INTEGRATED COMMAND & CONTROL CENTRE

1. Command & Control Platform/Application

(i) The Integrated security systems software shall support the following systems on a single platform with a feasibility to create/modify the reports as per client's requirement. The software shall support multiple web clients and desktop clients on client server architecture.

(ii) The software shall be an integrated software platform to monitor and manage the below system modules enabling the end user to have the comfort and convenience of establishing a single point responsibility for the monitoring, management and upkeep of their facilities.

- IP based CCTV monitoring and recording system
- IP based thermal camera monitoring and recording system
- Perimeter Intrusion detection system
- Fire Alarm system
- Communication system
- Contraband detection system

(iii) Access control system and CCTV System with Digital video transmission and recording including event (access and alarms) linked recording shall be supported.

(iv) The software shall support industry standard communication protocols.

(a) System Architecture

(i) The application shall be modular and must have a highly scalable architecture that can suit a single site and scale up to manage multiple sites across varied geographies if need be.

(ii) The application shall support single / multiple / clustered servers to meet the requirements of the implementation if required.

(iii) In its basic form the application, database, communications and user interface may be installed on a single Server / PC. As the system expands in terms of complexity, functionality or volume of data processed it shall be possible to install the different application server components in multiple machines and support full client server architecture for the user workstations.

(iv) The responder shall be able to provide load testing reports for defined scenarios covering a defined number of events / alarms / concurrent users on client workstations and defined number of hits to the database. This shall be available both in a LAN and WAN environments. The responder shall be required to establish a proof of concept under the defined load conditions and provide detailed load testing reports and allow inspection of the simulation in the responder's own facilities if need be.

(iv) The application shall support communication drivers for various real time systems / hardware platforms that need to be brought under the command and control infrastructure. The application shall support the ability to include custom developed communication drivers and provide an open architecture in interfacing multiple third party systems that may need to be brought under this infrastructure.

(v) The application shall be designed for high availability. The solution architecture shall optionally support dual redundancy in the servers and back up servers. It shall also support remote replication of data for disaster recovery. The application shall support remote desktop client workstations that shall be able to work as independent servers managing a local site / set of sites in case of connectivity loss with main / standby servers. Responder shall be able to provide detailed system architecture and a white paper on how the proposed application meets these requirements.

(b) General Requirements

(i) The application software shall be an integrated application for the management of various services within a building, campus or an enterprise across multiple global locations.

(ii) The services / disciplines managed by the software shall include Access control, Perimeter intrusion detection system, Fire, lighting, CCTV Systems etc.

(iii) The software shall have a single integrated back end database for all these disciplines and shall provide an integrated GUI (Graphical User Interface) for monitoring, managing and reporting across these disciplines.

(iv) The application shall be based on latest technology such as Microsoft.NET

(v) The application shall not require administrator privileges on the Operating system.

(vi) The application shall comply with a distributed 3 tier architecture. There shall be a common Business Logic layer and a single Data Access Layer that shall control access to the database.

(vii) The application should support MS SQL Server at the minimum. It is desirable that the application also support SQL Lite and MySQL.

(viii) The application shall provide an option of using a desktop based GUI as well as a web based UI.

(ix) The web based UI shall provide all functionality as the desktop GUI. Web UI restricted to alarm monitoring or only partial configuration shall not be acceptable.

(x) The desktop UI shall be designed to allow multiple screens to be opened at the same time. The user shall be able to fix windows (dock) or keep them floating.

(xi) Floating windows shall be dragged to another monitor in the case of a PC supporting multiple monitors. This shall facilitate graphics views on one monitor and list views or video on another.

(xii) The application shall provide a familiar Windows point and click environment. It shall also facilitate easy learning by providing quick access menus like toolbars.

(xiii) The application shall display all configurations in at least 2 formats:

(a) Hierarchical tree views for displaying all hierarchical data.

(b) List views that list all configured items based on user rights.

(xiv) It shall have the following Tree Views as minimum.

(a) Site Tree – Objects shall be linked under the respective sites. Hierarchical view based on site.

(b) Object browser – Objects shall be grouped under the Communication Gateways.

(c) Quick View – Objects shall be grouped like a windows explorer folder view (System wise). Operator configuration actions such as add/edit or delete shall be possible from either the tree view or the list view.

(xv) All operations on the application should be asynchronous and shall not hold up any other operation, for e.g., bulk data change should not hold up receipt of alarms.

(xvi) Communication across layers shall be encrypted. AES with 128 BIT key for symmetric shall be acceptable. Native encryption shall not be acceptable.

(xvii) Data transfer across layers shall be compressed to provide optimum utilization of bandwidth.

(xviii) Communication across layer shall preferable be over HTTP with suitable authentication. Responder to specify communication technology, port used and authentication mechanism.

(xix) Login from the Web UI shall be using MD5 or SSL.

(xx) The application shall not store any form of passwords in clear text. All such passwords either in configuration files or in the database shall be encrypted. AES with 128 BIT key. Native encryption shall not be acceptable.

(xxi) The access to database shall not be based on the default user; the application shall use a specified or pre-defined login.

(xxii) It shall be possible to designate a desktop as a specific workstation that exposes only a defined functionality like a specific Video Workstation irrespective of the logged in operator excluding the Master User or Administrator.

(xxiii) Application shall provide for the ability to copy existing configuration across hierarchies.

(xxiv) Application shall also provide the ability to clone (create multiple instances) of a configured entity. A minimum of 50 clones should be possible in one user action.

(c) Events & Alarms

(i) It shall be possible to define messages as normal events or as alarm globally for the system.

(ii) It shall be possible to define some alarms to require re-entry of operator password before process.

(iii) The system shall support up to 255 alarm priorities. Each alarm priority shall be associated with a color for easy identification of the alarm's criticality.

(iv) It shall be possible to define Operator instructions for each alarm from each site.

(v) System shall support alarm escalation where unacknowledged alarms shall be escalated and reported to supervisory workstations. Time out for each alarm for escalation shall be definable.

(vi) The application shall display alarms and events in separate windows. Alarm window shall pop up (or become window on top) in case it is minimized and an alarm is received.

