

RailTel Corporation of India Ltd
(A Navratna PSU under Ministry of Railways)



NOTICE INVITING EXPRESSION OF INTEREST (EOI)

EOI No.: RailTel/2024-25/L-Eoi/BD/Bihar MSSS/01 Dated 29.06.2025

Limited Expression of Interest (EOI) for Selection of Partner for Supply, Installation, Commissioning and Maintenance of Mukhyamantree Surakshit Sushaasit Shahar (MSSS) across six cities (Gaya, Chapra, Munger, Purnia, Darbhanga, Saharsa) in state of Bihar.

Issued by:

RailTel Corporation of India Ltd

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Disclaimer

RailTel Corporation of India Ltd. (herein after called the RailTel) has prepared this Expression of Interest (EOI) document solely to assist prospective bidders in making their decision of whether or not to bid.

While the RailTel has taken due care in the preparation of information contained herein and believes it to be accurate, neither the RailTel or any of its Authorities or Agencies nor any of their respective officers, employees, agents or advisors give any warranty or make any representations, express or implied as to the completeness or accuracy of the information contained in this document or any information which may be provided in association with it. This information is not intended to be exhaustive and interested parties are required to make their own inquiries and do site visits that it may require in order to submit the EOI. The information is provided on the basis that it is non-binding on RailTel, any of its authorities or agencies or any of their respective officers, employees, agents or advisors. The RailTel reserves the right not to proceed with the bidding/EOI process at any stage without assigning any reasons thereof, or to alter the timetable reflected in this document or to change the process or procedure to be applied. It also reserves the right to decline to discuss the EOI further with any party submitting an EOI. No reimbursement of cost of any type will be paid to persons or entities submitting the EOI.

EOI NOTICE & SCHEDULE OF EVENTS

1	EOI Availability	Limited EOI is made available by email to limited bidders.
2	Last date of submission of response to EOI Response	15:00 Hrs on 02-JUL-2025
3	Date & Time of Opening of EOI Response	15:30 Hrs on 02-JUL-2025
4	Mode of Submission of EOI Response	"Single stage" tender with physical submission of sealed envelope containing both Technical Bid and Commercial Bid. The physical submission is to be done at the address as mentioned in this EOI document. All interested partners may note that this is a 'Single Packet Bid Submission'. EOI response submitted through any other mode will not be accepted.
5	TOKEN EMD	Rs 10,00,000/- (Rupees Ten Lacs) to be transferred through RTGS in RailTel's Account detailed as under: Account detailed as under: Bank Name- UNION BANK OF INDIA Bank Account no:340601010050446 IFSC: UBIN0534064 MICR:110026012 Account name: RailTel Corporation of India Ltd. Bank and branch Address: Union Bank of India, Yusuf Sarai Branch, C-1, Green Park Extension, Arvindo Marg, New Delhi- 110016 Note: i) Amount of EMD should be transferred on or before the last date and time of submission (as above) of this EOI Bid and acknowledgement details (UTR etc) should be enclosed with the Bid. ii) It has to be ensured by the Bidder that EMD amount should be transferred and credited into RailTel's account, Due to any reason whatsoever if amount not gets credited into RailTel's account then Bid will not be considered and will be rejected. Therefore, before submission of Bid as per Document firm is required to get it confirmed that said amount is credited into RailTel's account. iii) Above Amount of Rs 10,00,000/- can also be paid through submission

		of EMBG/Insurance Surety Bond amounting to Rs 10,00,000/- having validity equal to the validity of Bid. iv) Remaining EMD of Rs. 9,90,00,000/- (Nine Crore Ninety Lacs) to be submitted within 30 days from the date of communication of selection of bidder in the form of BG/Insurance Surety Bond as detailed in the EOI document.
6	Validity of Bid	180 Days.

Note : RailTel reserves the right to change the above dates at its discretion.

Contact Details for this EOI :

Level 01: Aarushi Sinha / Deputy Manager (BD) / aarushi.sinha@railtelindia.com

Level 02: Alok V. Agnihotri / General Manager (BD) / avagnihotri@railtelindia.com

Ph. No.: +91-011- 22900600 **Fax No.:** +91-011-22900699

Address: RailTel Corporation of India Limited,
Plate-A, 6th Floor, Office Tower-2,
NBCC Building, East Kidwai Nagar,
New Delhi-110023

Note:

1. *The EOI response is invited from empaneled partners of RailTel. Only RailTel empaneled partners are eligible for participation in the EOI process.*
2. *All firms are required to submit hard copy of their EOI submissions at the above-mentioned address, duly signed by Authorized Signatories having Power of Attorney with Company seal and stamp.*

A) About RailTel

RailTel Corporation of India Ltd (RailTel) is one of the largest neutral telecom infrastructure providers in the country owning a Pan-India optic fibre network on exclusive Right of Way (ROW) along Railway track. The OFC network presently reaches to over 4500 towns & cities of the country including several rural areas. With its Pan India high-capacity network, RailTel is working towards creating a knowledge society at various fronts. The portfolio of services provided by RailTel includes Data Centre & DR services, Tele-presence as a service, NLD services, IP-1 services, Internet and Broadband services on a pan-India basis.

Equipped with an CMMiL3, ISO 9001, 20000-1:2011 & 27000 certification, RailTel offers a wide gamut of managed telecom services to Indian Telecom market including Managed lease lines, Tower colocation, MPLS based IP-VPN, Internet, Data Centre services, NGN based voice carriage services to Telecom Operators, Dark fibre leasing to MSOs/LCOs. The major customer segment for RailTel comprises of Enterprises, Banks, Government Institutions/Department, Educational Institutions/Universities, Telecom Service Providers, Internet Service Providers, MSOs, etc. RailTel being a “Navratna” PSU is steaming ahead in the enterprise segment with the launch of various services coupled with capacity augmentation in its Core network.

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B) Instruction to the EoI Participants

1. RailTel participated in the tender for Selection of System Integrator for Supply, Installation, Commissioning and Maintenance of Mukhyamantree Surakshit Sushaasit Shahar (MSSS) across six cities (Gaya, Chapra, Munger, Purnia, Darbhanga, Saharsa) in state of Bihar. This EOI is intended to select a bidder based on the discovered price in customer RFP as well as to execute the work on a competitive rate basis in three cities of Bihar.
2. RailTel is in the process to get the contract for three cities; accordingly, the bidder has to quote for three cities to match or better the L1 bidder's price for this project.
3. The indicative bill of material is provided for all 6 cities, however, RailTel shall receive PO for only 3 cities (likely Purnia, Darbhanga & Saharsa). Bidders have to quote value accordingly for the 3 cities only.
4. Only those bidder(s) who fulfil the below-mentioned criterion are eligible to participate in this EoI:
 - i. The bidder should have current and valid empanelment with RailTel.
 - ii. The bidder is allowed to form a consortium with suitable players for this purpose if they desire so. However, the consortium should not have more than 2 members with both members meeting above criteria at SN-5(i). The lead member of the consortium will be responsible for all back-to-back terms and conditions.
 - iii. The bidder/lead bidder shall be having its Operation in India as a Legal Entity for the last 5 years, Valid supportive document (Certificate of Incorporation) must be submitted in this regard.
 - iv. The average annual turnover of the bidder/lead bidder shall not be less than ₹250.00 Cr in the last three financial years ending on 31.03.2024 from provisioning of IT/ICT/ITeS, System Integration activities. CA certificate in the regard shall be submitted.
 - v. Bidder (both members in case of consortium) shall submit a self declaration by the authorized signatory on letter head of the bidder that "the bidder has not been declaration of ineligibility for corrupt or fraudulent practices or blacklisted/ debarred or bidder should not have its O&M suspended during the contract period after Go-Live by any Government/Public Sector organization in India at the time of submission of the response to this EOI.
 - vi. The bidder/lead bidder shall submit an undertaking to supply, install, commission and maintain the products for which the make & model as detailed in Para-H of this EOI.
 - vii. The bidder/lead bidder shall submit a certificate as per format at para-D of this EOI.
5. The BA participating in this EoI shall furnish an undertaking towards the Earnest Money Deposit as per the format attached.
6. Evaluation methodology: RailTel will evaluate the bidder(s) on L1 rates basis.
7. The EOI partner shall study the customer RFP thoroughly and collect all information incl. documents, certificates, etc. that are required for execution of project by RailTel.

8. It is informed again that the payment conditions & SLA are on back-to-back basis as per the original RFP. The payment shall be released to the Partner within 4-5 days after receiving of the same from end customer.
9. The selected partner has to support RailTel in the preparation of the project documents during the implementation phase.
10. The rates shall be comprehensive and in total for the entire work with break-up details, if any, and Taxes as applicable.
11. The offer against this EoI shall remain valid up to 180 days from the date of receiving PO from the end customer in the event of RailTel winning the bid.
12. It is further stated that before the release of final PO, RailTel may negotiate with the BA for various make/model/brand of the product as well as the offered rates if required by the end customer.
13. If any matter arises between the parties about this agreement, then the parties shall meet to discuss the matter and shall negotiate in good faith to endeavor to resolve the matter.
14. If any matter arising has not been resolved by the parties within thirty (30) days after the date the party raising the matter gave notice of it to the other party: then
 - i. The matter shall be submitted by either party to Arbitration. Arbitration shall be held in New Delhi, India. The arbitration shall be conducted as per the provisions of Indian Arbitration and Conciliation Act 1996 and any statutory modification or re-enactment thereof.
 - ii. Each party to the dispute shall appoint one Arbitrator each and the two Arbitrators shall appoint the third or the presiding Arbitrator. The arbitration proceedings shall be conducted in the English language. The courts of New Delhi, India alone shall have the jurisdiction. The arbitration award shall be final and binding upon the parties and judgement may be entered thereon, upon the application of either party to a court having jurisdiction.
 - iii. Each party shall bear the cost of preparing and presenting its case, and the cost of arbitration, including fees and expenses of the arbitrators, shall be shared equally by the parties unless the award otherwise provides.
15. The successful bidder will have to submit PBG (Bank BG or Insurance Surety Bond) equivalent to 10 % of the Total Project Cost. In case of consortium, the PBG may be submitted either by the lead bidder or by any consortium member or jointly by the consortium. The Performance Bank Guarantee/Surety Bond shall be valid upto 90 days beyond the term of the contract period and shall be renewed and maintained as necessary by the bidder for the contract period, and extensions if any.
16. The successful bidder will not be allowed to withdraw or back out from the response commitments. In case of withdrawal or back out by the successful bidder, EOI-EMD and Earnest Money Deposit shall be forfeited and may be blacklisted. In addition to this, all interests/claims of such Bidder shall be deemed as foreclosed.

