.	Amplifier	Built In Amplifier Function	
4.	power consumption	50 VA	
5.	Power handling capacity	1000W	
6.	Input Voltage	230/115 VAC,+/-10%,50/60 Hz	
7.	Relative humidity	95%	
8.	Inrush current	1.5 A 230 VAC / 3 A 115 VAC	
9.	Idle / max load current	0.2 A / 0.3 A	
10.	Battery Voltage	24 VDC,+15% / -15%	
11.	Battery Current max	1.8 A	
12.	Battery Typical / max load current	0.51 A / 1.5 A	
13.	Connectors	MC1,5 / 14-ST-3,5	
14.	Operating Temperature	-10 deg C to +55 deg C	
15.	Storage Temperature	-40 deg C to +70 deg C	

1120.	Power Amplifier (480W)		
Sr. No.	Description	Specification	Compliance
1.	Rated Output	480W	
2.	Max power consumption	1600 VA	
3.	Max powe	990W	
4.	S/N (flat at max volume)	>90 dB	
5.	Frequency response	60 Hz to 18 kHz (+1 / -3 dB at-10 dB ref. rated output	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

6.	Line Inputs	2x	
7.	Connector	3-pin XLR, balanced	
8.	Impedance	>20k ohm	
9.	Gain	40dB	
10.	Sensitivity	100V	
11.	Impedance	330k ohm	
12.	Connector	3-pin XLR	
13.	Operating temperature	-10 °C to +45 °C	
14.	Storage temperature	-40 °C to +70 °C	
15.	Relative humidity	<95%	

1121.	Ceiling Mount Speaker		
Sr. No.	Description	Specification	Compliance
1.	System features	It should come with excellent speech & music reproduction	
2.	Rated Power	It should support power tapping 6/3/1.5W	
3.	Frequency Range	It should be in the range between 150 Hz to 15KHz	
4.	SPL Rated Power	It should be 108dB at (1KHz at 1m)	

1122.	Cabinet Speaker		
Sr. No.	Description	Specification	Compliance
1.	System features	It should come with excellent speech & music reproduction	
2.	Rated Power	It should support power tapping 12/6/3	
3.	Frequency Range	It should be in the range between 200 Hz to 15KHz	
4.	SPL Rated Power	It should be 101dB at (1KHz at 1m)	

1123./ 1124.	Digital Call Station		
Sr. No.	Description	Specification	Compliance
1.	Zone	Six Zone Supported	
2.	Interface	2 x RJ45	
3.	Nominal sensitivity	85 dB SPL	
4.	Nominal output level	700 mV	
5.	Input sound level	110 dB SPL	
6.	Distortion	<0.6 %	
7.	Input noise level	25 dB SPLA	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

8.	Frequency response	100 Hz to 16 KHz	
9.	Speech filter	-3dB at 315 Hz, high-pass, 6 dB/oct	
10.	Output impedance	200 ohm	
11.	General	Should have PTT Key	
12.	General	Should have Volume control button	
13.	Operating temperature	-10 °C to +45 °C (14 °F to +113 °F)	
14.	Storage temperature	-40 °C to +70 °C (-40 °F to +158 °F)	
15.	Relative humidity	<95%	

1125.	2C 1.5 sq.mm FRLS Cable		
Sr. No.	Description	Specification	Compliance
1.	No of Core	2	
2.	Wire Diameter	1.5sqmm	
3.	Insulation Material	FRLS Armored	
4.	Inner Sheath	PVC	
5.	Armoring	Galvanized Steel	
6.	Outer Sheath	Extruded FRLSH PVC	
7.	Nominal OD	11.50 ± 2.0	
8.	Voltage	1100 Volts	

1126 ./ 1127 ./ 1134 ./ 1149 - 1154	Floor Mount Rack:	
Sr. No.	Description	Compliance
1.	Rack shall be constructed with high strength robust aluminum extruded frame structure with ventilation slots on the sides, top and bottom covers with provision to mount 4 nos. fans on top cover. Load carrying capacity – between 400 – 750 kg.	
2.	The other components except vertical profiles are made of CRCA Steel. CRCA steel used is as per “IS 513 Gr D” Standard. The Thickness of the CRCA sheets used for Doors is 1.2mm and for Side Panels is 1mm.	
3.	The cabinet shall be made of high impact CRCA steel as per IS 513 Gr D standard and design confirming to DIN 41494 or EIA 310D standards.	
4.	Top Covers and Bottom Covers and Side panels shall be of sheet steel and powder coated. The top and bottom covers shall be provided with number	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

	of 50mm and 75mm round cable knockouts for cable entry and cable knockouts shall be edge protected with rubber grommets.	
5.	Fully adjustable 19" equipment mounting angles. Two pairs of 19" Equipment mounting angles with mounting holes conforming to IEC 2973.	
6.	Vertical 19" metric panel mounts and door trims shall be of sheet steel and powder coated	
7.	Perforation area should be 70% of the total door area. Perforation for full or split doors the style should be "Honeycomb" type of perforation for maximum air circulation and stiffness.	
8.	Side Panels – must contain slam latches for locking purpose and option of providing slam locks, if required.	
9.	The rack should support various Locks Options like Slam Lock - Common Key or Unique Key, Swing Handle Lock, Digital Keypad operated locks, Bio-metric locks. Lockable Industrial Grade Castors with Foot Brakes.	
10.	Cabinet can be capable of dismantling and reassemble at the site.	
11.	Front Glass door made of toughened glass, tinted with easily detachable hinges.	
12.	Two Pair of slotted vertical cable manager shall be provided at front and back for managing Cables.	
13.	Rack shall be supplied with 4 Nos. 90 CFM fans at top, or optionally 250cfm	
14.	Rack shall be supplied with equipment mounting hardware in pack of 100s such as mounting nuts and screws either 12-24 or M6 type as applicable	
15.	Minimum 2 nos. of 10 x 5/15 Amps power distribution unit, 2 nos. of vertical cable managers and 2 no. of 19" 1U size horizontal cable managers.	
16.	Finish – cabinet shall be black or grey epoxy powder-coated of durable quality. The Powder coating of the racks is as per Nano Technology process with "Zirconium Coating".	
17.	Manufacturer must be ISO Standard Plants. The product must be UL Listed and certified for use in IT/CE. Environmental Safety – the rack must be RoHS compliant.	
18.	EIA standard pattern design with 12-24 tapped holes (EIA-310-E compliant) or EIA standard pattern design with 3/8" (9.5mm) square punches for Cage Nuts for mounting.	
19.	Rack should have dimension of at least 18U, 24U, 27U, 32U, 36U, 42U usable height, 600mmWx600mmD, 600mmWx800mmD, 800mmWx800mmD, 800mmWx1000mmD or 1000mmWx1000mmD.	
20.	Powder Coating thickness should be min 80 to 100 Microns with Scratch Resistance properties. Rack to be powder coated with Nano ceramic pre-treatment process using a zirconium coat and the process should be RoHS compliant.	
21.	The Network Racks must have unit prices for its individual knocked down items such as Main Frame, Front Glass Door, Rear Perforated Steel Door, Vented Side Panels, 4x90cfm Fans & Fan Tray, 2 No.x10 Socket 5A/15A PDU with MCB, 1U Cable Manager, Sliding Shelf, Keyboard Trey, Cantilever Shelf, Heavy Duty Stationery Shelf, Castors, Vertical Cable Manager, mounting hardware etc. It must be possible to configure the enclosure as per specific needs for a customized installation for every rack.	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

1128.	4MP IP IR Fixed Dome Camera		
Sr. No.	Description	Specification	Compliance
1.	Image Sensor	½.8" Progressive Scan, Backlight illuminated CMOS Sensor Note: The bidder must state the Make and model of the sensor to ensure the authenticity of the component. the bid would be disqualified if the sensor used is not as mentioned by the bidder	
2.	Minimum Resolution	4 MP or Higher (2560 x 1440)	
3.	Lens Type	2.8mm/4mm fixed lens	
4.	FOV	HFOV - 104° VFOV - 75° DFOV - 129°	
5.	Aperture (F#)	F 1.8	
6.	Iris	Fixed iris	
7.	Shutter speed	1/25-1/59000	
8.	Minimum Illumination	Color - 0.01 Lux @F1.2 (AGC ON) Monochrome - 0 Lux	
9.	Day/Night Camera Switching	Automatic/ Manual/ schedule	
10.	Built in IR irradiance up to	30 m	
11.	Noise Reduction	2 DNR, 3 DNR	
12.	Adaptive streaming	Should reduce the FPS and Bit rate during no activity period.	
13.	Signal to Noise Ratio (SNR)	≥70 dB	
14.	Back light Compensation (BLC)	Supported	
15.	Wide Dynamic Range	120 dB True WDR	
16.	VCA	Motion detection, View Tamper Detection, Tripwire detection, object Intrusion	
17.	Events and actions	Audio Exception, IP conflict, Network Disconnect, Storage Full, Time Trigger, E- mail, SMS, TCP notification	
18.	Image Enhancement	Saturation/ Contrast/ Sharpness/Brightness/Auto Exposure/ Gamma /White balance/ HVS & Forensic, Intelligent Defog	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