(vii) The alarm window shall group alarms by priority. The group header shall display the total live alarms and acknowledged alarms in each priority.

(viii) It shall be possible to regroup the alarms by location (sites) or application type on the fly.

(ix) Alarms messages shall provide the following minimum data:

(a) Date & Time of occurrence. Alarm Description (in case of perimeter Intrusion/Access control/CCTV).

(b) Location.

(c) Device Description.

(d) Card holder name (in case of access control system card based alarm).

(e) Priority (in case of grouping other than priority).

(x) It shall be possible to double click on every alarm and get additional data that shall consist of the following:

(a) Alarm Instruction for the operator.

(b) Alarm Action capture. This shall record free flowing text entered by the operator. This information shall be stored with the operator id and date time stamp.

(c) History of last 10 alarms from that Site / device.

(d) Last Card Entered in case of an alarm from Access Controllers.

(e) Link to play video in case event is linked to a video clip.

(xi) The application shall provide for a 2-stage alarm management. Operators shall acknowledge the alarm on receipt and after investigation and closure shall be able to process the alarm.

(xii) Alarms shall be visible till it is processed. It shall be possible to visually differentiate between a live alarm and an acknowledged alarm.

(xiii) It shall be possible to process a group of alarms. In such cases the application shall prompt for the logged in operator's password.

(xiv) Existing alarms (live alarms prior to login) shall be displayed separately as History Alarms. History alarms shall be grouped as:

(a) Today

(b) Yesterday

(c) Two Weeks

(d) Last Month

(e) Older

(d) Operator Definitions

(i) It shall be possible to create Operator Group profiles. Unlimited number of groups shall be possible.

(ii) Group Profiles shall define the operator menu rights, access rights and action rights.

(iii) Group profiles shall also define the events and alarm routing. Group Profiles shall also define the rights to acknowledge and/or process the alarms routed.

(iv) Individual operators may be created and assigned to the group profiles. The following minimum definition shall be possible:

(a) Password Change on next logon.

(b) Password change not allowed.
(c) Password Disabled.
(d) Auto Log Out period.
(e) Validity days.
(f) Partitions (Sites) allowed for access.
(g) Application disciplines (Access / Video / Intrusion) allowed for access.

(v) Operator password must be at least a combination of 6 alphanumeric characters long, containing at least 1 numeric character and at least one character in caps.

(vi) The application shall not allow last 6 passwords to be repeated.

(vii) The application shall notify expiry of the password if the validity is less than 15 days.

(viii) Application shall allow for an operator to have Menu and edit rights for an object say a card holder, but is shall be possible to restrict the view to avoid any personal data like address, mobile number etc.

(ix) It shall be possible to restrict operator access to limited workstations in case of desktop UI.

(e) Reporting

(i) The application shall provide a comprehensive reporting engine.

(ii) Normal day to day reports shall be predefined and shall consist of but not limited to the following:

(a) Listing of all master configurations
(b) Listing of all Group Profiles and the rights
(c) Listing of all operators and their associated group profiles
(d) Listing of Card Holders/point lists with respect to each plant
(e) List of all alarms based on date and time
(f) List of all normal events based on date and time.

(iii) These reports shall be available in Crystal Reports or equivalent reporting tool.

(iv) The application shall provide an additional report option where by the user shall customize the view based on:

(a) Groups
(b) Sort order
(c) Column Selection (based on predetermined sub set)

(v) The application shall also provide for a customizable report generator whereby report formats shall be created at site. The options shall be the following:

(a) Report title
(b) Group Headers and titles
(c) Column Selections (all fields in the database)
(d) Sort order
(e) Filter criteria based on SQL like statements. The operations shall be logical (<,>, =, <>, in, not in, like) and aggregate (count, sum, avg) functions.
(f) Font size, fore color and back color

(vi) It shall be possible to save report formats created and reused.

(vii) All reports shall provide an ability to export to the following:

(a) CSV
(b) Text

(f) Trending

(i) The application shall provide for creating a data log.

(ii) It shall be possible to define unlimited points and their frequency for data logging.

(iii) Frequency shall be selectable:

(a) Quarter Hourly
(b) Hourly
(c) Daily
(d) Weekly
(e) Monthly

(iii) Notwithstanding the frequency specified, the data log shall also include all state changes.

(iv) It shall be possible to define a point in more than one data log with different frequencies.

(v) The application shall provide for unlimited points from within the data log to be displayed as a trend chart.

(vi) It shall be possible to select a period on the trend chart and zoom into it.

(viii) Trend data shall also be represented as a summary consisting of:

(a) Max value.
(b) Min value.
(c) Average for the plotted duration.

(x) It shall be possible to select the color of each point charted on the trend.

(x) It shall be possible to save the trend graph as an image.

(g) Graphics

(i) The application shall provide a fully functional graphics module.

(ii) It shall be possible to import images into the graphics module to create a graphical representation of the facility.

(iii) The images can be linked by using a link button.

(iv) It shall be possible to define generic device properties for each type of physical hardware like doors, inputs etc.

(v) It shall be possible to create more than one generic device for each hardware type with unique properties like icons, actions and states.

(vi) It shall be possible to position these devices into the images to indicate actual location within the installation.

(vii) It shall be possible to associate a group of images and create an animation.

(vii) Generic devices shall accept animation files for various states.

(viii) Generic devices shall be associated with a specific instance of hardware to create association. For example, Main Entry Door shall be associated with one generic door device.

(ix) It shall be possible to define a specific instance of hardware in to more than one generic device.

(x) It shall be possible to display analog values as a horizontal bar, vertical bar or as plain text. Measurement unit like Celsius shall be definable and visible in the graphics.

(xi) It shall be possible to define which image must be popped up in case the device goes into alarm.

(xii) It shall be possible to perform actions from the device icon on the graphics.

(xiii) It shall be possible to view up to 5 live alarms from each device on the graphics.

(xiv) It shall be possible to view the device configuration from the graphics.

(xv) The system shall allow graphic pages to have devices across multiple disciplines. It shall be possible to define on the same graphics page any system device including cameras, access doors and intrusion alarm sensors.

(h) Interfaces

(i) The application shall be able to provide multiple interface options.