C) Bid Format

Commercial Bid (On Organization Letter Head)

To,

General Manager (BD),
RailTel Corporation of India Limited,
Plate-A, 6th Floor, Office Block Tower-2,
East Kidwai Nagar, New Delhi - 110023

Ref : EOI No.: RailTel/2024-25/L-Eol/BD/Bihar MSSS/01 Dated 28.06.2025

S No.	Item Name	Estimated Value with Taxes (in Rs.) [A]	Quoted % above/below of Estimated Value [B]	Resultant Figure after applying Quoted % Value with Taxes (in Rs.) [C = A – (A*B)]
1	TOTAL PROJECT COST	Rs. 19002.47 Lacs	_____ %	Rs. _____

Quoted % Value in words: _____

Resultant Figure in words: _____

Note :

1. Bidder quoting resultant lowest value (L1) will be considered as selected partner, subject to bidder's EOI response is in compliance of other requirement mentioned in the EOI document.
2. The estimated value of the project is considered based on the 45% value of the entire project to be received to RailTel. The final price with the Partner may be negotiated based on the final PO received by RailTel.
3. In case of calculation error, the "quoted % below Estimated Value" will be considered for calculation purpose. The percentage should be mentioned in words also, the value mentioned in words will be the final in case of any misprint.
4. The commercial bid should be neatly typed and any cutting, overwriting or manual entry may lead to rejection of bid.
5. The final BOM wise price shall be taken before the signing of the contract.
6. Each and every page of this commercial bid should be duly signed and stamped.

Sign:_____

(Name and Title of Authorized Signatory)

Date: _____

D) Land Border Certificate

{Certificate should be provided on company's letter head}

To:

General Manager/BD

RailTel Corporation of India Limited

New Delhi

Subject: Self Declaration for Land Border Sharing in response to the EOI.

Dear Sir,

I/we have read and understood the clause regarding restrictions on procurement from the OEM of a country which shares a land border with India and on sub-contracting to contractors from such countries.

I/We certify that this bidder is not from such a country or, if from such a country, has been registered with the competent authority as per the procedure laid down in reference to Government Orders in this regard.

I/We hereby agree to provide copy of and/or produce original of all such documents as may be necessarily required to be submitted for evidence in this regard.

I /We further undertake to not subcontract any work to a contractor from any prohibited countries. I/We hereby certify that this bidder fulfils all requirements in this regard and is eligible to be considered"

Yours sincerely,

Authorized Signatory:

Name and Title of Signatory: e-mail:

Mobile No.

E) EMD (Earnest Money Deposit) Declaration

{Certificate should be provided on company's letter head}

EMD Declaration

Subject: Undertaking as per GFR – 2017, Rule 170(iii)

To:

General Manager/BD

RailTel Corporation of India Limited

New Delhi

Dear Sir,

We, the undersigned, offer to support RailTel in its participation of the tender for "Safe City Project i.e. Mukhyamantree Surakshit Sushaasit Shahar (MSSS) across six cities (Gaya, Chapra, Munger, Purnia, Darbhanga, Saharsa) in state of Bihar" We are hereby submitting our proposal for same. As a part of eligibility requirement stipulated in said tender document, we hereby submit a declaration in lieu of Earnest Money Deposit (EMD), as given below:

- a. Our bid shall remain valid for 180 days from the date of submission and that we will not withdraw or modify our bid during the validity period,
- b. In case, we are declared as successful bidder and an order is placed on us, we will submit the acceptance in writing within 07 days of placement of order on us.
- c. In case, we are declared as successful bidder and an order is placed on us, we undertake, to submit a Performance Security of 10% of the order/contract value, as per terms stipulated in the EOI.
- d. In case of failure on our part to comply with any of the above said requirements, we are aware that we shall be declared as un-eligible for said tender and /or debarred from any future bidding process of RailTel Corporation of India Limited for a period of minimum one year.
- e. The undersigned is authorized to sign this undertaking.

Yours sincerely,

Authorized Signatory:

Name and Title of Signatory: e-mail:

Mobile No.

F) Scope of Work

The selected SI is responsible for the supply, delivery, installation, commissioning, operation, and maintenance of MSSS project among six cities (**Gaya, Chapra, Munger, Purnia, Darbhanga, Saharsa**) in state of Bihar.

The bill of material is provided for all 6 cities, however, RailTel shall receive PO for only 3 cities (likely Purnia, Darbhanga & Saharsa). Bidders have to quote value accordingly for the 3 cities only.

The SI has to ensure the successful completion of these tasks to support end customer, as outlined in the Scope of Services below.

Integrated Command & Control System comprising following features / systems

- 1) Adaptive Traffic Control System (ATCS)
- 2) Video Surveillance Cameras as part of safe city initiative.
- 3) Automatic Number Plate Recognition (ANPR) System
- 4) Red Light Violation Detection (RLVD) System
- 5) Radar based Speed Display System
- 6) Variable Message Display boards (VMD)
- 7) AI based Video Analytics (AIVA)
- 8) Public Address System (PAS)
- 9) Emergency Call Box (ECB) System
- 10) GIS System
- 11) Integration of e-Challan System
- 12) Mobile Vehicle Surveillance System.
- 13) Network Operation Centre with Integrated Command & Control Centre
- 14) Connectivity of all the field devices with Network Operation Centre/Integrated Common and Control Center and Zonal Viewing Center, Vehicle mounted Surveillance system.
- 15) Other necessary infrastructure to make the solution operational.

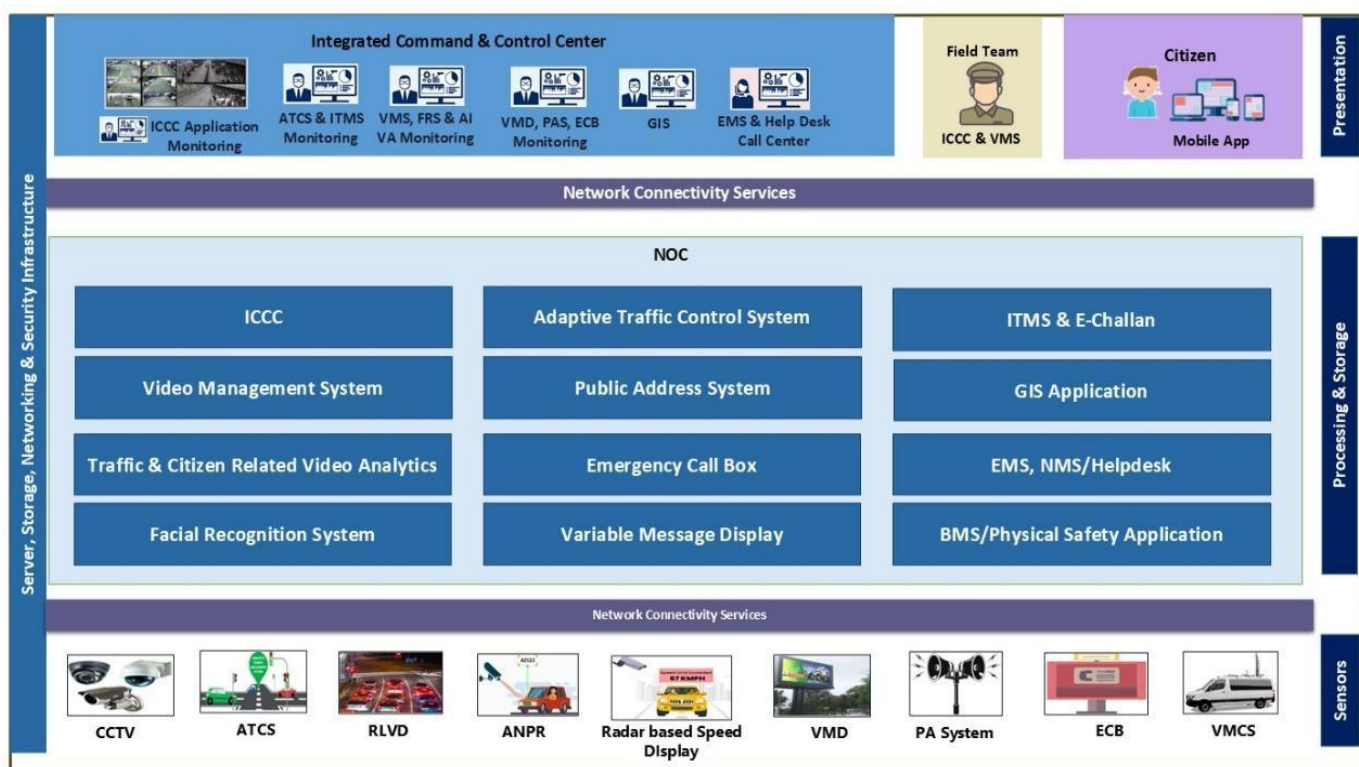


Figure: Scope of Work

BSEDC shall envisage the development of the Integrated Command and Control Centre (ICCC) in each city to enable real-time monitoring of Major City Junctions focusing majorly to deter Crime, to enhance Citizen safety and Traffic management. The project includes assessing the current scenario and designing future- proof architecture, implementing necessary ICT components. The SI shall provide the required devices, software, ensuring system safety and security, with all traffic data monitored through the ICCC. ICCC shall also focus on public awareness, proactive monitoring of critical situations, and managing VIP and emergency movements.