19.	ONVIF Compliance	Profile S & Profile G The IP Camera make, and model shall appear on the ONVIF Conformant products List	
20.	Unicasting/ Multicasting	Supported	
21.	Auto initiation	The camera shall connect to the Video Management Software (VMS) or Network Video recorder (NVR) of same brand without any need of Static IP to the Camera in LAN as well as WAN.	
22.	ROI	Supported	
23.	Privacy masking	Up to 3 Zone programmable	
24.	AWB	Supported	
25.	Network Failure recording	In case of Network failure, the Camera shall start recording on NAS or SD Card, which can be retrieved back when the network connectivity restores (if VMS belongs to same brand)	
26.	MAC Address	The Mac Address of the Camera shall be registered in the name of the OEM.	
27.	Supported Resolutions	2592 X 1944, 2592 X 1520, 2048 X 1536, 1920 X 1080, 720p, D1, 2CIF, VGA, CIF, QCIF	
28.	No of Stream Profiles	3	
29.	Video Compression	H.265 H.264 MJPEG	
30.	Frame Rate (FPS)	1 to 30	
31.	Video Standard	PAL	
32.	Number of Streaming profiles support	Three profiles support Profile 1: 2592X1944 @30fps (H.264/H.265) Profile 2: VGA @30fps (H.265/H.264) Profile 3: 2048x1536@8fps (MJPEG).	
33.	Bitrate	32 kbps-16Mbps	
34.	Bitrate Type	CBR, VBR	
35.	Ethernet	10Base-T/100BaseTX Ethernet (RJ-45)	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

36.	Network protocols	TCP/IP, HTTP, HTTPS, QoS, DHCP, DNS, DDNS, RTP, RTCP, RTSP, PPPOE, SMTP, NTP, HTTPS,TLS/SSL, FTP, ICMP, IGMP, ARP, UDP, 802.1x, SNMP, UPnP and Bonjour	
37.	Alarm input/output	1 Alarm IN, 1 Alarm Out	
38.	Regulatory Approvals/ Certifications:	UL, CE, FCC, EN/IEC, IP66 ,IK10,BIS. Note: All the reports and certificates shall be from a NABL accredited Lab	
39.	Power	POE (802.3af/at), 12 V 2A	
40.	Operating Temperature	0°C- +50°C	
41.	Storage Temperature	-20°C- +50°C	
42.	Operating Humidity	90% or less	

1129.	4MP IP IR Fixed Bullet Camera		
Sr. No.	Description	Specification	Compliance
1.	Image Sensor	½.8" Progressive Scan, Backlight illuminated CMOS Sensor Note: The bidder must state the Make and model of the sensor to ensure the authenticity of the component. the bid would be disqualified if the sensor used is not as mentioned by the bidder	
2.	Minimum Resolution	4 MP or Higher (2560 x 1440)	
3.	Lens Type	2.8mm/4mm fixed lens	
4.	FOV	HFOV - 104° VFOV - 75° DFOV - 129°	
5.	Aperture (F#)	F 1.8	
6.	Iris	Fixed iris	
7.	Shutter speed	1/25-1/59000	
8.	Minimum Illumination	Color - 0.01 Lux @F1.2 (AGC ON) Monochrome - 0 Lux	
9.	Day/Night Camera Switching	Automatic/ Manual/ schedule	
10.	Built in IR irradiance up to	30 m	
11.	Noise Reduction	2 DNR, 3 DNR	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

12.	Adaptive streaming	Should reduce the FPS and Bit rate during no activity period.	
13.	Signal to Noise Ratio (SNR)	≥70 dB	
14.	Back light Compensation (BLC)	Supported	
15.	Wide Dynamic Range	120 dB True WDR	
16.	VCA	Motion detection, View Tamper Detection, Tripwire detection, object Intrusion	
17.	Events and actions	Audio Exception, IP conflict, Network Disconnect, Storage Full, Time Trigger, E- mail, SMS, TCP notification	
18.	Image Enhancement	Saturation/ Contrast/ Sharpness/Brightness/Auto Exposure/ Gamma /White balance/ HVS & Forensic, Intelligent Defog	
19.	ONVIF Compliance	Profile S & Profile G The IP Camera make, and model shall appear on the ONVIF Conformant products List	
20.	Unicasting/ Multicasting	Supported	
21.	Auto initiation	The camera shall connect to the Video Management Software (VMS) or Network Video recorder (NVR) of same brand without any need of Static IP to the Camera in LAN as well as WAN.	
22.	ROI	Supported	
23.	Privacy masking	Up to 3 Zone programmable	
24.	AWB	Supported	
25.	Network Failure recording	In case of Network failure, the Camera shall start recording on NAS or SD Card, which can be retrieved back when the network connectivity restores (if VMS belongs to same brand)	
26.	MAC Address	The Mac Address of the Camera shall be registered in the name of the OEM.	
27.	Supported Resolutions	2592 X 1944, 2592 X 1520, 2048 X 1536, 1920 X 1080, 720p, D1, 2CIF, VGA, CIF, QCIF	
28.	No of Stream Profiles	3	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

29.	Video Compression	H.265 H.264 MJPEG	
30.	Frame Rate (FPS)	1 to 30	
31.	Video Standard	PAL	
32.	Number of Streaming profiles support	Three profiles support Profile 1: 2592X1944 @30fps (H.264/H.265) Profile 2: VGA @30fps (H.265/H.264) Profile 3: 2048x1536@8fps (MJPEG).	
33.	Bitrate	32 kbps-16Mbps	
34.	Bitrate Type	CBR, VBR	
35.	Ethernet	10Base-T/100BaseTX Ethernet (RJ-45)	
36.	Network protocols	TCP/IP, HTTP, HTTPS, QoS, DHCP, DNS, DDNS, RTP, RTCP, RTSP, PPPOE, SMTP, NTP, HTTPS,TLS/SSL, FTP, ICMP, IGMP, ARP, UDP, 802.1x, SNMP, UPnP and Bonjour	
37.	Alarm input/output	1 Alarm IN, 1 Alarm Out	
38.	Regulatory Approvals/ Certifications:	UL, CE, FCC, EN/IEC, IP66 ,IK10,BIS. Note: All the reports and certificates shall be from a NABL accredited Lab	
39.	Power	POE (802.3af/at), 12 V 2A	
40.	Operating Temperature	0°C- +50°C	
41.	Storage Temperature	-20°C- +50°C	
42.	Operating Humidity	90% or less	

1130.	4MP IP IR Varifocal Bullet Camera		
Sr. No.	Description	Specification	Compliance

TECHNICAL SPECIFICATIONS FOR ELV WORKS

1.	Image Sensor	½.8" Progressive Scan, Backlight illuminated CMOS Sensor Note: The bidder must state the Make and model of the sensor to ensure the authenticity of the component. the bid would be disqualified if the sensor used is not as mentioned by the bidder	
2.	Maximum resolution	4 MP or Higher (2592 x 1944)	
3.	Lens Type	2.7mm-13.5mm varifocal	
4.	FOV	HFOV: 101° - 30° DFOV: 137° - 38° VFOV: 72° - 23°	
5.	Aperture (F#)	F1.4-F3.2	
6.	Iris	P iris	
7.	Shutter speed	1/25-1/59000	
8.	Minimum Illumination	Color - 0.01 Lux @F1.2 (AGC ON) Monochrome - 0 Lux	
9.	Day/Night Camera Switching	Automatic/ Manual/ schedule	
10.	Built in IR irradiance up to	50 m	
11.	Noise Reduction	2 DNR, 3 DNR	
12.	Adaptive streaming	Should reduce the FPS and Bit rate during no activity period.	
13.	Signal to Noise Ratio (SNR)	≥70 dB	
14.	Back light Compensation (BLC)	Supported	
15.	Wide Dynamic Range (WDR)	120 dB True WDR	
16.	VCA	Motion detection, View Tamper Detection, Tripwire detection, object Intrusion, loitering detection, object counting, missing/abandoned object	
17.	Events and actions	Audio Exception, IP conflict, Network Disconnect, Storage Full, Time Trigger, E- mail, SMS, TCP notification	
18.	Image Enhancement	Saturation/ Contrast/ Sharpness/Brightness/Auto Exposure/ Gamma /White balance/ HVS & Forensic, Intelligent Defog	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

19.	ONVIF Compliance	Profile S & Profile G The IP Camera make, and model shall appear on the ONVIF Conformant products List	
20.	Unicasting/ Multicasting	Supported	
21.	Auto initiation	The camera shall connect to the Video Management Software (VMS) or Network Video recorder (NVR) of same brand without any need of Static IP to the Camera in LAN as well as WAN.	
22.	ROI	Supported	
23.	Privacy masking	Up to 3 Zone programmable	
24.	AWB	Supported	
25.	Network Failure recording	In case of Network failure, the Camera shall start recording on NAS or SD Card, which can be retrieved back when the network connectivity restores (If VMS belongs to the same brand)	
26.	MAC Address	The Mac Address of the Camera shall be registered in the name of the OEM.	
27.	Supported Resolutions	2592 X 1944, 2592 X 1520, 2048 X 1536, 1920 X 1080, 720p, D1, 2CIF, VGA, CIF, QCIF	
28.	No of Stream Profiles	3	
29.	Video Compression	H.265 H.264 MJPEG	
30.	Frame Rate (FPS)	1 to 30	
31.	Video Standard	PAL	
32.	Number of Streaming profiles support	Three profiles support Profile 1: 2592X1944 @30fps (H.264/H.265) Profile 2: VGA @30fps (H.265/H.264) Profile 3: 2048x1536@8fps (MJPEG)	
33.	Bitrate	32 kbps-16Mbps	
34.	Edge Storage	SD Card - 512 GB & NAS	
35.	Bitrate Type	CBR, VBR	
36.	Ethernet	10Base-T/100BaseTX Ethernet (RJ-45)	
37.	Network protocols	TCP/IP, HTTP, HTTPS, QoS, DHCP, DNS, DDNS, RTP, RTCP, RTSP, PPPOE, SMTP, NTP, HTTPS, , TLS/SSL, FTP, ICMP, IGMP, ARP, UDP, 802.1x, SNMP, UPnP and Bonjour	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