(ii) To interact with third party applications. It shall be possible to access and retrieve a list of alarms and events from external applications using web services.

(iii) It shall be possible to manually import cardholder data from an excel sheet. The interface shall import from a pre-defined excel template as well as provide the ability to map the excel columns to the required database fields.

(iv) It shall also be possible to programmatically import cardholder data from an XML or a CSV file. Any external application shall be able to push an XML or CSV file based on a schemer. The interface shall process the file and add, modify or delete cardholder's records.

(a) It shall be possible to export events or alarm to a text file. The following definitions shall be possible.
(b) Frequency.
(c) File name.
(d) File extension.
(e) Fields required.
(f) Separator

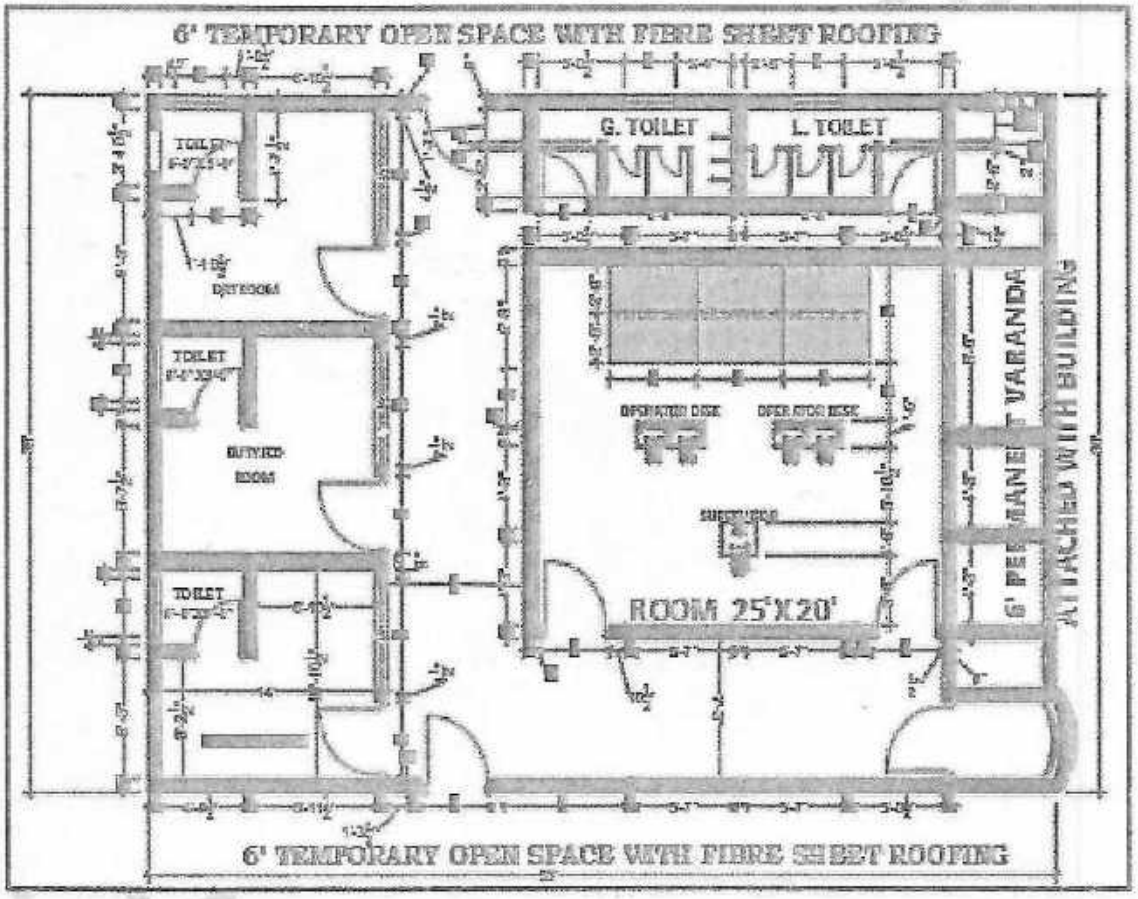
(v) It shall be possible to export cardholder data to text or XML file.

(vi) The application shall be a comprehensive solution that supports the following plug in modules.

(a) Time & Attendance with workflow.
(b) Visitor management.
(c) Notification.

3. Command and Control Room

The ICCC building will have Command and Control Room (CCR) where the operators would be sitting. Below is an indicative & suggestive layout of the proposed CCR. The exact floor dimensions and interiors of the building would be finalized by architects & the civil engineering experts who will be designing the ICCC layout, structural designs and interior planning & designing. The plan indicated in this section is indicative & suggestive in nature. The final architectural plan and relevant details shall be submitted separately.



ICCC building will also house the Datacenter, electrical & battery/UPS room. The details of the following are as below:

- Datacenter: This area will house all the core IT infrastructure which includes the server farm, storage, security and other datacenter assets in a controlled environment. The datacenter-controlled environment would provide clean power, adequate cooling, fire & hazard protection and physical security for the datacenter assets. The architects & civil engineering experts will design the interiors of the datacenter where in the cabling (both power & network)

would be provisioned under the floor. The datacenter area would be protected under 24x7 surveillance and would have biometric (finger print) based access control.

- Electric Room/battery/UPS room
- Officer's cabin
- Support Staff rooms

(a) Standards for construction and interior works in CCR

The scope of the project includes construction of control room, designing, engineering, supply & installation of ICCC Interiors with air-conditioners for adequate cooling of entire control room space. As the Control room is a significant place, it is imperative that it is designed properly in terms of Aesthetics, Ergonomics and Functionality. Various aspects should be considered while designing Control Room area to create ideal work place, considering physiological aspects such as line of sight and field of vision and cognitive factors such as concentration and perceptivity as per ISO 11064/ or equivalent.

The Architects & civil engineering experts would undertake the designing of the interior of the ICCC in such a fashion so that they shall reflect human factors requirements including the following:

- Satisfactory environmental conditions for operator personnel. Including noise, airflow, temperature and humidity, and precautionary measure under uncontrolled conditions (like fire) beyond acceptable limits.
- Adequate space for personnel and equipment for the movements and activities they are required to perform during operation and maintenance, under both normal and emergency conditions.
- Adequate visual / auditory status information and other communication links between personnel and equipment under normal and emergency conditions.
- Adequate illumination for the performance of operation, control, maintenance and training.
- The control room shall be built as per the criteria of "Human Factor Engineering" to improvise the efficiency utilization of the operators and provide them Fatigue free working environment.
- The interiors should be designed to
  - Ensure maximum standard of safety.