The selected bidder has to ensure that the entire solution is operational with the IT and Non-IT equipment's mentioned in the bid considering 100% scalability of deployment of cameras during the entire period. If any additional equipment is required to make the entire solution operational, It shall have to be provided by the selected bidder at no additional cost to the purchaser after submission of bid.

2.1 Functional Architecture

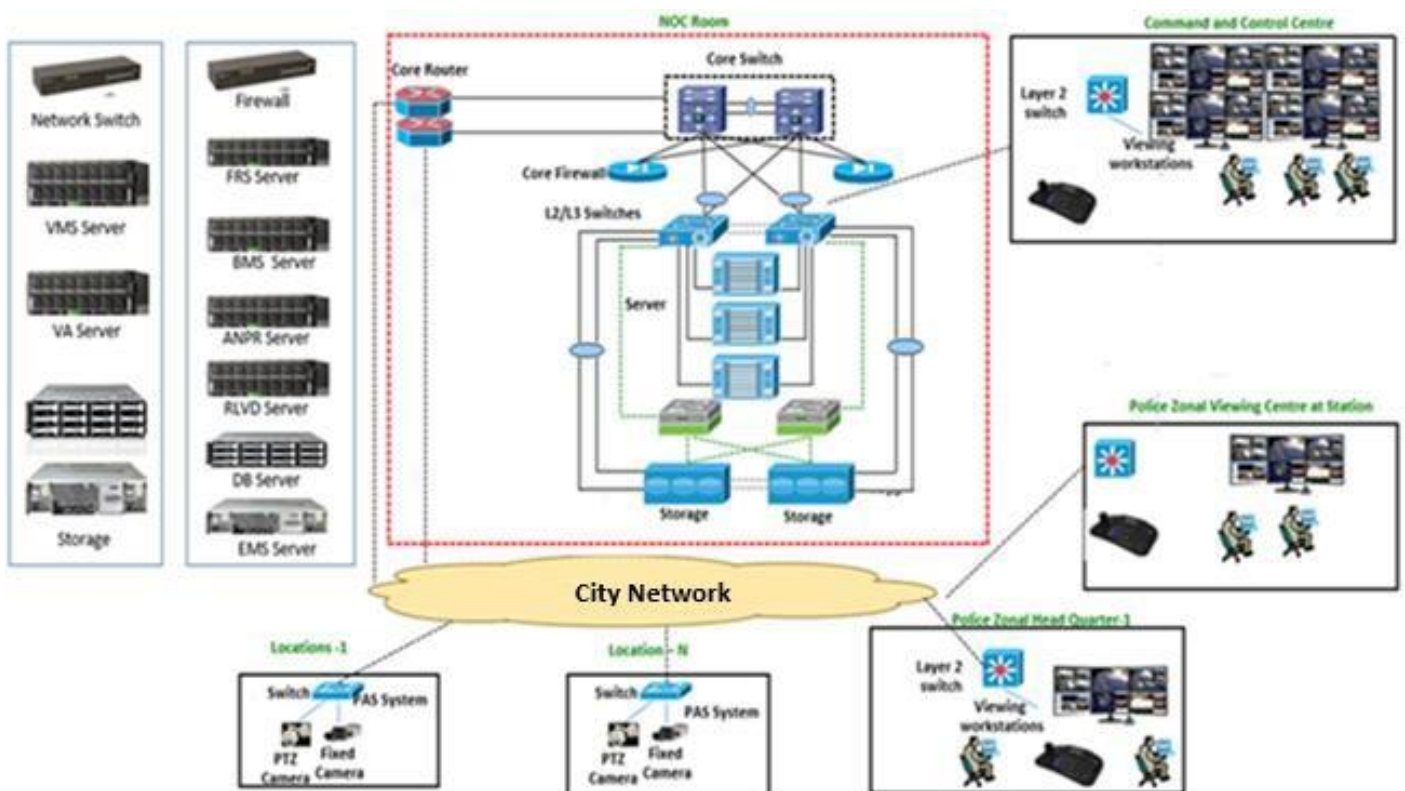
Centralized Software: The scope of this project includes the supply, installation, commissioning, and customization, as needed, of various layers essential for the successful operation of Traffic Signals Integration with CCTV Surveillance operations project.

1. **Sensor Layer** – This sensor layer shall assist BSEDC in capturing data about events and incidents occurring across 6 cities of Bihar and collecting information from edge-level devices such as cameras.
2. **Network Layer** – The network layer shall serve as the project's backbone, enabling the collection of data from cameras and transmitting video feeds to ICCC, ZVC and the Network Operation Center for further analysis.
3. **Security Layer** – The security of the entire system is very crucial. The system integrator shall be responsible for providing infrastructure security, network security and application security.
4. **Network Operation Center Layer** – The Network Operation Center layer shall provide centralized computing resources for storing, processing, and analyzing data to generate actionable insights. This includes servers, storage devices, supporting network equipment, security devices, and associated management tools.
5. **Integration Layer** – Data gathered from various cameras/Sensors deployed across 6 cities and their respective ICCC & NOC, as well as additional data from government and non-government agencies, shall be exchanged through this integration layer. It shall connect with underlying architecture components and systems developed by government agencies (e.g., eChallan databases) and non-government organizations.
6. **Application Layer** – This layer shall consist of applications such as Video Management Software (VMS), Intelligent Traffic Management System (ITMS), ATCS, FRS, PA System, Variable Sign Board, ECB etc. which shall allow secure viewing of camera feeds at monitoring centers. Alerts can be generated and transmitted to the Command & Control centers through the Network Operation Center, along with enterprise management systems to oversee and control all IT infrastructure and field devices deployed.
7. **Command & Control Center Layer** – The Command Center shall provide both citizens and administrators with a comprehensive view of city conditions, enabling informed decision-making.

2.2 Solution Architecture

The solution should be designed considering the high-level architecture and design principles mentioned in this RFP. The following section presents the overall solution architecture and description of the components shown in the design diagrams provided below.

The SI required to propose a solution which best fits the requirements considering the following indicative architecture diagram.



Indicative Solution Architecture

BSEDC has identified critical junctions and high-priority areas within the city for the deployment of system components and general surveillance cameras.

As part of the project, approximately 3000 CCTV cameras shall be installed. The CCTV feed shall be shared in real time with field units, including police patrols with vehicle-mounted camera systems and emergency response systems like PAS, ECB to address citizen safety-related distress situations.

The overall camera placement has been categorized as follows:

1. **CCTV Surveillance at Junction:** This includes major traffic junction, accident-prone areas, crime-prone zones, sensitive areas, and entry/exit points. These locations require comprehensive surveillance coverage with the deployment of Fixed, PTZ, and selective installation of ANPR and RLVD cameras.
2. **General Surveillance (GS):** This shall cover traffic intersections, markets, railway stations, bus stands, etc., and shall involve the installation of Fixed and PTZ cameras.
3. **Face Recognition at Key Public Locations:** Ultra HD cameras shall be deployed to facilitate face recognition around important commercial areas like Mall, Market etc.
4. **Crime Prone/Sensitive Areas:** These locations require the installation of PTZ and Ultra High-Definition cameras for enhanced surveillance.

Indicative List of locations are mentioned in this RFP.

2.3 Integrated Command and Control Centre (ICCC)

The Integrated Command and Control Centre (ICCC) shall act as the central hub for service associates and Authorized personnel to oversee, manage, and address incidents across multiple services, including security operations, alert messaging, utilities, emergency services, and traffic monitoring.

The ICCC aims to offer a comprehensive view of all response actions taken by various Bihar Government departments, assisting in decision-making and ensuring efficient city monitoring. The total prefabricated area for the ICCC and the Network Operation Centre (NOC) spans approximately 4,000 square feet. This space shall accommodate the ICCC, server room, UPS room, and seating arrangements for the operations/ team in each city.

The ICCC shall be equipped with workstations and video walls that shall display live CCTV feeds from across the city, with the option to zoom in on specific cameras when needed. It shall also allow the playback of archived video from both primary and secondary storage. A GIS application shall be integrated into the system, providing accurate location data for sources

feeding into the ICCC.

The centre's setup shall involve completing the building's interior, realigning available space according to requirements, and performing various construction tasks such as masonry, electrical work, carpentry, partitioning, flooring, false ceilings, fireproofing, cabling, and ducting. The facility shall also feature seating for at least 12 operators and other necessary utilities, requiring meticulous planning and coordination. The height of the ICCC shall be 20 feet or above so that videowall (4x4 matrix) as defined in technical specification shall be deployed.