38.	Alarm input/output	1 Alarm IN, 1 Alarm Out	
39.	Regulatory Approvals/ Certifications:	CE,FCC EN/IEC IK10, IP66 BIS, UL	
40.	Power	POE (802.3af/at), 12 V /2A	
41.	Operating Temperature	-20°C- +50°C	
42.	Storage Temperature	-20°C- +50°C	
43.	Operating Humidity	90% or less	
44.	Operating Temperature	-20°C to 50°C	
45.	Storage Temperature	-20°C to 50°C	
46.	Operating Humidity	Less than 90% RH (non-condensing)	
47.	Certifications	FCC,UL, BIS, CE, FCC, ROHS, BIS, IP66, IK10, UL	

1131.	64 Channel Network Video Recorder		
Sr. No.	Description	Specification	Compliance
1.	Input	64 IP Channels	
2.	Downlink Throughput	256Mbps Following Scenarios are Considered: 1. Cameras Streaming to Device 2. Cameras of Cascaded Devices are Being Viewed on Local 3. Streaming from NAS for Local/Web Client	
3.	Uplink Throughput	256Mbps Following Scenarios are Considered: 1. Cameras Streaming to Web Client 2. Storage or Backup to NAS	
4.	Simultaneous Log-in	9+1(Admin)	
5.	Image Resolution	Up to 12MP	
6.	Storage	Adaptive recording: Automatically Reduces the Number of Frames Captured Per Second Where There is No Motion, Thereby Saving Storage Space.	
7.	Search Mode	Date and Time, Camera, Event, Recording Type	
8.	Playback Modes	Fast Forward, Slow Forward, Slow Reverse, Fast Reverse at Different Speed Control, Next-Previous Frame	
9.	Backup	Manual Backup over USB and NAS, Scheduled Backup over USB, NAS and FTP	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

10.	Network Functions	TCP/IP, DHCP, PPPOE DNS, DDNS, Free Matrix DNS, FTP, SMTP, NTP, RTP/RTSP, HTTP, CIFS/NFS, UPnP	
11.	Remote Operation	PTZ Control, Playback, System Setting, File Download, Log Information, Upgrade	
12.	Trigger Events	Motion Detection, View Tampering, Connection Failure, Recording Failure, Manual Trigger, On Boot Alarm, Storage, Alert, Disk Volume Full, Disk Fault, Scheduled Backup Fail	
13.	Actions	Recording on Selected Channel, FTP, Email Notification with Snapshot, TCP Notification, Recall PTZ Preset Position, Turn On/Off Alarm Outputs, Buzzer Notification, SMS Notification, Calling from Mobile App	
14.	SATA Interface	8 SATA III (10TB per port)	
15.	RAID	RAID-0, RAID-1, RAID-5, RAID-10, Single Disk	
16.	Network Interface	2 Ports x Ethernet (RJ-45) 10/100/1000Mbps	
17.	USB	3 Ports (1x USB 3.0, 2x USB2.0)	
18.	Alarm Input	2	
19.	Alarm Output	1	
20.	Operating Temperature	0°C to +50°C (32°F to 122°F)	
21.	Humidity Range	5% to 95% RH Non-Condensing.	

1132.	Client PC		
Sr. No.	Description	Compliance	
1.	19.5 " screen (FHD) and with mouse and key board		
2.	Should have System Configuration :Desktop PC i7 3.4GHZ,11th gen		
3.	Should have 512GB SSD		
4.	Should have 32GB RAM		
5.	Should have 1TB Hard Disk		
6.	Should have 4GB Graphics		
7.	Should have Wifi Compatibility		
8.	Should have Keyboard and Mouse		
9.	Should have lifetime Windows License		

1133.	42" Inch Commercial Grade Display for Camera Monitoring		
Sr. No.	Description	Specification	Compliance

TECHNICAL SPECIFICATIONS FOR ELV WORKS

1.	Resolution	Should Support 4K Resolution	
2.	HDMI Input	3 HDMI Input	
3.	USB	2 USB Port	
4.	OS	Android OS	
5.	Speaker	20W Speaker	
6.	Bluetooth	5,2 Version or Higher	
7.	External HDD	USB Supported	
8.	Wi-Fi	802.11a/b/g/n	
9.	General	Should have 300 Nits Brightness	
10.	General	Should have Dynamic Contrast 1,000,000:1	
11.	General	Should have Static Contrast 1200:1	
12.	General	Should have 60Hz Refresh Ration	
13.	General	Should have RJ45 LAN / Wi-Fi	
14.	General	Should support Bluetooth Audio Playback	

1135.	Cat 6 UTP Cable		
Sr. No.	Parameter	Description	Compliance
1.	Conductors	23 AWG Solid Copper Cable.	
2.	Insulation	PVC Jacket	

1136.	Concealed/ PVC Back Box		
Sr. No.	Parameter	Description	Compliance
1.	Size	2x2 Inch	
2.	Material	Mild Steel/PVC	

1137./ 1141.	Patch Panels		
Sr. No.	Parameter	Description	Compliance
1.	Height	1U – 1.75"	
2.	No. of Ports	24 Ports, Fully Loaded with Key Stone Jack.	
3.	Port Type	Individual Key Stone Type or 6 Port Modular. Blank Inserts for un-used ports.	
4.	Panel	Fully Powder Coated, Pencil Grey Color.	
5.	Termination Type	TIA/EIA 568 A & B.	

1138./ 1139./ 1142.	Cat 6 Information Outlets		
Sr. No.	Parameter	Description	Compliance
1.	Colors	In a variety of color as required.	
2.		Category 6 keystone jacks are RJ45, 8 position 8 contact sockets.	
3.		Category 6 keystone jacks are suitable for 22-26 AWG stranded and solid wire.	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

4.		Category 6 keystone jacks are compatible with both 110 & Krone punch down tools.	
5.		It supports IEC 60603-7-4 and compliance with ANSI/TIA/EIA 568 C.2 standard.	
6.		The Category 6 keystone jacks shall be of a universal design supporting T568 A & B wiring.	
7.		Life of Jack should be 750 cycles minimum (ISO/IEC 11801, IEC 60603-7-4).	

1140.	20 Pair Armored Jelly Filled Telephone Cable		
Sr. No.	Parameter	Description	Compliance
1.	No of Pairs	20 Pairs or Higher	
2.	Wire Diameter	0.5mm	
3.	Insulation Material	HDPE	
4.	Material	Jelly Filled Armored	

1143.	Telephone tag Box (500 Pair)		
Sr. No.	Description	Specification	Compliance
1.	Pair	500 Pair	
2.	Box Material	Mild Steel	
3.	IP Rating	IP 44 or higher	
4.	Krone Module	50 Nos. (Each Krone 10 Pair)	
5.	Weight	Max 4 Kg	
6.	Fixing	Wall Mount	
7.	Cable Entry	Upper & Lower Side	

1144.	Optical Fiber Cable: (6 Core)	
Sr. No.	Description	Compliance
1.	Fiber cable should be Single Mode. Suitable for Indoor/Outdoor (Duct) Local Area Network Systems.	
2.	Should have excellent Water Proof Layer & Good Moisture Resistance.	
3.	Central Loose tube with jelly compound.	
4.	Glass yarns in between Steel tape & loose tube.	
5.	Fiber cable should support standard ITU-T: REC G.652D and Telecordia: GR-20 Core.	
6.	6 core Fiber cable outer diameter should be 7.2 mm +/- 0.5.	
7.	Thickness of the Jacket should be 1.8mm +/- 0.2.	
8.	Should have 3000N/100mm Crush Load (IEC 60794-1-2-E3).	
9.	Bend Radius (IEC 60794-1-2-E11 & E6) should be Short Term 20D in mm and Long Term 10D in mm.	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

10.	Proof Test - The entire fiber length is subjected to a tensile stress of 100Kpsi (0.7Gpa). This is equivalent to 1% strain.	
11.	Maximum Attenuation at 1310nm should be ≤ 0.38 dB/km.	
12.	Maximum Attenuation at 1550nm should be ≤ 0.25 dB/km.	
13.	Operating Temperature should be -20 dec C to +60 deg C.	
14.	Fiber cutoff wavelength should be 1160nm to 1320nm.	
15.	Storage Temperature should be -40 dec C to +60 deg C.	