- Allow Flexibility
- Minimize maintenance
- Improve operator's efficiency & alertness.

- Selection of fire retardant/rated material is must.
- Implementation agency is responsible for setting up and O&M of entire ICCC including all the, hardware and software, interior work for setting-up of ICCC at physical space provided by authority, Network Cabling, Electrical Works, Video Wall, Furniture's and Fixtures, CCTV Surveillance system of the ICCC, Access Control System etc. as per the scope of work.
- The Implementation agency will have to provide all necessary Hardware, Network Infrastructure, Active and Passive Connectivity, Power Backup including all IT infrastructures that may be required for the ICCC for the entire contract duration.
- Video Wall: A state of art 65" LED TV facility should be installed at CCC. Followings are the functional requirement of video wall: -

- The video wall shall use multi-monitor (e.g., different monitor can display different input source) and split screen (e.g., several intersections can be displayed on one monitor) display technology to provide the flexibility to accept audio and video inputs Camera system, TV signal, recorded video, and Laptop computer.
- Should have provision for live monitoring and control of various application & Smart solution modules

- Each operator shall be provided with one workstation with three monitors for system monitoring along with one intercom line.
- Implementation agencies scope of work and supply of the control room only in the ICCC and its components including Ergonomic Study, Desk, Ceiling, Flooring, Panelling, Partition, Illumination defined in this document shall be on turnkey basis. The expected size of the control would be 2000 Sq. ft.
- Design, Engineering, Manufacturing, supply of all related goods and providing all related services including installation, testing, integration, commissioning etc. all complete, preparation of related drawings, documentations etc. of the control room.
- Quality assurance and commissioning of the complete system at site to the complete satisfaction of the owner/consultant.

- The control room solution provider must be ISO 9001, ISO 14001, OHSAS 18001 and ISO 27001 certified.
- Wall paneling, ceiling & desk system shall be seismic zone 5 tested and certified from government approved test laboratory.

(b) Minimum Required Specifications for CCR components

- Control Desk: -
  - Structure: - Every desk shall be standing on aluminum pole-based system, the pole shall have 200 mm diameter and minimum 10 mm wall thickness at circumference. Both the load carrying poles shall be visible as design elements on the extreme sides of the desk; work top & floating CPU Cabinets shall be installed on these poles. The CPU cabinet shall be raised by 150mm from floor and shall be firmly mounted between extreme end poles. The CPU cabinet shall have curved extruded aluminum shutters. Straight shapes/profiles of desk like under structure, slat wall, front edge, table tops etc. shall be deemed unacceptable.
  - The standard frame width shall be 1160-1250mm with an overall height of 711-762 mm to correlate to standard seated height applications.
  - Conventional bulky, boxy type desk of metal and aluminum structure shall be deemed unacceptable.
  - Wire shall be routed into the cabinet through the pole. Proper maintenance access points to be provided via suitable snap fit plastic /metal covers.
  - Table Top: - The table top core shall be made up of aluminum and shall have 2 mm thick acoustic laminate finish on the top. Desk top shall have a feature of tilting by 2 to 5 degrees with help of noise free mechanisms.
  - Front Edge: - High-density Poly Urethane Foam molded on industrial grade aluminum core to form 50mm deep tapered edge to be installed on worktop. The Edge shall be mechanically replaceable within 30 minutes in case of damage or wear without opening or removing the worktop.
  - Cable Managers and Rear Edge: - All the cable manager openings and rear edge of worktop shall be protected from no spill molded PU edge, 5

mm high above worktop surface to prevent liquid from spilling inside the CPU/Equipment Cabinet.

- Slat Wall: - 60 mm thick Curvilinear Slat wall shall have radius matching to the CPU cabinet shutter. Slat wall shall have inbuilt mechanism for tool less & effortless sliding of the monitor arm across the length of the console without removing the monitor pole.
- Monitor Arm Assembly shall have auto-lock, push & add/remove die-cast aluminum extendible arms of 150mm each with tool less addition/deletion feature to cater future requirements. Tool less addition / deletion in less than a minute. UL certificate to be enclosed along with the bid.
- Electricals: - The exhaust fans shall be provided with thermostats. Fans will automatically shut down in case the shutters are opened.
- Cable Trays: - The desks must be designed with vertical and horizontal cable trays to allow for continuous cable management between the cabinets.

- **Panelling/Partition and Celling System:**
  - Look and feel of the control room shall be ultra-modern & unique. To solve monotony in control room in future, the panelling shall have inbuilt design in 20% tiles of panelling to change the colour without ordering new.
  - Conventional Gypsum, wood, Fabric and painting work shall be deemed unacceptable in the control room area.
  - Ceiling and panelling system shall be a combination of hexagonal and rectangular designs defined below: -
  - Hexagonal design: - Hexagonal ceiling and panelling shall be made up of extruded aluminum periphery rigid enough to pass seismic test mentioned above.
  - Rectangular design: - 25mm deep tray type panelling tiles with rounded corners shall be snap fitted to the main structure and firmly hold in place by die-cast aluminium corner locks. The die-cast locks shall be attached to the main MS structure or min 1.6 mm.
  - Tiles: - Tiles shall have minimum 10,000 micro-perforations per square meter to achieve NRC of 0.6 Sound Absorption Coefficient by diffuse field

method; IS: 8225-1987 "Measurement of Sound Absorption Coefficient in Reverberation Room" (Equivalent to ISO: 354- 1985 and ASTM 423-90).

- Hexagonal system shall extend possibility to integrate various raw materials like Solid surface, Fabric, Glass, Metal (perforated and non-perforated), illumination in the tiles to form multiple design combinations.
- Structure: - The structure shall be made up of 1.6mm thick powder coated steel structure.
- Cut-outs for LVS:- Panelling shall have provisions to accommodate Video wall in an aesthetically appealing manner.
- Wall Panelling System - Lockable & Replaceable: Modular wall panelling tile having secure locking arrangement for equidistant mounting. Locking arrangement enables easy replacement without using any tool within 20 seconds. The feature shall provide easy flexibility of locking all tiles in one column through gravity.