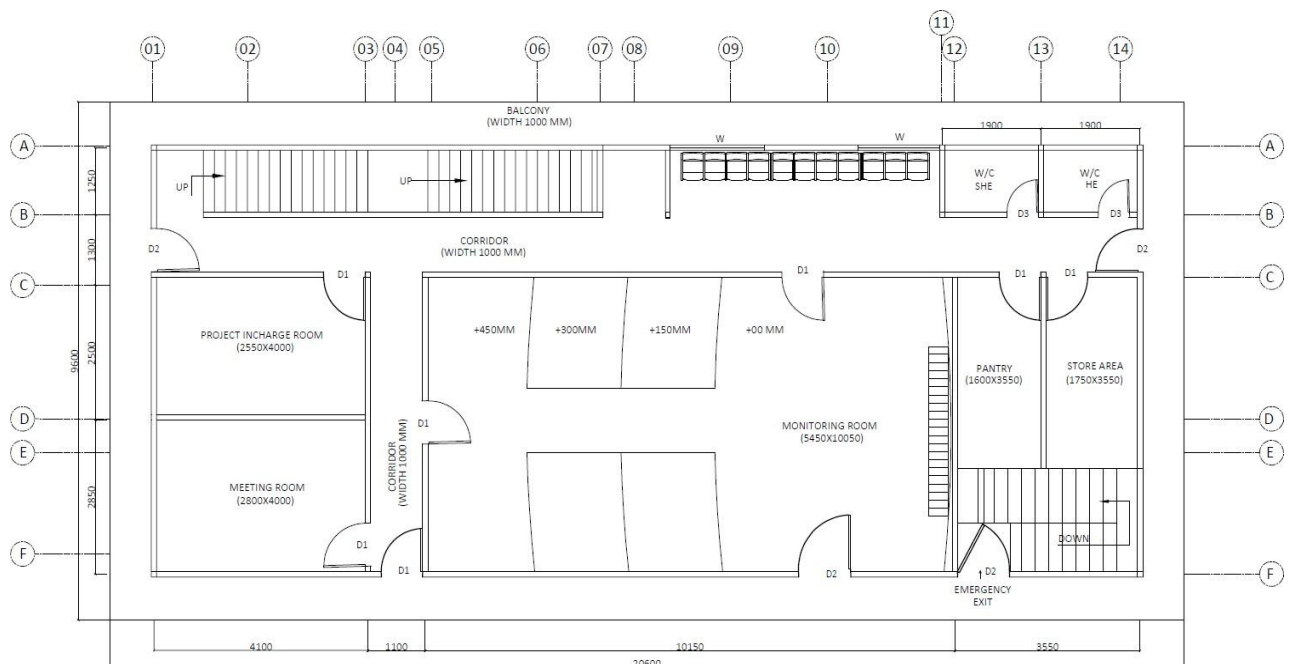


Figure: Indicative Layout of Integrated Command and Control Centre

2.4 Survey and Site Preparation

- The SI is responsible for surveying the ICCC location and preparing layouts for approval, covering civil, electrical, power, and cooling aspects. Once approved, SI shall carry out the necessary civil, electrical, cooling, and interior works. SI shall also handle the upkeep, operations, and maintenance of the ICCC infrastructure throughout the contract period at its own expense.
- SI shall oversee the final design, sizing, procurement, deployment, commissioning, integration, and testing of the solutions at the ICCC.
- The SI is required to assess and design the IT infrastructure needs, including compute, storage,

and video management software licenses for the real-time monitoring, recording, and integration of CCTV (PTZ and Fixed Box) cameras. SI has to define and propose the IT infrastructure necessary for successful operation and integration.

2.5 Delivery

- a) The SI has to notify BSEDC and relevant stakeholders about the delivery of items in writing at least 7 days before delivery. Upon delivery, a copy of the delivery challan shall be sent to BSEDC for verification and record-keeping. A delivery report has to be submitted to BSEDC.

2.6 Installation and Commissioning

The SI is responsible for unpacking, assembling, wiring, installing, cabling, interconnecting, and commissioning the delivered components and ensuring their integration. This includes, but is not limited to, all networking devices.

- a) Supply, installation, testing, and commissioning of line items as per the BoQ and project requirements.
- b) Performing necessary civil, electrical, cooling, and power work per the BoQ and project requirements.
- c) Once installation is completed, an installation report has to be submitted to BSEDC.
- d) Installation completion does not mark the Go-Live date of the project.

2.7 Electrical System

- a) Post site survey, the final calculation of electric load shall be submitted by SI.
- b) Electric Meter shall be applied by Govt of Bihar, SI will be responsible for coordination with concerned Electricity Department for the installation, of EB Meters at field as well as ICCC/ NOC.
- c) The SI shall be responsible for maintaining all electrical systems at the project site.
- d) The SI shall bear the one-time cost, monthly electricity bill and other related cost during the project contract duration.
- e) Periodic preventive maintenance schedules have to be established and followed by SI with prior approval from BSEDC. Also, SI has to give BSEDC a seven-day notice for planned maintenance.
- f) A comprehensive Facilities Maintenance Services (FMS) report shall be submitted periodically, validated by BSEDC.

2.8 Diesel Generator

- a) The SI shall be responsible for all consumables like engine oil, diesel, air and oil filters etc during entire contract period.
- b) A 24/7 DG backup has to be available, with proper fuel stock and backup arrangements.
- c) A detailed logbook for diesel consumption has to be maintained.
- d) Invoices for diesel purchases has to be retained.
- e) Preventive maintenance schedule have to be established and executed, with periodic maintenance reports submitted to BSEDC.
- f) Any defects or malfunctions has to be addressed immediately, including part replacements or service calls to the OEM for diagnostics.
- g) The maintenance plan/ schedule require BSEDC's approval.
- h) A seven-day notice has to be provided to BSEDC for planned maintenance.

2.9 Other Infrastructure or Services

- a) The ICCC and NOC room interiors must be maintained in good condition throughout the contract period. The SI is responsible for basic housekeeping services, including drinking water, waste disposal, and cleaning.
- b) The SI shall provide water dispensers and a regular supply of water within the ICCC and Network Operation Center (NOC).
- c) A comprehensive FMS report on civil and interior works must be submitted periodically, validated by BSEDC. Any necessary repair work shall be directed by BSEDC.
- d) All furniture and interior fixtures such as chairs, tables, walls, floors, glass panels, and lights must be maintained in good working condition. Damages must be rectified or replaced at SI's cost.
- e) SI is responsible for ensuring the physical safety of IT hardware at the NOC, ICCC, and field devices during both implementation and operational phases. In the case of theft, loss, or unintentional damage caused by third parties, SI must file a formal complaint with the local police.

2.10 Network Operational Centre (NOC)

The proposed Network Operation Center will be in a space provided by BSEDC/ Any Other Authorized Agency and will include essential infrastructure such as video recording, storage, remote viewing, management alerts, video analytics, and cybersecurity. The SI shall be responsible for setting up a complete server room, including systems for WLD, rodent

repellent, and cooling, as specified in the BOQ. The SI will also ensure full network connectivity from field locations to the NOC, as outlined in the RFP.

The Network Operation Center at the ICCC shall host all components necessary for the solution, including servers, storage racks, networking & Security equipment (routers, switches, Firewalls), and telecom terminals. Physical access to the IT infrastructure will be restricted and monitored, with only authorized personnel and the SI allowed entry based on their roles. Indoor surveillance cameras and an access control system Shall be installed to monitor and restrict access to this area.

The SI is tasked with designing a prefabricated structure for the Network Operations Center (NOC) on the ground floor, covering an approximate carpet area of 1500 square feet. This design must incorporate a server room, Utility/UPS room, operational room, and storeroom. Each area shall need to be carefully planned to meet the specific requirements of its intended function.