1145.	06 Port Fully Loaded LIU	
Sr. No.	Description	Compliance
	LIU Features	
1.	Fiber optic LIU should include with LIU Box itself, Adapter Panel and Adapters as per requirement.	
2.	Have sufficient slots for accommodate Simplex/duplex 12 number LC adapters individually.	
3.	Should be 1U 19-inch rack mountable.	
4.	Aluminum base material for light mounting.	
5.	Should have Splice Tray & Cable Spool provision inside LIU.	
6.	Accessory kit consists of cable ties; mounting ear screw earthling and spiral wrap tube.	
7.	Panel cover should be slide out for easy maintenance.	
8.	Removable Rear & Front cover for better access to interior of LIU.	
9.	Should have Rubber fiber slotted bracket built-in, metal splice shelf to protect the fibers.	
10.	Should capable of storing up to 3 meters of 900 μ m tight buffered fiber per adapter.	
11.	Adapter Plate Features	
12.	Plate made from Cold rolled steel materials.	
13.	Suitable for LC adapters	
14.	Adapter Features	
15.	All LC adaptors should be Simplex/Duplex type. Adapters should have compact design & high precision, which perform well under various circumstances & maintain good plug retention strength.	
16.	Should have Telcordia, TIA/EIA and IEC compliance.	
17.	The sleeves are basically recommended zirconia split type, the phosphor bronze split	
18.	Insertion Loss should be ≤ 0.20 dB for Zirconia Sleeve	
19.	Sleeve/Ferrule Withdrawal Force should be 2.0N ~ 5.9N for SC/1.0N ~ 2.5N	

1146.	24 Port Fully Loaded LIU	
Sr. No.	Description	Compliance
	LIU Features	
1.	Fiber optic LIU should include with LIU Box itself, Adapter Panel and Adapters as per requirement.	
2.	Have sufficient slots for accommodate Simplex/duplex 24 number LC adapters individually.	
3.	Should be 1U 19-inch rack mountable.	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

4.	Aluminum base material for light mounting.	
5.	Should have Splice Tray & Cable Spool provision inside LIU.	
6.	Accessory kit consists of cable ties; mounting ear screw earthling and spiral wrap tube.	
7.	Panel cover should be slide out for easy maintenance.	
8.	Removable Rear & Front cover for better access to interior of LIU.	
9.	Should have Rubber fiber slotted bracket built-in, metal splice shelf to protect the fibers.	
10.	Should capable of storing up to 3 meters of 900 µm tight buffered fiber per adapter.	
11.	Adapter Plate Features	
12.	Plate made from Cold rolled steel materials.	
13.	Suitable for LC adapters	
14.	Adapter Features	
15.	All LC adaptors should be Simplex/Duplex type. Adapters should have compact design & high precision, which perform well under various circumstances & maintain good plug retention strength.	
16.	Should have Telcordia, TIA/EIA and IEC compliance.	
17.	The sleeves are basically recommended zirconia split type, the phosphor bronze split	
18.	Insertion Loss should be ≤ 0.20dB for Zirconia Sleeve	
19.	Sleeve/Ferrule Withdrawal Force should be 2.0N ~ 5.9N for SC/1.0N ~ 2.5N	

1147.	Optical Fiber Patch Cords:		
Sr. No.	Parameter	Description	Compliance
1.	Standards and Compliance	ITU-G657.B - Bend Insensitive Fiber.	
2.	General	Should have good geometrical characteristics of apex offset & radius of curvature & fiber height.	
3.	General	Should be 100% inspected for optical characteristics & fiber end face finish.	
4.	General	Should have single-mode G652D optic fiber.	
5.	General	Typical Insertion Loss should be ≤0.2dB, Max. 0.3dB.	
6.	General	Return Loss should be ≥50 dB.	
7.	General	Should have Ceramic Connector Ferrule.	
8.	General	Repeatability should be ≤0.2dB, 200 times mating cycles.	
9.	Length	1, 2, 3 or 5 Mtr length.	
10.	Operating Temperature	0° C to +60° C.	

1148.	Wall Mount Rack:		
Sr. No.	Description	Specification	Compliance
1.	Network Rack Size	Wall Mount, 19", CRCA Powder Coated Network Rack of Various size 6U, 9U, 12U, 15U. Front Glass Door, 600mmW x 600mmD.	
2.	Fan	Should have minimum 2 Nos 230V AC Fans, 90CFM	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

3.	19" Cable Manager	Should have 2 Nos., 1U Metal Cable Manager.	
4.	19" Cantilever Tray	Should have 1 Nos. 1U Cantilever Tray.	
5.	AC Panel	Should have 1 Nos. 6 Socket 5/15Amp AC Panel.	
6.	Front Mount Hardware	2 Packet (10 Nos. per Packet)	

1155./ 1156./ 1157.	Face Plates		
Sr. No.	Parameter	Description	Compliance
1.	No. of Ports	One, Two, Four Ports	
2.	Material	ABS / UL 94 V-0, Color: White	

1158.	RG6 Cable		
Sr. No.	Description	Specification	Compliance
1.	Conductor Type	Copper Clad Steel (CCS)	
2.	Nominal Conductor Diameter	18 AWG (1.02 mm nominal)	
3.	Dielectric type	Gas Expanded Foam PE	
4.	1st Shield	Aluminum tape bonded to dielectric	
5.	2nd Shield	Aluminum braid wire	
6.	Flooding Jelly	As per customer requirement (Amorphous PP)	
7.	Outer Sheath material	PVC- Black	
8.	Nominal thickness	0.70 mm	
9.	Approximate Cable OD	6.60 mm	
10.	Impedance	75 \pm 3 Ω	

1159.	RG6 Socket		
Sr. No.	Description	Specification	Compliance
1.	Item Dimensions	H 90mm x W 90mm	
2.	Material	Polycarbonate	
3.	Installation	Assembled	
4.	No of Modules	1 Module	

1161.	24 Port Non PoE Switch:		
Sr. No.	Description	Specification	Compliance
1.	24*10/100/1000 Mbps, Additional 4*Gigabit SFP port.		

TECHNICAL SPECIFICATIONS FOR ELV WORKS

2.	IEEE 802.3 10BASE-T Ethernet, IEEE 802.3u 100BASE-TX Fast Ethernet, IEEE 802.3ab 1000BASE-T Gigabit Ethernet, 802.3ae, IEEE 802.3x Flow Control for Full-Duplex Mode, Auto-negotiation	
3.	Should support IEEE 802.3az Energy Efficient Ethernet.	
4.	Switching Capacity should be 56 Gbps	
5.	Forwarding Rate Should be 41Mpps	
6.	MAC Address Table should be 16K or more.	
7.	MTBF should be 5,10,000 hours or more.	
8.	Should support Head of Line blocking prevention for lower latency and better performance.	
9.	Support Jumbo Frame up to 9000 Bytes or higher.	
10.	Should support IGMP Snooping, Able to create 256 or more IGMP groups and require support for Host-based IGMP Snooping Fast Leave.	
11.	Should support MLD Snooping, Able to create 256 or more MLD groups, Per VLAN MLD Snooping and require support for Host-based MLD Fast Leave.	
12.	Should have 802.1D STP, 802.1w RSTP and 802.1s MSTP Spanning Tree Protocol.	
13.	Should support Loop Back detection.	
14.	Should support Multicast Filtering to filters or forward all unregistered groups.	
15.	Require IEEE 802.1Q Tagged VLAN protocol.	
16.	Should support 4K VLAN Groups and configurable VLAN ID: 0 to 4094	
17.	Should support Auto Voice VLAN, GVRP, Asymmetric VLAN and Auto Surveillance VLAN	
18.	Quality of Service (QoS)	
19.	Should support 802.1p Quality of Service with 8 queues per port.	
20.	Should support CoS based on 802.1p priority, VLAN, MAC address, Ether type, IP address, DSCP, Protocol type, TCP/UDP port number, DSCP of IPv6 Traffic Class and IPv6 flow label.	
21.	Support at least 700 ACL rules, each rule should be applied on single/multiple ports.	
22.	Should support Access Control List based on 802.1p priority, VLAN, MAC address, Ether type, IP address, DSCP, Protocol type, TCP/UDP port number, DSCP of IPv6 Traffic Class and IPv6 flow label.	
23.	Should have default routing support.	
24.	Should support Static Routing with minimum 60 IPv4 static route entries and minimum 30 IPv6 static route entries.	
25.	Support Neighbor Discovery (ND) protocol for IPv6.	
26.	Support per port Broadcast/Multicast/Unicast Storm Control.	
27.	Should support DHCP Server Screening.	
28.	Should have SSH and SSL for IPv4 and IPv6.	
29.	Require prevention of DoS attacks, which include Land, Blat, TCP Null Scan, TCP Xmas Scan, TCP SYNFIN, Ping of Death Attack and TCP Tiny Fragment attack.	
30.	Support Traffic Segmentation to limit traffic flow from a single or group of ports, to another group of ports.	
31.	Should have IP+MAC+Port Binding to restrict the access to a switch.	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

32.	Able to manage through Web-GUI, fully functional CLI interface and Telnet.	
33.	Should have dual Image support to reduced down time for the switches.	
34.	Should support Cable Diagnostics to test copper cables and determine the quality of the cables and the types of error.	
35.	Should have SNTP/NTP protocol for time synchronization.	
36.	Should have IPv4/v6 Dual Stack.	
37.	Should support LLDP and LLDP-MED.	
38.	AC Input: 100 to 240 VAC, 50/60 Hz internal universal power supply	
39.	Operating Temperature: -5 to 50 °C (41 to 122 °F)	
40.	Safety: cUL, CB	
41.	Switch should be supplied with the all-necessary hardware accessories like Power cord, Rack-mount bracket, Installation Guide, etc. and necessary software image file to fulfill all above mention feature set from day 1.	