- Doors
  - Metallic Door:- With door spring and locking arrangements and both way handle. Prepare with rigid thermo fused film metal panels. Specification: 0.6mm thick Metal panel sheets, cavity filled with glass wool insulation of density 24kg/cum in roll form of make inside adequate quantity. Material of the partition and that of metal door will remain the same.
  - Metal door with Toughened Glass Vision Panel: - The door shall have 100mm frame (made of same material as that of wall Panelling /partition) and shall have 12mm thick glass pane in between. Glass Properties: Safety (tempered): when broken, must split into tiny harmless pieces.

- Illumination: - Control Room illumination shall be designed as per ISO 11064.

3. Workstation/Desktop

S. No.	Component	Minimum Requirement
1	Processors	Latest generation X86 Processor
		3.2 Ghz or Higher
		Min 8 MB
2	Mother Board	Latest series 64 bit chipset
		Either on the Display system or on chassis or external OEM speaker
		Intel/OEM
		16 GB DDR-IV (2400 MHz) or higher expandable up to 64 GB
		Graphics Card – 2 GB
		1x PCIe x16 and 1 PCIe x4 (total minimum 2 PCI Slots)
3	Display	21.5" or higher
		Active Matrix TFT LCD (Backlit LED); 3nos. monitor with each workstation/desktop
		1920x1080 or higher
4	Miscellaneous	Minimum 6 USB Ports (minimum two USB 3.0 ports and minimum 2 USB port 2.0 or higher in front) 10/100/1000 Ethernet Card, VGA/HDMI, Display Port/HDMI/DVI, Microphone & Stereo Head Phone/Combo port and other standard ports, tool less cabinet, TPM 2.0
		External/Internal 180 W or higher Power supply (>=85% efficient), Active PFC
		Tower
5	Mouse Optical Drive Keyboard	Optical/Laser USB
		Internal 8x or higher Standard USB
6	OS & Other Software	Preloaded Windows 10 Prof 64 bit Windows/Linux Ubuntu, MS Office, Adobe acrobat reader, Anti-virus etc.
7	HDD	1 TB SATA (7200 RPM) or higher capacity

DATA CENTRE COMPONENTS

1. Chassis Layer 3 Core fiber switch

S. No.	Detailed Technical Specifications
	Architecture
1.	Switch capacity - 1.4 Tbps or higher
2.	Switch forwarding rates – 1Bpps or higher
3.	10G/Gigabit - 24 ports scalable to 40 x 1/10G fiber ports
	40 Gig interface for uplink – 4 scalable to 12 x 40G Ports
4.	Non-blocking switch architecture and modular operating system
	Switching features
5.	802.3ad based standard port/link aggregation, Jumbo frames, storm control
6.	Support at least 4000 VLAN and 200,000 MAC Address
7.	FIP snooping, Datacentre bridging exchange (DCBX) and IEEE 802.1Qbb (PFC) from day1
	Security
8.	802.1X Network Security and Radius/TACACS AAA authentication
9.	MAC Address filtering based on source and destination address
10.	support for various ACLs like port based, vlan based and L2- L4 ACL's
11.	Should have Control plane (DoS) protection
12.	The switch should support MACsec, SSH v1 & v2 and Dynamic ARP inspection
	Network Protocols
13.	Layer3 routing protocols like Static, RIP, OSPF, OSPFv3 from day 1 for the solution.
14.	The switch should support MPLS, L2 and L3 VPN and IPv6 Tunneling
	Quality of Service
15.	8 number of hardware queues per port
16.	DSCP, 802.1p and FCoE
	Multicast
17.	IGMP v1,v2,v3, IGMP snooping, PIM SM and MSDP
	High Availability
18.	The switch should support ISSU and BFD

	Management
19.	SNMP v1, v2, v3, RMON/RMON-II enabled, SSH, telnet, GUI, Web management and should have dedicated Management port
20.	The switch should support CLI via console, telnet, or SSH and should have image rollback option.
21.	Switch should support port mirroring feature for monitoring network traffic of a particular port/VLAN.
22.	Switch should support Link Aggregation on two different switches
23.	Built-in real-time performance monitoring capabilities
24.	Power Supply: Switch should have internal Hot Swappable Redundant Power supply
25.	Cooling Fans: Should have redundant cooling FANS
26.	The switch should support NEBS
27.	Switch should be stackable/VPC/Equivalent (All accessories to be provided from day 1)
28.	The Switch should be EAL3/ NDPP certified
29.	Certification - CE, FCC, UL EN 60950-1

2. Firewall

S. No.	Detailed Technical Specifications
	Architecture:
1	The appliance based security platform shall be capable of providing firewall, IPS and VPN (IPSec) functionality simultaneously.
2	The Firewall should support Application visibility and control, Antivirus and Antispam in future.
3	The Firewall should support Advanced Threat Protection like malware and zero-day threats
4	The platform should be based on real time, secure, embedded operating system.
5	Capability to detect hardware failure during power up and before going online
6	Should provide Stateful failover.
7	HA configuration that uses dedicated HA-control interfaces apart from the mentioned traffic interfaces
8	Should provide active/active and active/standby failover
	Sessions
9	Should support upto 2Million Concurrent sessions and at least 50,000 sessions per second
	System Throughput