An Indicative Architecture is depicted as below:-

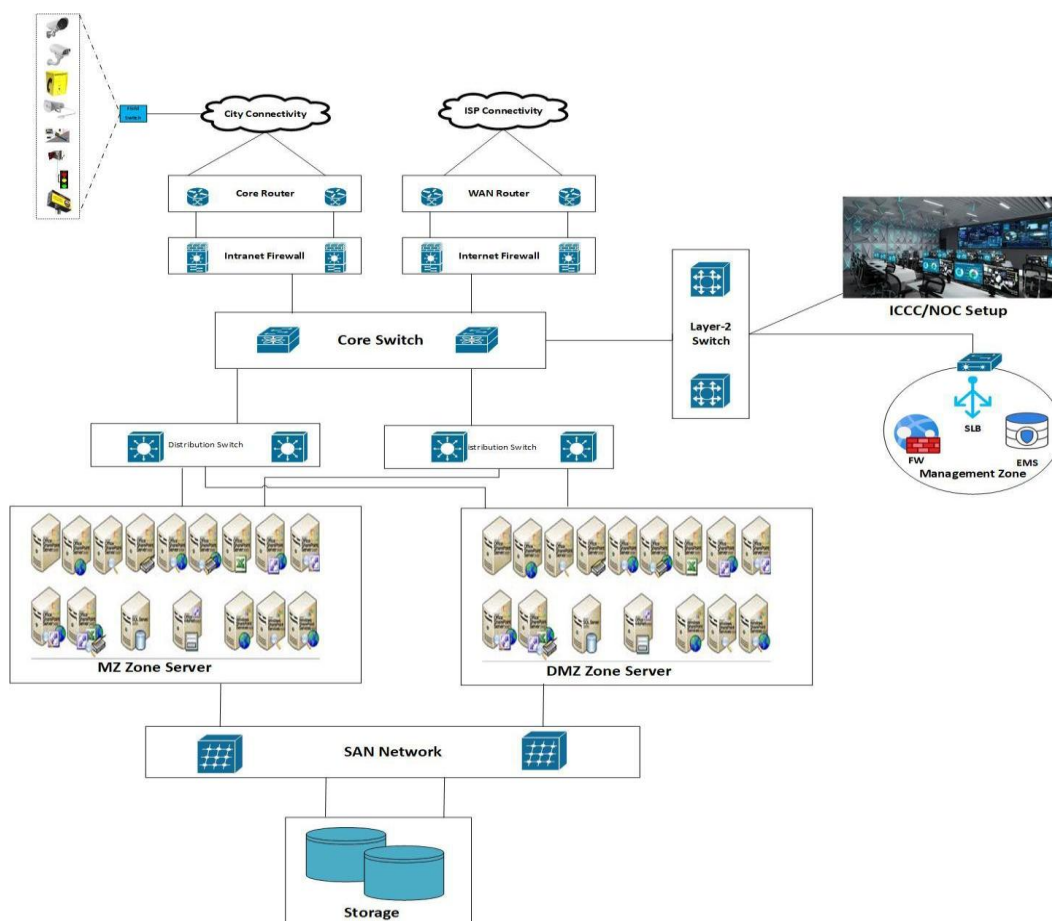


Figure 1: Indicative Architecture of NOC

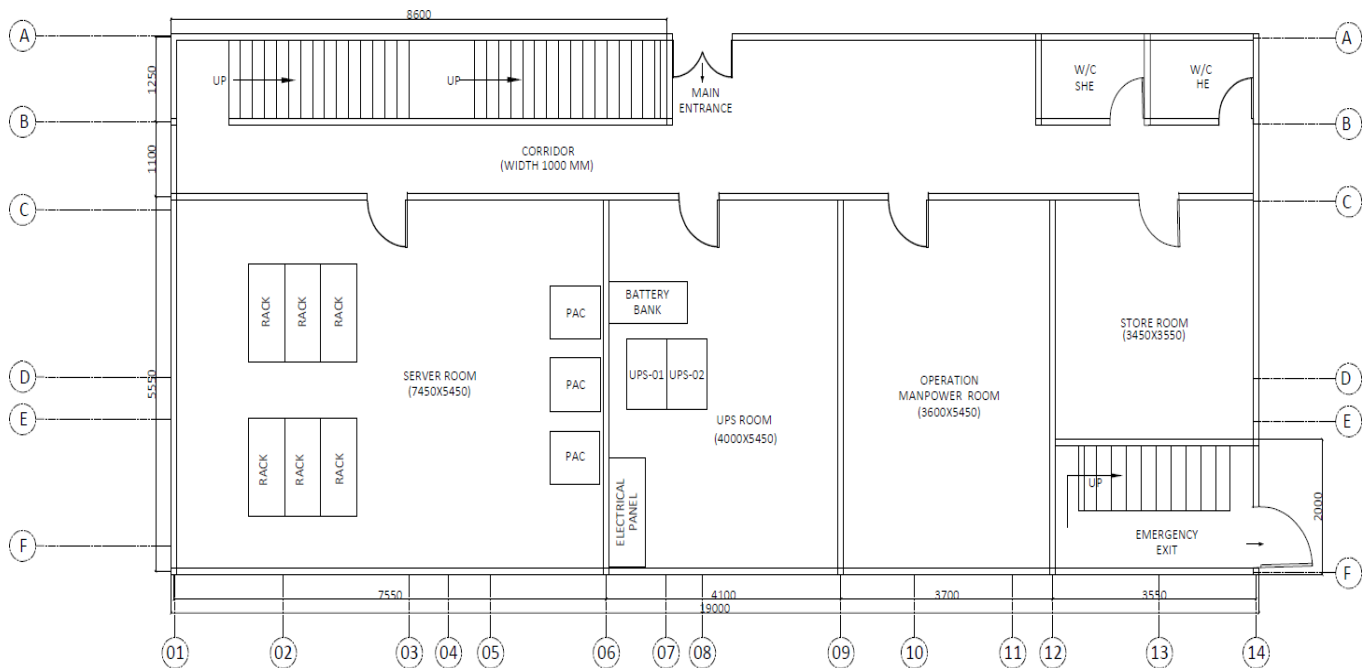


Figure: Indicative Layout of Network Operational Centre-Ground Floor

2.10.1 Setting up NOC:

Service Provider shall establish NOC at each city. Scope for Network Operation Centre would include the setting up of Server, Network and Storage Racks, IT hardware, software applications with required set of licenses as per specifications mentioned in the RFP.

- a) **Server Room:** The server room must be designed to accommodate 42U server racks. Sufficient space has to be provided for the racks, cable management, and equipment installation. The design shall include raised flooring, false ceilings, structured cabling, fireproof gates, partitions, fireproof painting, and other necessary civil works to ensure the server room and UPS room meet all technical and safety requirements.
- b) **UPS Room:** The UPS room has to be designed to accommodate UPS systems along with a battery bank. The layout shall allow sufficient space for the LT panel, alternator, cable management, and equipment installation. Careful planning shall be done to ensure proper airflow and accessibility for maintenance.
- c) **Operation/WAR Room:** This room shall serve as the central operational hub for the NOC

staff, including network engineers and technicians. It shall be furnished with tables and chairs to accommodate around 8-10 people. The layout shall promote efficient workflow and collaboration, ensuring that staff have the necessary space and equipment to perform their duties effectively.

- d) **Storeroom:** The storeroom shall be designated for storing spare equipment, tools, and supplies necessary for the maintenance and servicing of the network infrastructure. The size of the storeroom can be adjusted according to the specific needs of the NOC, ensuring ample space for efficient storage and easy access to essential items.

The selected bidder must provide system integration services to procure and commission the necessary software and infrastructure for the Network Operations Room.

- a) The SI shall be fully responsible for sourcing, installing, commissioning, testing, and certifying the required software licenses and infrastructure needed to deploy the solution at the Network Operations Room in each city.
- b) The SI must ensure that support and maintenance, performance, and uptime levels comply with the SLAs outlined in the relevant sections of this RFP.
- c) To meet redundancy requirements, SI must ensure that the procured infrastructure includes built-in redundancy.
- d) The SI is responsible for sizing the hardware to meet the scalability and performance requirements of the solution.
- e) SI shall provide a dedicated network terminal with redundancy.
- f) Video feeds must be stored for a period of 30 days in full HD at 25 FPS (frames per second).
- g) Flagged Data refers to data identified by the department as critical for incident investigation, potential court evidence, or data needed for further assessment and analysis at a later stage. A 90-day storage period for all cameras must be implemented, with 3% of the total storage capacity dedicated to Flagged Data. The system shall be designed to handle scalability and manageability, accommodating an increase in cameras and sensors in the future. The NOC shall be planned in accordance with industry standards.
- h) SI shall ensure that the servers and storage are adequately sized, with redundancy built into the architecture to meet the SLAs specified in the RFP.
- i) SI is responsible for determining the appropriate hardware sizing and specifications to meet the project's requirements.

- j) SI shall oversee the overall monitoring and management of the solutions implemented for the project.
- k) SI is responsible for continuous 24x7 monitoring and management of the availability and IT security of infrastructure and assets, including data, servers, and systems, using the Enterprise Management Solution implemented for the project.
- l) SI shall implement a comprehensive security policy to ensure compliance with the project's requirements and applicable standards.
- m) SI is responsible for performing regular backups, managing patches, testing, and installing software upgrades issued by OEMs/vendors. These upgrades and patches must be tested before being applied to the live infrastructure. Any downtime caused by these upgrades or patches shall be borne by the SI and not considered "Agreed Service Downtime."
- n) SI shall create Standard Operating Procedures (SOPs) for managing the project infrastructure. These SOPs shall cover infrastructure installation, monitoring, management, data backup/restoration, security policies, business continuity, and operational procedures. The SI shall obtain approval from BSEDC for the SOPs and make any necessary updates every six months to meet BSEDC's satisfaction.
- o) SI shall carry out preventive maintenance, repair work, and part replacements as needed to ensure hardware and equipment perform in accordance with the SLA.
- p) SI shall provide reactive maintenance to troubleshoot and resolve system issues with sufficient technical support teams.
- q) SI shall monitor and record server and database performance daily and take necessary corrective actions to ensure performance optimization.
- r) SI shall manage escalation processes and work with other vendors or OEMs to resolve issues as necessary.
- s) SI shall be responsible for system administration tasks, such as managing the system, creating and managing user accounts, and performing backups.
- t) SI shall regularly monitor security advisories (such as industry bulletins) to identify potential vulnerabilities that could impact the system and take necessary preventive measures.

System Integrator ensures that there is helpdesk facility includes the following:

- a) A call logging mechanism via phone
- b) A call logging mechanism via email
- c) A call logging mechanism via portal.

All complaints and grievances received through any mode must be recorded, and the

records shall be maintained for at least one month (or more) from the date of resolution. Additionally, the System Integrator shall ensure that the helpdesk solution is staffed with a minimum of three members, working 24/7 in shifts. (1 member per shift).

2.10.2 Zonal Viewing Centre (ZVC)

1. Zonal Viewing Centres shall be set up at the SSP/SP/Police Stations in each city to view camera feeds from their respective zones.
2. Live or recorded video feeds shall be accessible by any Zonal Viewing Centre in real-time, whenever the concerned authorities wish to view the footage.
3. Zonal Viewing Centres, including all IT/Non-IT components, shall be deployed at every SSP/SP/Police Station in accordance with the solution requirements and scope of work.

The list of Zonal Viewing Centres for each city is provided in the Annexure of this RFP.

2.10.3 Intelligent Traffic Management System

The proposed solution is specifically tailored to meet the requirements of the Indian traffic landscape, addressing the functional needs of the police department. The system shall capture Automatic Number Plate Recognition (ANPR) data for all vehicles and generate E-Challans for various infractions, including Red-Light Violations, Stop Line Violations, Vehicle Tracking, No Helmet & Triple Ride Detection, Wrong- Way Detection, Detection of Stopped or Broken-Down Vehicles, Hot-listed/Stolen Vehicle Detection and Tracking etc.

The system aims to replace outdated manual processes, offering a more efficient method to track, regulate, and analyse vehicle movement on the roads. By doing so, it enforces traffic rules to protect citizens and their properties. Additionally, it shall function as a decision-support tool for traffic planners and law enforcement agencies, aiding in the development of safer road policies.

Components of the proposed Intelligent Traffic Management System (ITMS):

1. Automated Number plate recognition (ANPR)
2. Red Light Violation Detection (RLVD)

Automated Number plate recognition (ANPR)

The broad scope of work to be covered under this submodule includes, but is not limited to, the following:

1. The SI shall install ANPR (Automatic Number Plate Recognition) cameras at designated junctions/locations across the six (6) cities as specified in the RFP.
2. The system shall automatically capture the license plate number of vehicles at these junctions and store them in the database. This ensures that vehicle details, along with associated video footage, are available for future reference. In cases where multiple vehicles are within the camera's field of view (FOV), the system shall independently process and recognize the license plates of all vehicles, regardless of type (e.g., private car, taxi, bus, truck, auto rickshaw, motorcycle, etc.).
3. The SI shall ensure that the proposed system supports vehicle and license plate detection. It shall be agnostic to the background and foreground colors of license plates and capable of automatically generating alerts when any vehicle captured within the camera's field of view (FOV) is identified as 'suspicious,' 'wanted,' or categorized under any other user-defined classification.
4. The system shall allow for vehicle searches based on timestamp, number plate, color, or vehicle category, with the appropriate functionality provided for these searches.
5. The SI shall design, supply, and install the ANPR camera system as outlined in the RFP. This includes all necessary camera accessories such as IR Illuminators, camera housing, and mounting, all of which shall be installed by the SI.
6. The SI shall supply all necessary equipment for the camera and local processing system, including but not limited to computers, local storage, ancillary camera equipment, camera poles, and warning signs. The SI shall also be responsible for making the final connections to the cameras.
7. The SI shall provide all required IT infrastructure to support detection, analysis, storage, and retrieval of license plate data at the ICCC or any other specified location, as outlined in the RFP.
8. The SI shall be responsible for maintaining the system throughout the entire contract period.