1162.	48 Port Non PoE Switch:		
Sr. No.	Description	Specification	Compliance
1.	48*10/100/1000 Mbps, Additional 4*Gigabit SFP port.		
2.	IEEE 802.3 10BASE-T Ethernet, IEEE 802.3u 100BASE-TX Fast Ethernet, IEEE 802.3ab 1000BASE-T Gigabit Ethernet, 802.3ae, IEEE 802.3x Flow Control for Full-Duplex Mode, Auto-negotiation		
3.	Should support IEEE 802.3az Energy Efficient Ethernet.		
4.	Switching Capacity should be 104 Gbps		
5.	Forwarding Rate Should be 77.4 Mpps		
6.	MAC Address Table should be 16K or more.		
7.	MTBF should be 5,10,000 hours or more.		
8.	Should support Head of Line blocking prevention for lower latency and better performance.		
9.	Support Jumbo Frame up to 9000 Bytes or higher.		
10.	Should support IGMP Snooping, Able to create 256 or more IGMP groups and require support for Host-based IGMP Snooping Fast Leave.		
11.	Should support MLD Snooping, Able to create 256 or more MLD groups, Per VLAN MLD Snooping and require support for Host-based MLD Fast Leave.		
12.	Should have 802.1D STP, 802.1w RSTP and 802.1s MSTP Spanning Tree Protocol.		
13.	Should support Loop Back detection.		
14.	Should support Multicast Filtering to filters or forward all unregistered groups.		
15.	Require IEEE 802.1Q Tagged VLAN protocol.		
16.	Should support 4K VLAN Groups and configurable VLAN ID: 0 to 4094		
17.	Should support Auto Voice VLAN, GVRP, Asymmetric VLAN and Auto Surveillance VLAN		
18.	Quality of Service (QoS)		
19.	Should support 802.1p Quality of Service with 8 queues per port.		
20.	Should support CoS based on 802.1p priority, VLAN, MAC address, Ether type, IP address, DSCP, Protocol type, TCP/UDP port number, DSCP of IPv6		

TECHNICAL SPECIFICATIONS FOR ELV WORKS

	Traffic Class and IPv6 flow label.	
21.	Support at least 700 ACL rules, each rule should be applied on single/multiple ports.	
22.	Should support Access Control List based on 802.1p priority, VLAN, MAC address, Ether type, IP address, DSCP, Protocol type, TCP/UDP port number, DSCP of IPv6 Traffic Class and IPv6 flow label.	
23.	Should have default routing support.	
24.	Should support Static Routing with minimum 60 IPv4 static route entries and minimum 30 IPv6 static route entries.	
25.	Support Neighbor Discovery (ND) protocol for IPv6.	
26.	Support per port Broadcast/Multicast/Unicast Storm Control.	
27.	Should support DHCP Server Screening.	
28.	Should have SSH and SSL for IPv4 and IPv6.	
29.	Require prevention of DoS attacks, which include Land, Blat, TCP Null Scan, TCP Xmas Scan, TCP SYNFIN, Ping of Death Attack and TCP Tiny Fragment attack.	
30.	Support Traffic Segmentation to limit traffic flow from a single or group of ports, to another group of ports.	
31.	Should have IP+MAC+Port Binding to restrict the access to a switch.	
32.	Able to manage through Web-GUI, fully functional CLI interface and Telnet.	
33.	Should have dual Image support to reduced down time for the switches.	
34.	Should support Cable Diagnostics to test copper cables and determine the quality of the cables and the types of error.	
35.	Should have SNTP/NTP protocol for time synchronization.	
36.	Should have IPv4/v6 Dual Stack.	
37.	Should support LLDP and LLDP-MED.	
38.	AC Input: 100 to 240 VAC, 50/60 Hz internal universal power supply	
39.	Operating Temperature: -5 to 50 °C (41 to 122 °F)	
40.	Safety: cUL, CB	
41.	Switch should be supplied with the all-necessary hardware accessories like Power cord, Rack-mount bracket, Installation Guide, etc. and necessary software image file to fulfill all above mention feature set from day 1.	

1163.	24 Port PoE Switch:		
Sr. No.	Description	Specification	Compliance
1.	24*10/100/1000 Mbps PoE, Additional 4*Gigabit SFP port.		
2.	Port Standards & Functions: IEEE 802.3 10BASE-T Ethernet, IEEE 802.3u 100BASE-TX Fast Ethernet, IEEE 802.3ab 1000BASE-T Gigabit Ethernet, 802.3ae, IEEE 802.3x Flow Control for Full-Duplex Mode, Auto-negotiation		
3.	Should support IEEE 802.3az Energy Efficient Ethernet.		
4.	Switching Capacity should be 56 Gbps or more.		
5.	64-byte Packet Forwarding rate should be 41 Mpps or more.		
6.	MAC Address Table should be 08K or more.		

TECHNICAL SPECIFICATIONS FOR ELV WORKS

7.	MAC Address Update Up to 256 static MAC entries, Enable/disable auto-learning of MAC addresses.	
8.	MTBF should be 2,70,000 hours or more.	
9.	Should support IEEE 802.3af and IEEE 802.3at PoE support in all ports.	
10.	Should support 193W power budget or higher for PoE .	
11.	Should have time based PoE setting to determine the PoE activation period.	
12.	Should support Head of Line blocking prevention for lower latency and better performance.	
13.	Support Jumbo Frame up to 9000 Bytes or higher.	
14.	Should support IGMP Snooping, Able to create 256 or more IGMP groups and require support for Host-based IGMP Snooping Fast Leave.	
15.	Should support MLD Snooping, Able to create 256 or more MLD groups, Per VLAN MLD Snooping and require support for Host-based MLD Fast Leave.	
16.	Should have 802.1D STP, 802.1w RSTP and 802.1s MSTP Spanning Tree Protocol.	
17.	Should support Loop Back detection.	
18.	Should support Multicast Filtering to filters or forward all unregistered groups.	
19.	Require IEEE 802.1Q Tagged VLAN protocol.	
20.	Should support 4K VLAN Groups and configurable VLAN ID: 0 to 4094	
21.	Should support Auto Voice VLAN, GVRP, Asymmetric VLAN and Auto Surveillance VLAN	
22.	Should support 802.1p Quality of Service with 8 queues per port.	
23.	Should support CoS based on 802.1p priority, VLAN, MAC address, Ether type, IP address, DSCP, Protocol type, TCP/UDP port number, DSCP of IPv6 Traffic Class and IPv6 flow label.	
24.	Support at least 700 ACL rules, each rule should be applied on single/multiple ports.	
25.	Should support Access Control List based on 802.1p priority, VLAN, MAC address, Ether type, IP address, DSCP, Protocol type, TCP/UDP port number, DSCP of IPv6 Traffic Class and IPv6 flow label.	
26.	Should have default routing support.	
27.	Should support Static Routing with minimum 60 IPv4 static route entries and minimum 30 IPv6 static route entries.	
28.	Support Neighbor Discovery (ND) protocol for IPv6.	
29.	Support per port Broadcast/Multicast/Unicast Storm Control.	
30.	Should support DHCP Server Screening.	
31.	Should have SSH and SSL for IPv4 and IPv6.	
32.	Require prevention of DoS attacks, which include Land, Blat, TCP Null Scan, TCP Xmas Scan, TCP SYNFIN, Ping of Death Attack and TCP Tiny Fragment attack.	
33.	Support Traffic Segmentation to limit traffic flow from a single or group of ports, to another group of ports.	
34.	Should have IP+MAC+Port Binding to restrict the access to a switch.	
35.	Should have dual Image support to reduced down time for the switches.	
36.	Should support Cable Diagnostics to test copper cables and determine the quality of the cables and the types of error.	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

37.	Should have SNTP/NTP protocol for time synchronization.	
38.	Should have IPv4/v6 Dual Stack.	
39.	Should support LLDP and LLDP-MED.	
40.	AC Input: 100 to 240 VAC, 50/60 Hz internal universal power supply	
41.	Operating Temperature: -5 to 50 °C (41 to 122 °F)	
42.	Safety: cUL, CB	

1164.	48 Port PoE Switch:		
Sr. No.	Description	Specification	Compliance
1.	48*10/100/1000 Mbps PoE, Additional 4*Gigabit SFP port.		
2.	Port Standards & Functions: IEEE 802.3 10BASE-T Ethernet, IEEE 802.3u 100BASE-TX Fast Ethernet, IEEE 802.3ab 1000BASE-T Gigabit Ethernet, 802.3ae, IEEE 802.3x Flow Control for Full-Duplex Mode, Auto-negotiation		
3.	Should support IEEE 802.3az Energy Efficient Ethernet.		
4.	Switching Capacity should be 104 Gbps or more.		
5.	64-byte Packet Forwarding rate should be 77.4 Mpps or more.		
6.	MAC Address Table should be 08K or more.		
7.	MAC Address Update Up to 256 static MAC entries, Enable/disable auto-learning of MAC addresses.		
8.	MTBF should be 2,70,000 hours or more.		
9.	Should support IEEE 802.3af and IEEE 802.3at PoE support in all ports.		
10.	Should support 370W power budget or higher for PoE .		
11.	Should have time based PoE setting to determine the PoE activation period.		
12.	Should support Head of Line blocking prevention for lower latency and better performance.		
13.	Support Jumbo Frame up to 9000 Bytes or higher.		
14.	Should support IGMP Snooping, Able to create 256 or more IGMP groups and require support for Host-based IGMP Snooping Fast Leave.		
15.	Should support MLD Snooping, Able to create 256 or more MLD groups, Per VLAN MLD Snooping and require support for Host-based MLD Fast Leave.		
16.	Should have 802.1D STP, 802.1w RSTP and 802.1s MSTP Spanning Tree Protocol.		
17.	Should support Loop Back detection.		
18.	Should support Multicast Filtering to filters or forward all unregistered groups.		
19.	Require IEEE 802.1Q Tagged VLAN protocol.		
20.	Should support 4K VLAN Groups and configurable VLAN ID: 0 to 4094		
21.	Should support Auto Voice VLAN, GVRP, Asymmetric VLAN and Auto Surveillance VLAN		
22.	Should support 802.1p Quality of Service with 8 queues per port.		
23.	Should support CoS based on 802.1p priority, VLAN, MAC address, Ether type, IP address, DSCP, Protocol type, TCP/UDP port number, DSCP of IPv6 Traffic Class and IPv6 flow label.		