10	Should provide 9 Gbps Firewall Throughput
11	Should have 4 Gbps IPsec throughput
12	IPS throughput of 3Gbps
13	Memory - atleast 16GB or higher and 100GB storage
14	Support: - IKEv1 and v2, IPsec VPN standards, 56-bit DES, 168-bit 3DES, OSPF routing, x.509, Up to 256-bit AES data encryption
15	Authentication, Authorization and Accounting (AAA) support: RADIUS, TACACS or TACACS+
16	Support for: Network and application level attacks ranging from malformed packet attacks to DoS attacks, Support RSA and Diffie-Hellman, MD-5, SHA-1, SHA-128, SHA-256
	DHCP relay: -
17	Forwards DHCP requests from internal devices to an administrator-specified DHCP server, enabling centralized distribution, tracking, and maintenance of IP addresses.
	Provides:
18	Rich dynamic NAT and PAT services ; Bidirectional NAT and Transparency; Static NAT and PAT services; Stateful and stateless and Zone-based firewall; Denial of service (DDoS) protection; Traffic anomaly protection; MPLS (RSVP, LDP) , MPLS VPN; Virtual private LAN service (VPLS)
	Management
19	Web based management to support for remote monitoring
20	Accessible through variety of methods including: Telnet, Console Port, SSH
21	Dedicated Out-of-Management interface
22	Support SNMPv1, v2, v3 & Support for syslog
23	Should have the ability to create customizable administrative roles/profiles (monitoring only, read-only access to configuration).
	Software features
24	support for IPv4, RIPv2, OSPF, BGP, VLAN, DHCP. Support for IPv6 RIPng, OSPFv3.
	Power Supply
25	Internal Redundant Power supply
26	Minimum Interfaces Required
	4 No's 10Gig ports and 8 No's of 1Gig Ports

3. 8 port (10/100/1000) Industrial Field Switch

S. No.	Parameters	Description
1	Switch Architecture and performance	The switch should provide 8 ports 10/100/1000 Mbps T POE+ ports, (with minimum power budget of 240W) and switch should additionally have 4 GE SFP uplinks.
		Switch should have wire rate switching capacity of minimum 24 Gbps or more
2	Layer 2 features	802.1Q VLAN on all ports with supply of minimum 256 VLANs and minimum 1K Mac addresses or higher

		Spanning tree protocol as per IEEE 801.1d, 802.1s and 802.1w
		Should support improved resiliency with support of ERPS or equivalent for ring topology
		Link Aggregation control protocol (LACP) as per IEEE 802.3ad
		Switch should support IGMP v1/v2/v3 as well as IGMP snooping and minimum 255 IGMP Multicast Groups
3	Quality of service (QoS)	Switch should support classification and scheduling as per IEEE 802.1P on all ports ad four egress queues per port. Switch should support mechanism of applying Automatic QoS or equivalent mechanism
		Switch should support eight hardware based priority queuing or equivalent to guarantee that the highest priority packets are serviced ahead of all other traffic
4	Security Features	Switch should support ACL's, TACACS+, RADIUS, ARP Spoofing, DHCP snooping, DHCP option 82, Dynamic ARP Inspection (DAI), IP source guard and BDU Guard or equivalent
5	Management, Easy-to-use Deployment and Control Features	Switch should have console port, support for SNMP version 1,2 and 3, TELNET, SSHv2, 4 groups of embedded RMON, DHCP server
6	Standards	IPv4/IPv6, IEEE1588v2 PTP, IEEE 802.3af, 802.3at,802.3az, NTP, PTP
7	Industry Standards	RoHS and IP30
8	Certifications	CE, FCC, UL EN 60950-1
9	Mount	DIN rail mount
10	EMC Compliance	FCC, IEC/ EN 61000-(3-2, 3-3, 4-2 to 4-6, 4-8, 4-11), RoHS
11	Operating Temperature	(-)10° C to +70° C
12	Shock Vibration	IEC 60068-2-27 IEC 60068-2-64 IEC 60068-2-32
13	Relative Humidity	Relative Humidity of 5% or 95% Non-considering
14	stability and credibility	OEM should have supplied minimum 1500+ switches in any surveillance project/multi-location project in Government.
		To ensure stability and credibility of OEM , Company should not have any history of merger / acquisition in last 10 years.

4. 24(10/100/1000) Port Managed Switch

S. No.	Parameter	Minimum Technical Requirement

1	Switch Architecture and Performance	Switch should have 24 Nos. 10/100/1000 Base-TX auto-sensing plus with minimum 2x10G SFP+ uplinks.
		Should support stacking using dedicated stacking ports with minimum 40 Gbps upto throughput
		Switch should support link aggregation across multiple switches in a stack.
		Should support stacking of minimum of eight switches
		Switch should have non-blocking wire-speed architecture.
		Switch should support IPv4 and IPv6 from day One
		Switch should have non-blocking switching fabric of minimum 128 Gbps or more
		Switch should have Forwarding rate of minimum 60 and above Mpps.
2	Features	IEEE 802.1Q VLAN tagging.
		802. 1Q VLAN on all ports with support for minimum 255 active VLANs and 4k VLAN ids
		Support for minimum 8 k MAC addresses
		Spanning Tree Protocol as per IEEE 802.1d
		Multiple Spanning-Tree Protocol as per IEEE 802.1s
		Rapid Spanning-Tree Protocol as per IEEE 802.1w
		Self-learning of unicast & multicast MAC addresses and associated VLANs
		Jumbo frames up to 9000 bytes
		Link Aggregation Control Protocol (LACP) as per IEEE 802.3ad.
		Port mirroring functionality for measurements using a network analyzer.
		Switch should support IGMP v1 / v2 / v3 as well as IGMP v1 / v2 / v3 snooping.
3	Quality of Service (QoS) Features	Switch should support classification and scheduling as per IEEE 802.1P on all ports.
		Switch should support DiffServ as per RFC 2474 / RFC 2475.
		Switch should support minimum 4 (four) queues per port.
		Switch should support QoS configuration on per switch port basis.
		Switch should support classification and marking based on IP Type of Service (TOS) and DSCP.
		Switch should provide traffic shaping and rate limiting features (for egress as well as ingress traffic) for specified Host, network.
		Strict priority queuing guarantees that the highest-priority packets are serviced ahead of all other traffic.