Red Light Violation Detection (RLVD)

The SI shall adhere to the following basic principles for the Red-Light Violation Detection (RLVD) system:

1. A video-based Red Light Violation Detection (RLVD) system shall be provided, which includes an overview camera with ANPR functionality, LPU (Local Processing Unit), Connectivity, and Centralized Control Management capabilities.
2. The overview camera shall capture the entire violation scenario, while the ANPR functionality shall photograph the license plate of the violating vehicle. The Optical Character Recognition (OCR) technology shall then convert the license plate image into readable text.
3. The system shall receive input from traffic lights and begin capturing license plates of vehicles violating the red light once the traffic signal turns red. It shall not require lane-disciplined traffic for detecting violations.

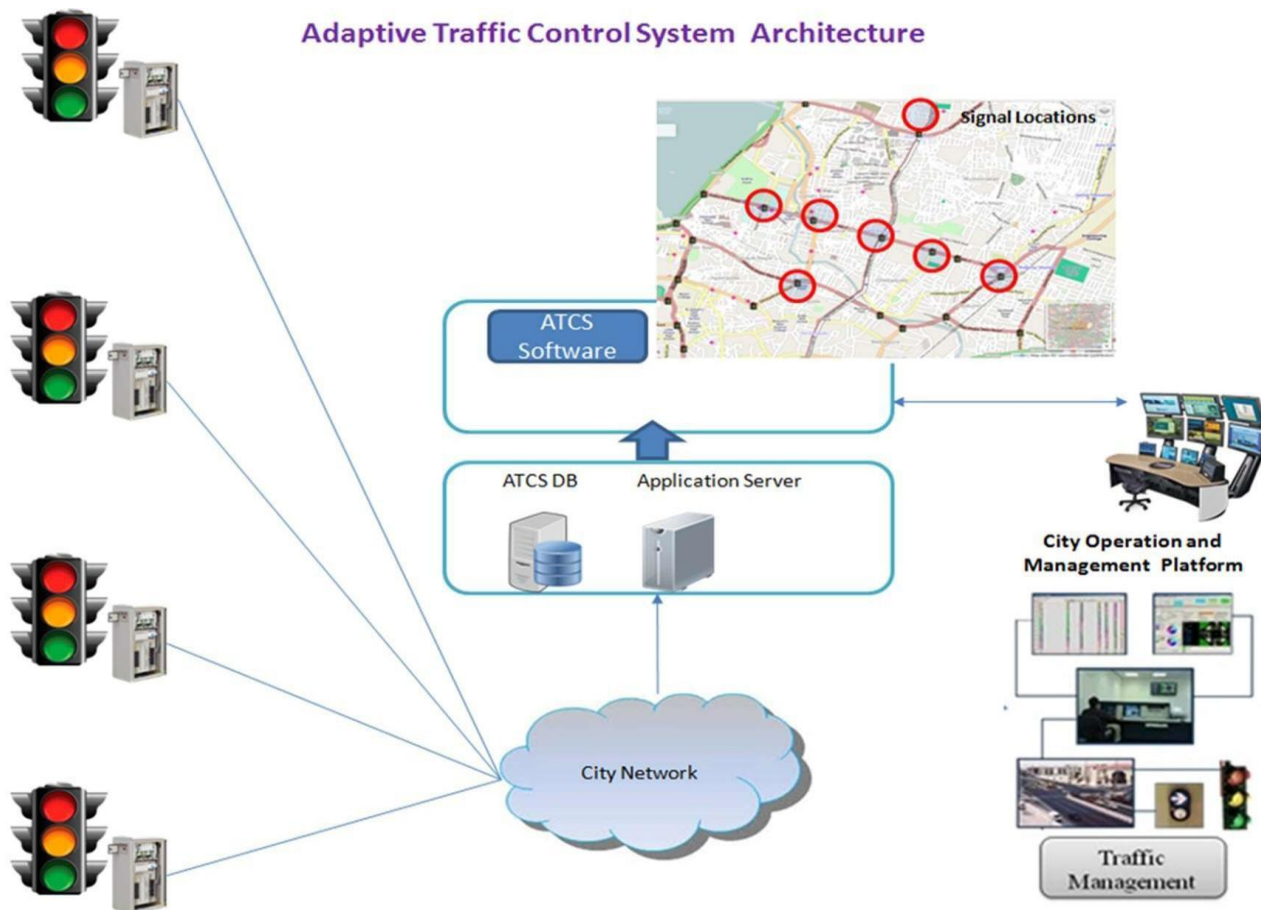
The broad scope of work to be covered under this submodule includes, but is not limited to, the following:

1. The SI shall install the RLVD (Red Light Violation Detection) systems at traffic junctions across the six (6) cities. These systems shall capture infractions such as red light and stop line violations at these junctions.
2. The SI shall design, supply, and install the RLVD system as outlined in the RFPs. This includes all wiring connections to the traffic signal controllers and camera platforms, which shall be installed by the SI. The SI shall provide all necessary equipment for the camera and detection system, including but not limited to: LPU (Local Processing Unit), camera equipment, camera housings, camera poles, warning signs, and shall make the final connections to the cameras.
3. The proposed solution by the SI shall seamlessly integrate with the E-Challan system, which is part of this project's scope. BSEDC shall facilitate access to the E-Challan application and its database. The bidder shall access the system through appropriate APIs.
4. The SI shall be responsible for providing all necessary IT infrastructure for the analysis, storage, and retrieval of infraction data at the NOC, ICC, or any other location specified in the RFP.
5. The SI shall maintain the system throughout the entire contract period. Additionally, the SI shall be responsible for any damage, repair, or theft of systems installed at the end locations.

Adaptive Traffic Control System (ATCS)

The system shall be capable of managing traffic signals in near real-time, based on inputs from traffic detectors. The main objectives for implementation of Advanced Traffic Control System (ATCS) are as follows:

1. The system shall allow for centralized management of traffic signals by receiving real-time traffic inputs from sensors installed at key locations.
2. The system shall automatically adjust traffic signal timings to optimize traffic flow based on real-time data.
3. By adjusting signal timings dynamically, the system aims to reduce traffic congestion and minimize waiting times at intersections.
4. The system shall contribute to more predictable and reliable travel times by optimizing traffic flow.
5. The system shall prioritize the movement of emergency response vehicles, such as ambulances and police cars, to ensure quick access through traffic.
6. The system shall also facilitate better management of VIP movements.
7. The system shall analyse traffic data to assess travel demand, which shall help in managing traffic effectively and planning for future infrastructure needs.
8. The system shall send traffic updates and alerts to commuters, helping them plan their routes better.
9. By providing better traffic signal management and reducing congestion, the system aims to improve overall compliance with traffic rules.
10. The system shall gather and generate data regarding traffic volume and vehicle classifications for each traffic approach, helping in further analysis and planning.
11. These objectives shall work together to enhance the efficiency and safety of the traffic system, ultimately improving the overall travel experience for commuters.



Implementation of ATCS Module:

1. The SI shall develop the solution architecture as per the project requirements to achieve above mentioned objectives.
2. SI shall install necessary ATCS infrastructure such as vehicle detectors, traffic controllers, traffic light aspects, poles, cantilevers, junction boxes, and related accessories at the traffic junctions across six cities in state of Bihar.
3. The SI shall ensure the seamless integration of the field infrastructure with the proposed ATCS software application for real-time management and monitoring of traffic signals and related systems.
4. The SI shall design an energy-efficient signaling system using advanced technologies to reduce power consumption while maintaining optimal performance.
5. The SI must adhere to the functional and technical specifications in the RFP, ensuring the solution's scalability, security, and reliability while meeting the SLAs and aligning with industry

best practices.

6. The SI is encouraged to propose an innovative and optimized solution that meets project requirements, ensuring superior functionality and cost-effectiveness while focusing on future scalability.
7. The SI shall refer to the detailed functional and technical specifications provided in the RFP to align the solution with the project's requirements.
8. The SI shall be responsible for the maintenance of the ATCS during the contract period and shall be liable for any damage, repair, or theft of the systems installed at the locations.

2.10 AI based Video Analytics platform

AI-powered predictive analysis frameworks are essential in modern crime prevention strategies. By leveraging machine learning, deep learning, and advanced data analysis techniques, law enforcement agencies can better predict, prevent, and respond to criminal activities, ultimately enhancing public safety and creating a more efficient criminal justice system. However, careful attention to data quality, ethical considerations, and bias management is critical for successful implementation.