TECHNICAL SPECIFICATIONS FOR ELV WORKS

24.	Support at least 700 ACL rules, each rule should be applied on single/multiple ports.	
25.	Should support Access Control List based on 802.1p priority, VLAN, MAC address, Ether type, IP address, DSCP, Protocol type, TCP/UDP port number, DSCP of IPv6 Traffic Class and IPv6 flow label.	
26.	Should have default routing support.	
27.	Should support Static Routing with minimum 60 IPv4 static route entries and minimum 30 IPv6 static route entries.	
28.	Support Neighbor Discovery (ND) protocol for IPv6.	
29.	Support per port Broadcast/Multicast/Unicast Storm Control.	
30.	Should support DHCP Server Screening.	
31.	Should have SSH and SSL for IPv4 and IPv6.	
32.	Require prevention of DoS attacks, which include Land, Blat, TCP Null Scan, TCP Xmas Scan, TCP SYNFIN, Ping of Death Attack and TCP Tiny Fragment attack.	
33.	Support Traffic Segmentation to limit traffic flow from a single or group of ports, to another group of ports.	
34.	Should have IP+MAC+Port Binding to restrict the access to a switch.	
35.	Should have dual Image support to reduced down time for the switches.	
36.	Should support Cable Diagnostics to test copper cables and determine the quality of the cables and the types of error.	
37.	Should have SNTP/NTP protocol for time synchronization.	
38.	Should have IPv4/v6 Dual Stack.	
39.	Should support LLDP and LLDP-MED.	
40.	AC Input: 100 to 240 VAC, 50/60 Hz internal universal power supply	
41.	Operating Temperature: -5 to 50 °C (41 to 122 °F)	
42.	Safety: cUL, CB	

1165.	1 Gigabit SFP Modules:	
Sr. No.	Description	Compliance
1.	Connector Type – LC.	
2.	10G Base-LR.	
3.	Should support 1 Gbps up to 10km on Single Mode Fiber.	
4.	Should be from same OEM of Switches.	

1166.	Stack Cable		
Sr. No.	Description	Specification	Compliance
1.	Length	50 cm Stack Cable	

1167.	Core Switch		
Sr. No.	Specification		Compliance
	Switch Number of Ports and Power Supply		
1.	Modular switch with 20*10/100/1000BASE-T ports, additional 4*Combo 10/100/1000BASE-T/SFP ports and additional 4 SFP+ ports for uplink to Switch/Servers or Stacking.		
2.	Switch should provide option of redundant power supply.		

TECHNICAL SPECIFICATIONS FOR ELV WORKS

3.	Switch shall have Min. 256 MB SD RAM & 128 MB Flash Memory.	
4.	Switch shall have SD Card slot for easy file store & restoration like firmware, configuration file, boot image, syslog etc.	
5.	Switch shall provide digital I/O design through external alarm port to have better security protection.	
6.	Switch shall be able to receive events detected by external sensors (e.g. temperature, smoking or anti-theft sensor). The switch shall be able to send a trap/log out to report the issue.	
7.	Switch shall be able to activate external air-conditioner/fan or ring the bell based on the condition defined by the user.	
8.	Network Media	
9.	Supported SFP Transceivers: 1000Base-LX, 1000Base-SX, 1000Base-TX, 1000Base-LHX, 1000Base-ZX and 1000Base-BX WDM.	
10.	Supported SFP+ Transceivers: 10GBASE-SR, 10GBASE-LR, 10GBASE-ER, 10GBASE-ZR, 10GBASE-LRM, 1000Base-LX, 1000Base-SX, 1000Base-LHX and 1000Base-ZX.	
11.	Performance	
12.	The Switch shall have Non-blocking wire speed switch fabric.	
13.	The Switch shall have Min. 128Gbps Back plane or more.	
14.	The Switch shall have Min.95Mpps or more.	
15.	The Switch shall support Min. 32K Mac address or more.	
16.	The Switch shall support Min. 4000 VLANs.	
17.	The Switch shall support IPv4/IPv6 Routing including IPv6 Tunnel, ICMPv6, IPv6 Neighbor Discovery (ND), DHCPv6, RIPng and OSPFv3.	
18.	The Switch shall have 40 Gigabit Stacking Backplane.	
19.	The Switch shall be able to do Physical Stack up to 10 units per stack or more.	
20.	The Switch shall be able to do IP Stacking up to 30 units per IP.	
21.	The Switch should support Jumbo Frame (up to 9216 Bytes).	
22.	Layer 3 Features	
23.	The Switch should have RIPv1 (RFC1058)/RIPv2 (RFC2453), RIPng, OSPFv2, OSPFv3, MPLS, MPLS VPN, VRF, LDP.	
24.	The Switch should have Policy Based Routing, BGP 4 & VRRP.	
25.	The Switch should have DVMRP v3, PIM-DM/SM/SDM for IPv4.	
26.	The Switch should have IPv6 Tunneling.	
27.	The Switch should have Up to 256 IP Interfaces & 10K route entries or more.	
28.	The Switch should have Multi Path Routing support for Equal cost & Weighted Cost.	
29.	The Switch should have per port Limit IP Multicast Address Range for Control Packet.	
30.	Layer 2 Features	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

31.	The Switch should have IGMP Snooping v1, v2 and v3 & MLD Snooping.	
32.	The Switch should have Spanning tree 802.1d, 802.1w and 802.1s.	
33.	The Switch should have 802.3ad Link Aggregation Up to 30 groups per device.	
34.	The Switch should have Port Mirroring One to one/Many to One & RSPAN.	
35.	The Switch shall have the intelligence to detect the loop occurring from the unmanaged network segment.	
36.	The Switch shall have the capability to build the trunk across stack.	
37.	The Switch shall support IEEE 802.3ah, IEEE 802.1ag, 802.1AX & ITU-T Y.1731.	
38.	It shall support LLDP and LLDP-MED including client location information. It shall exchange link and device information in multi-vendor networks.	
39.	VLAN	
40.	The LAN switch shall have IEEE 802.1Q VLAN encapsulation. Up to 255 VLANs per switch and up to 4000 VLAN IDs.	
41.	It shall have Automatic Negotiation of Trunking Protocol, to help minimize the configuration & errors.	
42.	It shall have centralized VLAN Management. VLANs created on the Core Switches shall be propagated to all the others switches automatically, thus reducing the overhead of creating/modifying/deleting VLANs in all the switches in turn eliminating the configuration errors & troubleshooting.	
43.	It shall have support for Detection of Unidirectional links and to disable them to avoid problems such as spanning tree loops.	
44.	It shall support 802.1v & Q-in-Q VLAN.	
45.	Quality of Service	
46.	It shall support 802.1p Priority Queues (8 Queues).	
47.	Queue handling mode: WRR & Strict Mode.	
48.	Granular Rate Limiting functions on per port & flow based to guarantee bandwidth in increments shall be as low as 64 Kilobits per Second.	
49.	Switch shall support three color marker with CIR/PIR minimum granularity of 1 kbps.	
50.	Class of service shall be based on Switch port, DSCP, VLAN ID, TCP/UDP port, Protocol type, 802.1p queues, IPv4/v6 address, IPv6 flow label & User defined packet content.	
51.	Access Control List	
52.	The LAN Switch shall have the capability to apply access list control based on IPv4/v6 address, Protocol type, IPv6 flow label, Time based ACL, VLAN-ID, MAC-ID, DSCP, IPv6 traffic class, TCP/UDP Port, Switch port & user defined packet content.	
53.	The Switch shall support up to 1600 Access Control Entries minimum.	
54.	Network Security	
55.	The LAN switch shall support IEEE 802.1x to allow dynamic, port-based security, providing user authentication.	
56.	The LAN switch shall support for Admission Control features to improve the network's ability to automatically identify, prevent and respond to security threats and also to enable the switches to collaborate with third-	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

	party such as Microsoft for security-policy compliance and enforcement before a host is permitted to access the network.	
57.	It shall support for SSHv2, SNMPv3 to provide network security by encrypting administrator traffic during Telnet and SNMP sessions.	
58.	It shall support RADIUS authentication to enable centralized control of the switch and restrict unauthorized users from altering the configuration.	
59.	It shall support DHCP snooping to allow administrators to ensure consistent mapping of IP to MAC addresses. This can be used to prevent attacks that attempt to poison the DHCP binding database, and to rate limit the amount of DHCP traffic that enters a switch port.	
60.	It shall support DHCP Interface Tracker (Option 82) to augment a host IP address request with the switch port ID.	
61.	It shall support that each end node can be isolated from each other and they should be able to connect to share ports such as Internet and servers.	
62.	It shall support port security to secure the access to an access or trunk port based on MAC address. After a specific timeframe, the aging feature should remove the MAC address from the switch to allow another device to connect to the same port.(up to 14 MAC-ID per port).	
63.	It shall have MAC-IP-Port binding up with support for ACL mode to 475 Entries per device.	
64.	It shall have Web & MAC Based Access Control.	
65.	It shall have CPU Filtering to protect the CPU from Broadcast / Multicast / Unicast flooding & protocol control packets attacks.	
66.	Management	
67.	The LAN switch shall have CLI support to provide a common user interface and command set with all routers and switches of the same vendor.	
68.	It shall have Remote Monitoring (RMON) software agent to support four RMON groups (history, statistics, alarms and events) for enhanced traffic management, monitoring and analysis.	
69.	It shall support Trivial File Transfer Protocol (TFTP) to reduce the cost of administering software upgrades by downloading from a centralized location.	
70.	It shall support Network Timing Protocol (NTP/SNTP) to provide an accurate and consistent timestamp to all intranet switches.	
71.	It shall support SNMPv1, SNMPv2c, and SNMPv3 and Telnet interface to deliver comprehensive in-band management, and a CLI-based management console to provide detailed out-of-band management.	
72.	It shall provide management functions for network segments (access links and individual circuits), monitors individual links.	
73.	It shall have traffic monitoring for all network ports effective at gigabit speed or higher, shall not impact the network performance while providing the real time & historical data of all devices from Layer 2 to Layer 7.	
74.	It shall support configuration rollback to replace current configuration with any saved configuration file.	
75.	Switch shall be capable to store multiple image file and configuration.	
76.	Switch should have RFC3176 sFlow	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

77.	Switch shall consume less power through auto-detection of link status and cable length.	
78.	Certification	
79.	Switch should be CE, FCC, UL, VCCI, ERTL certified.	
80.	Switch should be functionally test and verified from ERTL and vendor need to present complete functional test report from ERTL.	