4	Security Features	Switch should support MAC address based filters/ access control lists (ACLs) on all switch ports.
		Switch should support Port as well as VLAN based Filters/ ACLs.
		Switch should support RADIUS and TACACS+ for access restriction and authentication.
		Secure Shell (SSH) Protocol, HTTP and DoS protection
		IP Route Filtering, ARP spoofing, DHCP snooping etc.
		Should support DHCP snooping, DHCP Option 82, Dynamic ARP Inspection (DAI)
		Should support a mechanism to shut down Spanning Tree Protocol Port Fast-enabled interfaces when BPDUs are received to avoid accidental topology loops.
		Should support a mechanism to prevent edge devices not in the network administrator's control from becoming Spanning Tree Protocol root nodes.
		Switch should support static ARP, Proxy ARP, UDP forwarding and IP source guard.
		The Switch should support IPv6 features from day-1.
5	Management, Easy-to-Use Deployment and Control Features	Switch should have a console port with RS-232 /RJ-45 Interface for configuration and diagnostic purposes.
		Switch should be SNMP manageable with support for SNMP Version 1,2 and 3.
		Switch should support all the standard MIBs (MIB-I & II).
		Switch should support TELNET and SSH Version-2 for Command Line Management.
		Switch should support 4 groups of embedded RMON (history, statistics, alarm and events).
		Switch should support system and event logging functions as well as forwarding of these logs to multiple syslog servers.
		Switch should support on-line software reconfiguration to implement changes without rebooting. Any changes in the configuration of switches related to Layer-2 & 3 functions, VLAN, STP, Security, QoS should not require rebooting of the switch.
		Support for Automatic Quality of Service for easy configuration of QoS features for critical applications.

		Support to detect unidirectional links caused by incorrect fiber-optic wiring or port faults and disable on fiber-optic interfaces
		Switch should have comprehensive debugging features required for software & hardware fault diagnosis.
		Should support DHCP Server feature to enable a convenient deployment option for the assignment of IP addresses in networks that do
		DHCP servers configured on servers and integrated with Directory Services.
		Switch should support Multiple privilege levels to provide different levels of access.
		Switch should support NTP (Network Time Protocol)
		Switch should support FTP / TFTP
6	Standards	RoHS Compliant.
		IEEE 802.1x support.
		IEEE 802.3x full duplex on 10BASE-T and 100BASE-TX ports.
		IEEE 802.1 D Spanning-Tree Protocol.
		IEEE 802.1p class-of-service (CoS) prioritization.
		IEEE 802.1Q VLAN.
		IEEE 802.3u 10 BaseT /100 Base Tx /1000 Base Tx.
7	Compliance	The switch should be IPV6 logo ready or Certified
		Switch should be tested and certified for EAL2/EAL3 / NDPP or above under Common Criteria Certification

5. Server/Network Rack

S. No.	Item	Minimum Requirement Description
1	Rack Height	42U
2	Rack Width	19"
3	Max Height	2000mm
4	Max Width	800mm
5	Max Depth	1200mm
6	Color	Black / standard color
7	Front Door	Glass with unique lock
8	Rear Door	Steel
9	Load bearing capacity	1400 kg

6. Server

S. No.	Parameter	Description
1	Chipset	Latest Intel Chipset
2	Form Factor	Max. 2U rack mounted with sliding rails
3	Configured CPU	should be populated with 2nos. of latest series CPU each should be min. 16 core & min. 2.0Ghz or better
4	Memory slots	24 DDR4 DIMM slots supporting speeds up to 2666MT/s.
5	Memory configured	Server should be configured with 256Gb memory
6	RAID Controller	12Gbps PCIe 3.0 with RAID 1, 5, 6
7	Internal Storage	2nos. of 300Gb 10K RPM HDD
8	DVD writer	DVD RW
9	I/O slots	Up to 8x PCIe Gen3 Slots
10	GPU	Server should support upto 2 GPU Cards (SI has to consider GPU cards as per their solution requirement)
11	Network Interface	2 x 1G RJ45, 2 x 10 GbE LAN ports for providing Ethernet connectivity, 2 x Dual-port 16Gbps FC HBA for providing FC connectivity
12	OS Support	Latest version of Microsoft Windows Server / Linux / Unix and Anti Virus
13	Power Supply	Platinum rated redundant Power Supply
14	SD Modules slots	Dual SD Module slots supporting redundant configuration
15	Management Integration	Support for integration with Microsoft System Center, VMware vCenter etc.
16	Power & temperature	Real-time power meter, graphing, thresholds, alerts & capping with historical power counters. Temperature monitoring & graphing
17	Pre-failure alert	Should provide predictive failure monitoring & proactive alerts of actual or impending component failure for memory, CPU, HDD etc.
18	Configuration & management	• Real-time out-of-band hardware performance monitoring & alerting • Agent-free monitoring, driver updates & configuration, power monitoring & capping, RAID management, external storage management, monitoring of FC, HBA & CNA & system health • Out-of-band hardware & firmware inventory • Zero-touch auto configuration to auto deploy a baseline server configuration profile • Automated hardware configuration and Operating System deployment to multiple servers • Zero-touch repository manager and self-updating firmware system • Virtual IO management / stateless computing • Support for Redfish API for simple and secure management of scalable platform hardware

19	LCD/LED panel	Should display system ID, status information and system error code followed by descriptive text. LCD/LED background should light up in different colours during normal system operation & error conditions.

7. Storage

S. No.	Parameter	Minimum Requirements
1	Converge/ Unified Storage	Storage solution with NSPoF (No single point of failure) Architecture. The Storage solution shall support NAS or SAN as an integrated offering with high availability at each level. The architecture shall allow upgrades of hardware and software for investment protection.
2	Protocols	Solution shall be configured with required protocols for the solution CIFS/SMB 3/ NFS 4/iSCSI/FCoE/FC. All required protocols required for the solution to be enabled.
3	Controllers	System to have minimum Two controllers with NSPoF Architecture (NO single point of failure architecture). Storage shall support non-disruptive online firmware upgrade for both Controllers and disk drives.
4	Operating System	The storage array should support Operating System Platforms & Clustering including: Linux/Windows
5	Cache Memory	Cache Memory: Each controller/node should be provided with minimum 64 GB RAM h usable protected data cache for disk IO Operations. If NAS controllers with separate controllers additional RAM cache to be provided. The storage array shall have complete cache protection mechanism either by de-staging data to disk/flash or protecting with NVRAM.
6	Host	The storage system shall be capable of providing host connectivity as per solution offered (Unified/SAN/NAS/Scale out NAS).
7	Connectivity	Minimum 2 ports per controller to be provided for host connectivity.
8	RAID Supports	RAID levels Supported: 0, 1, 5, 6, 10 or equivalent
9	Redundancy	Fans and power supplies: Dual redundant, hot-swappable.
10	Disk Drive Support	Storage subsystem shall support 8TB/10TB dual ported or higher NL-SAS/SAS/equivalent 7.2K drives in the same device array.