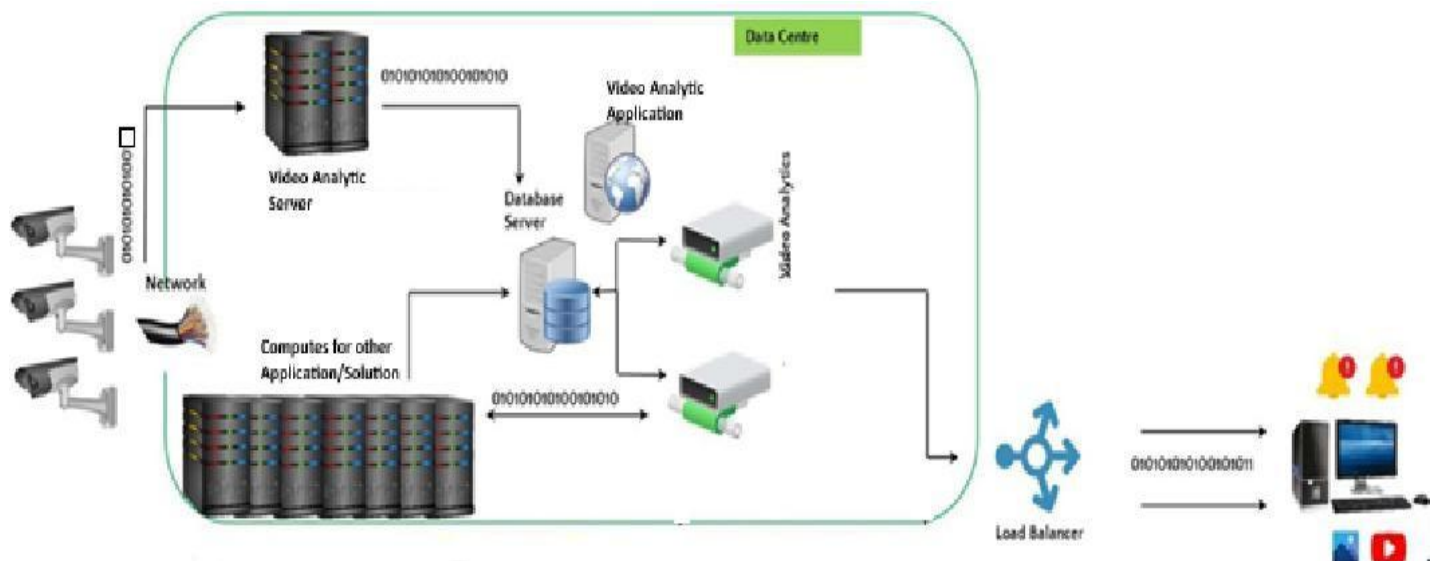


Figure 2: An Indicative Video Analytics Platform

AI-enabled Video Analytics can revolutionize surveillance and security systems across a wide range of environments by providing real-time insights and allowing for quick decision-making in response to potential threats or anomalies.

The analytics system shall support resolving, among others, the following use cases

Object Detection and Tracking:

- a) **Real-Time Object Identification:** VA systems can detect and classify objects (e.g., vehicles, bags, or specific items) in real-time. This allows operators to monitor any objects left behind or potentially misplaced, making it easier to spot suspicious items in public spaces like airports, malls, or government buildings.
- b) **Automatic Tracking:** Once an object is detected, the AI system can track its movement across the video feed, providing continuous monitoring. This is particularly useful for security staff who need to keep an eye on specific objects or individuals in crowded places.
- c) **Encroachment detection:** VA can help prevent any illegal encroachment in marketplaces, roads and other commercial areas.
- d) **Garbage bin Monitoring:** VA systems can detect the status of Garbage Bin to improve waste management efficiency

People Detection and Behavior Analysis:

- a) **People Counting:** VA system count the number of people entering or exiting an area, providing real-time crowd size analysis. This feature can be used in locations such as malls or public events to monitor crowd density, ensuring safety and enabling timely evacuation if needed.
- b) **Anomaly Detection in Behavior:** VA system can analyze human behavior in a scene and identify suspicious or abnormal activities (e.g., someone entering restricted areas, or loitering). Such behaviors can trigger an alert to security personnel for further investigation.
- c) **Face Recognition:** In sensitive areas (e.g., government infrastructure or airports), AI-enabled facial recognition can identify individuals based on a database of known people or suspects, enhancing security by detecting unauthorized access.

Crowd Management and Monitoring:

- a) **Crowd Density Detection:** VA can detect crowd density in real-time and provide alerts when the crowd reaches unsafe levels. This is particularly useful for venues like stadiums, malls, and public events, where crowd control is crucial for safety.

Intrusion Detection and Violation Monitoring:

- a) **Unauthorized Access:** VA can monitor and alert security teams in real-time if someone enters restricted zones, such as off-limits areas or security perimeters around critical infrastructure. This can prevent unauthorized access, theft and Camera Tempering.
- b) **Perimeter Security:** video analytics can help monitor the perimeter of secured locations by identifying motion or activity in a designated boundary. Any activity beyond a set threshold triggers an automatic alert for further inspection.

Traffic Management and Vehicle Monitoring:

- a) **Vehicle Counting and Classification:** VA can analyze traffic flow and classify vehicles (e.g., cars, trucks, motorcycles). It helps track Vehicle Tracking, Traffic volume estimation, Vehicular Analytics
- b) **Traffic Violation Detection:** VA system can detect violations like illegal parking, No helmet, Triple Riding, wrong Side Driving, Hot-listed Vehicle/Stolen Vehicle, Unauthorized parking, No Seat Belt, Detection of mobile while driving.
- c) **License Plate Recognition (LPR):** The system can automatically read and store vehicle license plates, allowing for real-time monitoring of vehicles entering or leaving secured areas. This technology is vital for applications like toll booths, secure parking lots, or public transportation systems.

2.11 Video Management System and Facial Recognition System

The video management system (VMS) shall be a platform designed for viewing, recording, and replaying video as part of the overall project solution. It shall provide centralized management for all field cameras, video servers, and client users.

- 1) The VMS shall support ONVIF-compliant IP cameras. The system design shall offer flexible video signal compression, display, storage, and retrieval.
- 2) The VMS shall support data retrieval from edge storage. When a lost or broken connection is restored, the system shall allow the retrieval of video from an SD card and transfer it to central storage. It shall also support viewing recordings stored on local camera storage devices (e.g., SD cards) and transferring them to the server.
- 3) The VMS shall be designed to maintain N+1 redundancy, with camera recordings available for up to 30 days at 25 FPS.

- 4) The Face Recognition System (FRS) shall be designed to identify or verify a person using photo inputs from digital images or video sources. It shall offer logical algorithms and an intuitive graphical user interface for easy facial matching.
- 5) The system shall be capable of matching a suspect's or criminal's photograph with a database created from images provided by state police or other state/central government entities. The FRS shall be deployed at crime-sensitive locations as defined in RFP.

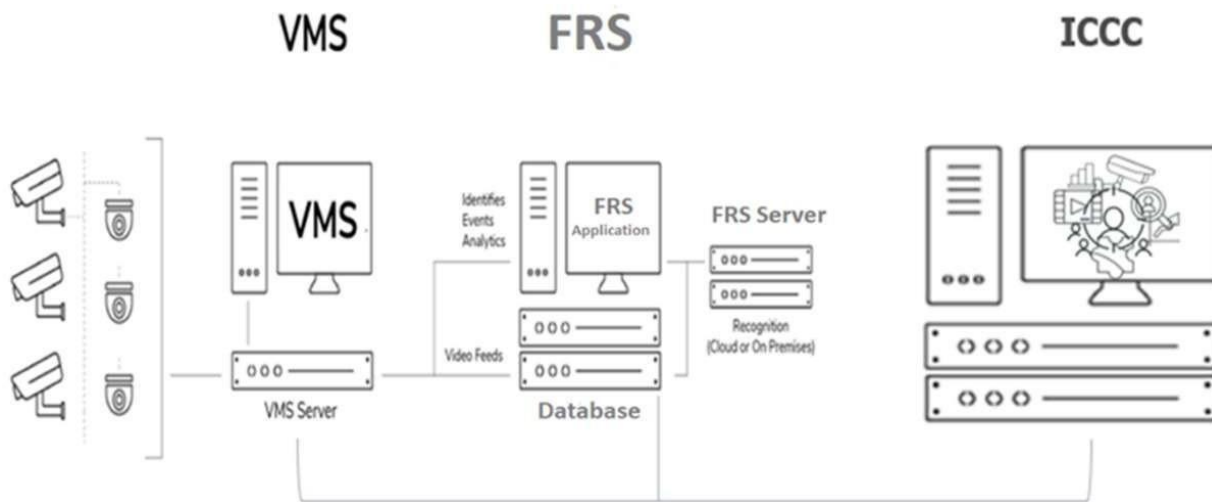


Figure 3: Architecture of VMS & Facial Recognition System

1. The Facial Recognition system shall be able to:

- 1) Capture facial images from IP camera feeds and generate alerts if a match is found in the blacklist.
- 2) Search the database for photographs that match the features of a suspect.
- 3) Match suspected criminals' faces from pre-recorded video feeds collected from IP cameras in various critical locations, or from video feeds provided by private or other public organizations.
- 4) Add photographs obtained from newspapers, raids, public submissions, sketches, etc., to the criminal repository, tagged with attributes such as sex, age, scars, tattoos, etc., for future searches.
- 5) Investigate and verify the identity of individuals upon receiving requests from police stations.

2.11.1 Public Addressing System with Emergency Call Box

The Public Address (PA) system serves as a communication link between citizens and the Central Command Centre. To ensure smooth operations, it is crucial to manage incidents efficiently. Direct communication with citizens, both in the field and in the control room, makes the system more accessible and effective.

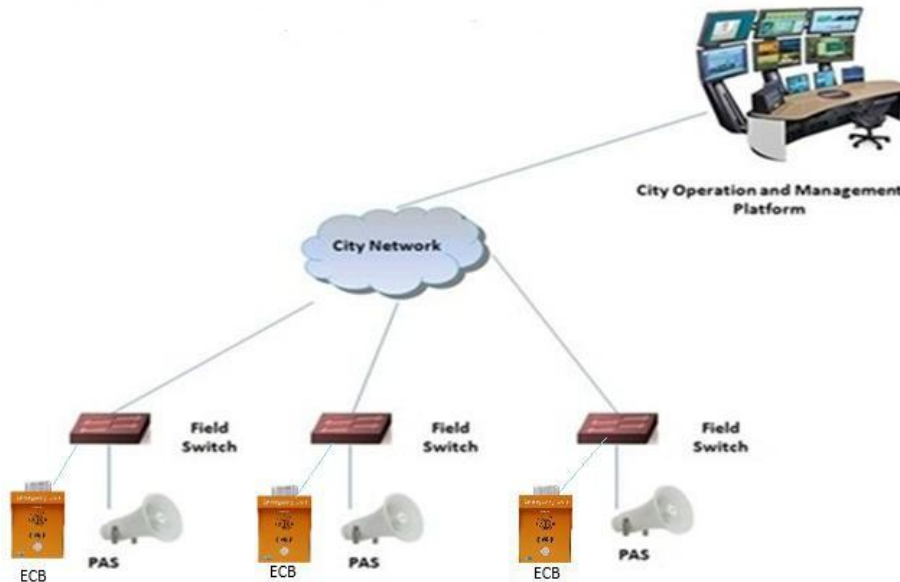


Figure 4: An Indicative PAS & ECB Architecture

The SI shall install the Public Address (PA) System at intersections, public areas, marketplaces, and other critical locations as specified in this RFP to make important public announcements.