1168.	Wireless Controller	
Sr. No.	Description	Compliance
1.	The controller must support for management of IEEE 802.11a, IEEE 802.11b, IEEE 802.11g, IEEE 802.11n and 802.11ac Access points.	
2.	Support for management of at least 1000 Access points without any license upgrade	
3.	Support for automatic channel and output power	
4.	Support adjustment based on surrounding RF environment.	
5.	The Controller must be accessible from a Web-based user interface.	
6.	Must be able to manage an access point in a remote location (not in the same location and network as that of the controller).	
7.	Access point management features	
8.	The controller must support L2 roaming across managed access points	
9.	The controller must support Band steering for managed access points.	
10.	The controller must be able to detect Rogue Access Points in the wireless network	
11.	The controller must be able to update the firmware of the managed access points.	
12.	The access point must provide Monitoring of connected clients giving information of each client for the connected SSID, RSSI value, MAC address, IP address and Authentication method.	
13.	The controller must have an inbuilt network topology visualization tool that gives an overview of the connected devices in the network.	
14.	Support for Web based authentication via captive portal	
15.	The controller must support the following authentication types- Local Database with username and password credentials, external RADIUS, LDAP, POP3, and passcodes.	
16.	The passcodes (Temporary passwords) created for guest authentication should have option be limited by time.	
17.	The controller must support for creation of list of at least 60 MAC address per SSID and allow access to only those devices - SSID based MAC authentication	
18.	Bulk upload of MAC address for authentication must also be supported.	
19.	Support for creation of multiple SSID's per Access Point.	
20.	The controller must be able to manage the bandwidth of the Wireless network and have option to limit the Uplink and downlink bandwidth on a per user and per SSID basis.	
21.	The configuration should have an option for scheduled update at a defined time and date.	
22.	The controller must support for mapping a VLAN to a particular SSID.	
23.	Port based VLAN support	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

24.	Syslog -system logs must be saved locally in the controller and must have option to export the logs to a system/PC.	
25.	Hardware Specification	
26.	19.5 " screen (FHD) and with mouse and key board	
27.	Should have System Configuration :Desktop PC i7 3.4GHZ,11th gen	
28.	Should have 240GB SSD for OS Installation	
29.	Should have 16GB RAM	
30.	Should have 1TB Hard Disk	
31.	Should have 4GB Graphics Card	

1169.	Wireless Access Point	
Sr. No.	Description	Compliance
1.	Should Have 1 x 10/100/1000 Mbps (PoE) Ethernet LAN, 1 x RJ45 console port, factory reset, power input	
2.	Should have Power/Status LED Indicator	
3.	Should have minimum 2 x dual-band internal antennas	
4.	Should Support Wifi6	
5.	Should have 3.2 dB (2.4 GHz), 4.3 dB (5 GHz)	
6.	Should 2.4 GHz - Up to 575 Mbps 5 GHz - Up to 1200 Mbps	
7.	Should have IEEE 802.11a/b/g/n/ac/ax, IEEE 802.3u/ab, IEEE 802.3az Energy-Efficient Ethernet (EEE), IEEE 802.3at PoE	
8.	Should have 2.4 - 2.483 GHz, 5.15 - 5.35 GHz, 5.47 - 5.85 GHz	
9.	Should have MTBF > 30,000 hours	
10.	Should support Authentication via Customizable Captive Portal, 802.1x and RADIUS Server, POP3, LDAP, AD	
11.	Should have Searchable Event Log and Change Log	
12.	Should support Remote Config. & Batch Config.	
13.	Should support Traffic Reporting & Analytics	

1170.	EPABX System		
Sr. No.	Description	Specification	Compliance
1.	System Features	The telephony system should be a converged communication System with ability to run TDM and IP on the same platform using same software load based on server and Gateway architecture. The system should be capable of support Analog and IP SIP based phones. The communication server should be appliance based; no card-based processor should be quoted.	
2.		The Telephony system shall have all the hotel / hospitality features including integration with PMS system.	
3.		The system should support duplicated databases such that it is possible to make administrative changes to the system even during outage of primary server/database.	
4.		EPBX system shall have valid TEC compliance	
5.		The system should have 128 users of analogue extension from day 1 and should be scalable upto 512 users.	
6.		The system should be based on server gateway	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

		architecture with external appliance server. No card-based processor systems should be quoted.	
7.		The system should be modular, scalable and distributable in nature.	
8.		The system to have distributed architecture and the centralized control for all the IP PBX entities in the network. It should be possible to have centralized applications like voice mail, UC for the network users	
9.		The system shall be configured for SIP and IP trunk interfaces without any external interfaces or adapters.	
10.		The Call Server should able to handle traffic minimum 300K BHCC	
11.		It should be possible for the IP phone to be connected on the same line which is connected to the computer i.e., single wire to desk.	
12.		System should support commercial grade encryption security with minimum 250-bit key security for both signaling and voice with in a node for all IP subscribers	
13.		The VOIP should be implemented through Plug and Play interface boards in any of the Universal slots of the system. The replacement of cards in both Call Control and Media gateways should be online (i.e., hot pluggable) without the need to power off the system.	
14.		System should be able to operate with any SIP compliant devices and should be able to support internal Gatekeeper for the same. If required it should be able to operate with SIP Standard based external gatekeepers.	
15.		System should have from day one Multi Media Conferencing solutions including audio, Video and Data Collaboration applications.	
16.		System should have inbuilt presence server supporting both SIMPLE and XMPP protocols from day 1.	
17.		The PBX system should have full virtualization support from day 1 and should provide option for both customers supplied servers or provisioned by the OEM.	
18.		The system software version offered should be the latest release as on the date of supply of EPABX as available globally.	
19.	System features	The system should support at least 8-digit numbering scheme.	
20.		The proposed system should support automatic route selection (ARS) and least Cost routing (LCR) features to route the calls based on priorities related to user profile, tariff, and network availability, along the most cost-effective path. This service will be transparent for users and irrespective of the physical carrier connection.	
21.		Auto-attendant facility on all trunks simultaneously with	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

		flexibility of having different sets of announcements to separate incoming trunk groups.	
22.		The system must be equipped with a server-based voice mail of the same OEM, offering the best interactivity with user. Mailboxes for all the users should be provisioned	
23.		All future upgrades of system software as and when released shall be provided by vendor subsequently without any additional cost to the user. The user will however, procure essential hardware required.	
24.		The system should be able to synchronize with external LDAP or Microsoft AD director service. It should be possible to provide bi-directional synchronization i.e., a user created in the directory should be auto-provisioned for telephony basis rules and subsequently the number assigned by the system should be reflected in the directory service	
25.		Class of Service (COS). Should be able to define whether or not voice terminal users may access the following features and functions: Automatic Callback, Call Forwarding All Calls, Call Forward Busy / Don't Answer, Data Privacy, Extended Forwarding All, Extended Call Forward Busy / Don't Answer, Priority Calling, Restrict Call Forwarding Off-Net, Personal Station Access, Trunk – to Trunk Transfer Restriction Override, Off-Hook Alert, Console Permission and Client Room.	
26.		<p>The following basic telephony features to be provided by the offered system:-</p> <ol style="list-style-type: none"> Abbreviated Dialing Automatic Callback on Busy Automatic callback on No answer Direct Inward Station Access Call forwarding Unconditional Call forwarding on No answer Call forwarding on Busy Malicious call trace Group Call Pick up Extended Group Call Pickup Call Park Call retrieve Calling line identification restriction Call waiting class of service Hot Line Do not Disturb Do Not Disturb override Call Hold Call Transfer Internal Music on Hold External Music on Hold Support 	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

		<p>w. Last Number Redial</p> <p>x. Save Number Redial</p> <p>y. Instrument locking for preventing outgoing calls</p> <p>z. One Number service. -Through this feature it should be possible to have the same number for internal extension and Mobile Number. Through this feature both internal extension and Mobile number will ring simultaneously and once the call is picked up from either of the devices the ringing on the other device stops. This requires integration of PRI Lines with DOT/MTNL. This feature may also be termed as parallel ringing.</p>	
27.	IM and Presence	The solution must be able to support point-to-point and multi-party messaging	
28.		It must support ability to send Multimedia (Text, voice, video and photo) messages between users	
29.		It must have ability to store messages centrally and be able to deliver them when users connect. Senders should be able to send to offline receivers and messages should be able to be delivered on demand. The centrally stored messages should provide secure access through encryption between servers and endpoints. Also, data should be available only through secured logins	
30.		Conversation persistency should be maintained so that users can view and participate in active conversations from multiple messaging applications, until they leave the conversation	
31.		It must support notification events for all new messages	
32.		It must support user search for current and active conversations	
33.		It should provide administrators to retrieve archived messages in future	
34.		It should be possible to provide storage management through automatic closure of old conversations and controlling of over-size media files that can be sent by users	
35.		The solution should be deployed on the virtualized server on the same hardware for simplicity	
36.		It should support multiple devices like Windows, Android and IOS on iPhones and iPads	
37.		The advanced soft phone users must have access to Rich telephony services as any other user of the IP PBX. The soft client should provide Web RTC based option along with mobile on IOS and Android. The IP softphone users should be able to view the IM and telephony presence of other softphone users and do instant messaging with each other. The system must allow the association of a user's extension with up to 10 devices.	
38.	Voice, Video and Web	Within its proposal, the vendor must include the provision of a solution in site that enables voice conferencing, web,	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