11	Global Hot Spare	System shall have the capability to designate global hot spares that can automatically be used to replace a failed drive. Storage system shall be configured with required Global Hot-spares for every thirty drives for the different type and no. of disks configured.
12	Capacity	The capacity should be configured to meet the performance requirement of solution.
13	Snapshots	Shall be able to take "snapshots" of the stored data. Offered Storage shall have support to make the snapshot in scheduled or auto snaps. Snapshot shall support block or file as applicable for solution.
14	Replication	The storage array shall have the capability to do remote replication using IP technology.
15	Software Licenses	All necessary software required for the solution needs to be provided.
16	Monitoring	Shall support the functionality of proactive monitoring of Disk drive and Storage system for all possible hard or soft failure.

POWER BACKUP FOR DEPOT

1. UPS 30+30 KVA for Control Room and 30 KVA for Field

Sr. No	Parameter	Minimum Requirement Description
1	Capacity	30 KVA
2	Technology	True ON-LINE (Double Conversion) with IGBT based inverter and PWM Technology
3	Connector	RS 232 port for software interface
4	Electrical Input	3 phase 4 wire and ground
		Voltage Range - 330 V - 480V
		Frequency Range - 47 to 53 Hz
		Efficiency AC to AC: > 85% (AC to AC)
		220V AC / 230V AC / 240V AC (Selectable)
		Frequency: 50 Hz + /- 0.1% (free running)
		Voltage Regulation: + / - 1% (or better)
		Overload Capacity: 125% for 1 sec, 110% for 10 secs
		Waveform: Pure Sine wave
5	Protection	Electronic Overload Sensing, and circuit breaker protection Over heating, short circuit, low battery, input over / under voltage
6	Galvanic Isolation	Through Inbuilt Transformer
7	Battery Type	Sealed Maintenance Free Battery, Mains & Battery with necessary indicators, alarms and protection with proper battery rack
8	Backup Time	Minimum 120 minutes backup on full load
9	DC Voltage	MIN. : 240 V DC
		Adjusted to about 10% of battery capacity for fast charging.
10	Charging Features	1. Boost / trickle charging facility
		2. Uncontrolled rectifier with high efficiency and reliability.
		3. Low battery protection to avoid deep discharging of batteries.
		4. Self test diagnostic feature
11	Other Features	UPS Bypass Automatic
		Monitoring panel with LCD display to provide following information:-
		1. Input / output voltage
		2. Input / output frequency

		3. Load current
		4. Charging current
		LED display for:- UPS on, battery operation, bypass, battery charge
		level, etc. Alarms for :- Mains failure, low battery, overload etc.
12	Environmental	Temperature 0-45°C
		Humidity 0 – 95% RH non-condensing
		Audible noise < 50 dB (A) at 1 meter distance
13	Certification	CE & RoHS Certification with make & model number mentioned on it
		ISO 9001:2000 and ISO 14001 certified.
14	Compliance	Dimension Light Weight / Smaller Footprint

2. Diesel Generator Set

Sr. No.	Item	Minimum Requirement Description
1	General	(KVA as per Depot requirement) at 1500 RPM, four stroke, electric start, six cylinder engine conforming to BS: 5514 Or ISO 3046 with capacity of 10% over loading for one hour in twelve hours operation
2	Air Intake System	Air intake manifold.
		Dry type air cleaner
3	Exhaust System	Turbocharger.
		Companion flanges for silencer & bellow.
		Residential silencer.
4	Coolant System	Engine water pump.
		Radiator.
		Coolant additive concentrate
5	Lubricating System	Oil pan.
		Engine mounted lube oil pump
		Full flow spin-on lube oil filter.
6	Fuel System	In line fuel pump with Mechanical
		Governor.
		Spin-on fuel filter
7	Starting system	12V DC electric starter.
		12V DC battery charging alternator
8	Power start Control	Yes

	Microprocessor based.	
9	LED including lamps	The control includes LED lamp indication for the following functions Genset Running
		Remote Start Shutdown Warning
		Manual, Auto and Stop
10	Data Logs	Includes Engine run time and controller on time
11	Alternator Data	Yes
12	Engine Data	Yes
13	Control	Engine Metering, Alternator metering, Battle switch function, Delay Start
		/Stop, Configurable Cranking cycle, Sleep mode time
14	Protection	Low lube oil pressure warning Or shutdown
		High engine temperature warning Or shutdown
		Low coolant temperature warning Sensor failure indication
		Low and High battery voltage warning
		Weak battery warning Fail to start shutdown Cranking lockout
		High Or Low AC voltage shutdown Under Or Over Frequency shutdown Loss of sensing voltage shutdown.
15	Alternator	Synchronous alternator, single bearing, suitable for continuous operation at 1500 RPM generating 415 volts at 0.8 p.f.(lag), 50 Hz, 3 phase, 4 wire system. The alternator shall be Brushless type, self-excited & self-regulated through an AVR. The alternator will be suitable for tropical climate The salient features of the alternator are: + 1.5% voltage regulation (max) in static conditions. IP: 23 protection with insulation. Permanent lubricating bearing. Permissible overload of 10% for one hour in 12 hours of operation
16	Control Panel	The standard Control Panel is alternator mounted & fabricated from 14 Or 16 SWG sheet and Powder Coated after seven tank treatment process. The panel is equipped with:- 200A TP MCCB 10KA (Fixed O /C, & S/C) Thermal Magnetic Release With Spreader Link PS-500 (DG Auto start Or stop, Alt. Mtg., Protection and Engine Protection) Relay Module with 2 relay,12V DC
17	Base Frame	Engine and alternator are mounted, coupled and aligned on a common channel iron fabricated Base Frame with pre-drilled holes
13	Certification	CE & RoHS Certification with make & model number mentioned on it
		ISO 9001:2000 and ISO 14001 certified.