	Conferencing	and video. This solution must comply with at least the following requirements:	
39.		The solution must be based on Linux and support the deployment in virtual environment	
40.		It must support at least the audio codecs G711, G729, G722 and G726, and the video codecs H.263 and H.264.	
41.		In addition, it must support the cascade functionality. This means to link a group of users of the same locality and belonging to the same audio and/or video conference to a single stream. This will allow reducing significantly the bandwidth transmitted over the WAN.	
42.		It must support the Reverse Proxy functionality.	
43.		It must support collaboration API, allowing creating customized applications or interfaces.	
44.		It must support capacity to integrate with mobile clients based on Android and iOS.	
45.		It must support the capacity to associate user accounts with an LDAP directory.	
46.		Access to conferencing sessions must be through a web browser with the capacity to extend audio and video to this meeting via HTTPS session.	
47.		It must have the option to dial-out for all participants, thus giving them the ability to participate in the conference. With this option, participants can define a phone number to which they may call to join the conference on audio or video.	
48.		It must have the option such that when the moderator disconnects, the conference can continue.	
49.		Each system user must have their own library in order to upload documents that can be shared and presented in audio or video conferencing, either through the different mobile devices or web interface.	
50.		As part of the moderator features, it must have at least the following: <ul style="list-style-type: none"> a. Capacity to call someone else from the conferencing session itself for a new participant to join the voice or video conference. b. Able to promote a user in order to receive host permissions. c. Lock the meeting so no other participant can enter in the session. d. Mute the audio or video for all participants, or a particular participant. e. Expel a participant from the conference. f. Recording meeting option, whether voice, video, or web. This option should be available all the time so that the moderator of the meeting can enable, or disable it during the course of a session. 	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

		g. Ability to distribute the recording to the meeting participants. h. Share an application, desk, blackboard, or a document.	
51.		It must have the functionality of public and private chat in the web or video conferencing.	
52.		It must have the integration possibility with mobile clients in cellphones and tablets, as well as integration with collaboration clients on the desktop so that a conference session can be generated from these applications, in addition to provide ad-hoc and meet-me (audio-web-video) functions.	
53.		The solution must integrate through SIP trunks to the IP telephony system.	
54.		For the video conference sessions, it must support at least 8 video parties in continuous presence, SVC/AVC and have additional video participants on voice activation basis	
55.		For mobile users, it should support the integration through a dedicated voice firewall to provide multi-conference audio and video with continuous presence; this integration will avoid the VPN setting up in mobile clients.	
56.		It must support audio and video encryption through the SRTP protocol. Likewise, it should have the option of handling security certificates.	
57.		It must have the ability to support at least 8 concurrent conferences with each conference supporting 99 participants each in a single conference, with the possibility to scale further.	
58.		It must have the capacity from a web interface to control and monitor in real-time the active sessions, bandwidths, video resolutions, users associated with an account, licenses, monitoring of alarms, logs, performance measurements.	
59.	Gateway	Should have universal slots in cabinet/chassis.	
60.		System shall have power supply redundancy	
61.		Environmental Conditions: a. Operational temperature: 0 to 40 Degree C. b. Storage -20 degree C to +65 degree C c. Humidity 10% to 90% without condensation	
62.		The exchange cabinet should field replaceable RAM, flash, DSPs, PSUs, fan tray, and main board module for enhanced reliability	
63.	VoIP Management	Network support and call details for Voice over IP	
64.		Call detail records including current active calls and call history for at least one month.	
65.		VoIP quality- Latency, Jitter, packet loss for each call and get historical reports and trend charts.	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

66.		VoIP Traffic Analysis-Monitor a mix of VoIP and other network traffic proactively to understand the network, preferably the bandwidth and capacity bottlenecks of different applications.	
67.		It should be possible to centrally take packet captures for in and out of any IP endpoint to help troubleshoot audio quality issues.	
68.		It should be possible to trace route to detect DSCP markings to ensure end-to-end markings are provisioned	
69.		It should be possible to access the IP phone interface with live screen capture for taking remote control of the phone for faster resolution. It should also be possible to simulate multiple calls from one end node to another	

1171,	PRI Card		
Sr. No.	Description	Specification	Compliance
1.	Channel	30	

1172.	Analogue Phone (Type-1)		
Sr. No.	Description		Compliance
1.	Should have Ringer LED Indicator,		
2.	Should have Ringer Volume Control		
3.	Should have Receive Volume Control		
4.	Should have Tone/Pulse		
5.	Should have Flash		
6.	Should have Redial Function		
7.	Should have Mute Function		
8.	Desktop/Wall-mountable		

1173.	Analogue Phone (Type-2)		
Sr. No.	Description		Compliance
1.	Should have Ringer LED Indicator,		
2.	Should have Ringer Volume Control		
3.	Should have Receive Volume Control		
4.	Should have Tone/Pulse		
5.	Should have Flash		
6.	Should have 30 Incoming Memory		
7.	Should have 05 Outgoing Memory		
8.	Should have 16 Digit CLI Back Light		
9.	Should have 2 Way Speaker		
10.	Should have Music on hold Functionality		
11.	Should have Redial Function		
12.	Should have Mute Function		
13.	Desktop/Wall-mountable		

TECHNICAL SPECIFICATIONS FOR ELV WORKS

1174.	Analogue Phone (Type-3)	
Sr. No.	Description	Compliance
1.	Should have Ringer LED Indicator,	
2.	Should have Ringer Volume Control	
3.	Should have Receive Volume Control	
4.	Should have Tone/Pulse	
5.	Should have Flash	
6.	Should have 99 Incoming Memory	
7.	Should have 18 Outgoing Memory	
8.	Should have 16 Digit CLI Back Light	
9.	Should have 3 One Touch Memory	
10.	Should have Mute Function	
11.	Desktop/Wall-mountable	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

Nurse Call System:

672.	Nurse Call Master Control Unit	
Sr. No.	Description	Compliance
1.	Should have 1.05 Inch Display	
2.	Having Inbuilt Power Supply or External Power Supply	
3.	Should Indicate Display in Min 3 Alphanumeric Character	
4.	Should Indicate in Alarm	
5.	Should Distinct LED indicators for normal / emergency / mid priority call	
6.	Should be able to Connect upto 24 patient or bed unit Devices in one system in any Combination	
7.	Should come with Complete battery backup, mute and reset buttons	
8.	Should be housed in a dust proof cabinet with all necessary arrangements	

673.	Nurse Call Master Control Unit	
Sr. No.	Description	Compliance
1.	Should have 1.05 Inch Display	
2.	Having Inbuilt Power Supply or External Power Supply	
3.	Should Indicate Display in Min 3 Alphanumeric Character	
4.	Should Indicate in Alarm	
5.	Should Distinct LED indicators for normal / emergency / mid priority call	
6.	Should be able to Connect upto 16 patient or bed unit Devices in one system in any Combination	
7.	Should come with Complete battery backup, mute and reset buttons	
8.	Should be housed in a dust proof cabinet with all necessary arrangements	

674.	Nurse Call Master Control Unit	
Sr. No.	Description	Compliance
1.	Should have 1.05 Inch Display	
2.	Having Inbuilt Power Supply or External Power Supply	
3.	Should Indicate Display in Min 3 Alphanumeric Character	
4.	Should Indicate in Alarm	
5.	Should Distinct LED indicators for normal / emergency / mid priority call	
6.	Should be able to Connect upto 08 patient or bed unit Devices in one system in any Combination	
7.	Should come with Complete battery backup, mute and reset buttons	
8.	Should be housed in a dust proof cabinet with all necessary arrangements	

675.	Patient bed Side Unit	
Sr. No.	Description	Compliance
1.	Should have two call buttons both on plate & handle much easier for Patient to Call	
2.	Should have Unique Talk Function	

TECHNICAL SPECIFICATIONS FOR ELV WORKS

3.	Should have Connect the call button to the Phone	
4.	Should have Patient Talk Remotely with the nurse directly	
5.	Should have Inbuilt Speaker with high Volume and Clear Voice	
6.	Should have Appropriate back box with IP44 rating	

676.	Waterproof Toilet unit	
Sr. No.	Description	Compliance
1.	Should have pull chord which is specially design for toilets that allows patients in health care settings to alert a nurse or other health care staff member remotely of their need for help	
2.	Should have Appropriate back box with IP44 rating	

677.	Door Lamp	
Sr. No.	Description	Compliance
1.	Should have 4 Color LEDs for Different Indicate the position of Caller ward and Status.	

678.	Corridor Display	
Sr. No.	Description	Compliance
1.	Should have Display with Buzzer to indicate the position of Caller ward and Status.	

679.	Cat 6 UTP Cable		
Sr. No.	Parameter	Description	Compliance
1.	Conductors	23 AWG Solid Copper Cable.	
2.	Insulation	PVC Jacket	

680.	25mm PVC Conduit		
Sr. No.	Parameter	Description	Compliance
1.	Size	25mm	
2.	Type of Pipe	MMS	
3.	Material	PVC	