- a) The SI shall also install Emergency Call Boxes/Panic Buttons at designated locations throughout each city to ensure accessibility for citizens.
- b) The SI shall comply with all functional and technical requirements for the Public Address System, as outlined in the technical specifications of the RFP.
- c) The PA system software installed by SI at the ICCC shall enable broadcasting messages across all PA systems or allow specific announcements to be made to particular locations, supporting both single-zone and multi-zone operations. The system shall also support the delivery of pre-recorded messages to loudspeakers via the IP network and locally connected media for public announcements.
- d) SI shall ensure the system includes an IP based Speakers with Inbuilt Amplifier, as well as control software

for managing and monitoring all system components.

- e) SI shall provide a detailed description of the design, operational, and physical requirements for the proposed PA system to demonstrate compliance with all RFP specifications.
- f) The PA systems shall be deployed at identified junctions to make public interest announcements. The system shall be IP-based, with management and control capabilities from the ICCC room.
- g) SI shall maintain all Public Address Systems and Panic Buttons during the Operations and Maintenance (O&M) period.
- h) SI shall be responsible for any damage, repair, or theft of the systems installed at the specified locations.

2.11.2 *Variable Message Display*

The Variable Messaging Display (VMD)/Outdoor Display System shall be used to communicate important information and guidance, such as traffic updates, diversions, and other essential messages, to citizens and the public on the road. These systems shall also be utilized to display emergency or disaster-related messages when required.

- a) The SI shall install Variable Message Displays at intersections, public areas, marketplaces, and other critical locations to deliver important information to the public. It is important to note that VMD systems shall be installed at 10 locations in each city.
- b) The SI shall comply with all functional and technical requirements for the VMD system as outlined in the technical specifications of the RFP.
- c) SI shall be responsible for the Supply, Installation, Testing, and Commissioning (SITC) of the Variable Message Display, including the IT/Non-IT infrastructure such as poles, gantries, civil foundations, etc.
- d) SI shall maintain all Variable Message Display systems throughout the entire contract period.

2.11.3 *Radar Based Speed Detection System*

A radar-based speed warning system uses radar sensors to detect the speed of vehicles and provide warnings to drivers if they exceed a predefined speed limit. It aims to promote safer driving by alerting drivers when they are traveling above the allowed speed threshold.

- a) The system shall be installed as standalone system in accident-prone areas, highways, and other locations with speeding concerns, helping to reduce accidents. There shall be 15 radar-based speed detection systems installed in each city.
- b) The system shall display the speed of vehicles passing near the installed sensor at each junction.
- c) The SI shall comply with all functional and technical requirements of the system, as outlined in the technical specifications of the RFP.
- d) SI shall be responsible for the Supply, Installation, Testing, and Commissioning (SITC) of the radar-based speed detection system, including IT/Non-IT infrastructure such as poles, gantries, civil foundations, etc.

2.12 Network Connectivity Service

Network connectivity is a critical component of this project and requires thorough assessment, planning, and implementation. It is essential to ensure that the required connectivity is provisioned within the specified timelines, while also ensuring its reliability, security, and compliance with the required SLA parameters.

a) In order to meet the project requirements and SLA requirements as defined in the RFP, it has been decided that the SI shall provision network connectivity either through their own network infrastructure or by engaging a licensed Internet Service Provider (ISP).

b) The SI shall provide network connectivity as service for entire network, connecting

1. Field locations to the NOC/ICCC,

2. NOC to ZVCs and

3. Vehicle Mounted Camera System

c) The System Integrator (SI) shall provide a dedicated internet leased line (ILL) at the Integrated Command and Control Centre (ICCC) in all six cities across the State of Bihar to facilitate patch upgrades, firmware updates, and other necessary maintenance activities.

d) The SI shall conduct a detailed study to assess the connectivity of all field devices/cameras, considering feasibility, design optimization, and reliability.

e) The System Integrator (SI) shall submit comprehensive network architecture for the overall system, incorporating the findings from the site survey. The proposed network design must ensure redundancy to support high availability (ring topology or other) and fault tolerance.

f) The SI shall be responsible for obtaining all necessary permissions like ROW, etc from the concern authorities.

g) The SI shall prepare an overall network connectivity plan for the project, which shall include the deployment of network equipment at the junctions/locations to be connected via the network.

2.13 Vehicle Mounted Camera System

- a) Vehicle Mounted Camera System (VMCS): A total of 10 Vehicle Mounted Cameras, along with MNVR (Mobile Network Video Recorder), Network connectivity, shall be implemented per city, addressing the various challenges encountered in law-and-order management.
- b) The VMCS setup shall be installed on government vehicles, as approved by the Authority, and shall support live monitoring during events such as riots, demonstrations, VIP movements, crime investigations, daily patrolling, demolition activities by the Municipal Corporation, public gatherings, and more. The feeds from the vehicle-mounted cameras shall be uploaded and stored in the Network Operation Centre as required.
- c) SI shall be responsible for providing Network connectivity and ensuring its operation throughout the project duration for each setup. SI must also offer a comprehensive solution for transferring video recordings from the mobile van-mounted cameras to storage for further processing.
- d) The SI's scope includes modifying the vehicles (if necessary), implementing the Vehicle Mounted Camera Systems, and providing Annual Maintenance Contracts (AMC) for the system. The vehicles shall be selected jointly by the Authority and the successful bidder based on the requirements submitted by the bidder.
- e) SI shall note that the provision of vehicles, their fuel, and routine maintenance are not part of the bidder's scope.

2.14 Enterprises Management System

To ensure that ICT systems are delivered at the desired performance levels, an effective monitoring and management system must be implemented. Therefore, it is proposed that a proven **Enterprise Management System (EMS)** be adopted by the SI for efficient system management, reporting, SLA monitoring, and issue resolution.

The key components of the EMS to be implemented in this engagement are:

1. Fault & Performance Monitoring
2. Network Configuration & Change Management
3. Traffic Analysis
4. Assets Management
5. Log Management
6. Reporting & Dashboarding with Integration
7. Helpdesk Tool

8. IP Address Management

The proposed EMS solution shall be based on industry-standard best practice frameworks, such as **ITIL**, to ensure optimal performance and scalability. Furthermore, all ICT and non-ICT components shall be compliant and integrated with the EMS.

Key functionalities and expectations for the EMS solution are as follows:

- 1) **Fault & Performance Management:** The solution shall monitor server-side infrastructure and IP/SNMP-enabled devices such as routers, switches, sensors, etc. It shall also monitor key KPI metrics like availability to measure SLAs.
- 2) **SLA & Contract Management:** The solution shall enable the city to capture all system-based SLAs defined in the tender and automatically calculate penalties on a quarterly or defined duration basis. The solution shall integrate data from various sources to measure uptime, performance, and security SLAs.
- 3) **Traffic Monitoring:** The solution shall be able to monitor network traffic by capturing flow data from network devices. It must store all flows without rollups or loss during the retention period, ensuring compliance with security and audit requirements.
- 4) **IP Address Management (IPAM):** The solution shall include comprehensive IP discovery, management, historical tracking, and support IP grouping, subgrouping, as well as role-based and privileged access management.
- 5) **Asset Management:** The Service Provider must offer an Asset Management module that allows for the tagging and management of both IT and non-IT infrastructure. This module shall help monitor and manage every asset in the ecosystem using a systematic approach, improving visibility and control. By implementing this EMS solution, the system's performance, security, and service levels shall be effectively managed, ensuring the project's success and compliance with SLA requirements.

2.15 GIS System

The System Integrator (SI) shall be responsible for implementing a Geographic Information System (GIS) to manage, analyze, and visualize spatial data, enhancing decision-making and supporting crisis management and real-time monitoring of law enforcement activities. This GIS shall play a crucial role in ensuring swift incident response and proactive security management.

The SI shall be responsible for the following key tasks:

- 1) SI shall design and deploy a GIS solution that integrates multiple geospatial data layers, such as police

station boundaries/ jurisdictions, zones, and surveillance infrastructure.

- 2) SI shall ensure the GIS solution is scalable, secure, and optimized for high-performance data processing.
- 3) SI shall Implement spatial analytics capabilities to support efficient decision-making and operational planning.
- 4) SI shall integrate GIS with law enforcement databases and third-party applications to facilitate seamless data sharing and operational coordination.
- 5) SI shall maintain and update geospatial data to ensure its accuracy and reliability, ensuring the GIS reflects the latest information.
- 6) SI shall provide real-time data visualization and mapping capabilities to aid in immediate decision-making.
- 7) SI shall develop a secure web-based GIS interface with role-based access control, ensuring appropriate user permissions for different roles.
- 8) SI shall enable users to query, analyse, edit, print, and generate reports using geospatial datasets.
- 9) SI shall provide multi-layered spatial analysis tools that enhance situational awareness for law enforcement and other authorities.
- 10) SI shall ensure the GIS solution complies with open geospatial standards and industry best practices, promoting interoperability.
- 11) SI shall implement API-based integration with other law enforcement applications, allowing for real-time data exchange and collaboration.
- 12) SI shall ensure the system supports large datasets and high-resolution spatial data, enabling comprehensive and detailed analysis.
- 13) The GIS shall provide access to both real-time data and historical data from various connected devices for reporting and analytics. Users shall be able to generate reports and add them to a favourite list for quick access.
- 14) SI shall design and deploy a centrally located GIS engine that fetches data based on latitude and longitude and renders it on a base map for visualization, ensuring a user-friendly interface for easy access to geospatial data.
- 15) SI shall implementation of this GIS solution shall enable law enforcement agencies to make informed decisions, respond effectively to incidents, and improve overall public safety management through real-time geospatial data analysis and visualization.

2.16 Field Components

This section of the RFP outlines the planning and implementation process for cameras and other

field equipment at designated locations. The exact placement of poles, the number of cameras at each site, the type of cameras, and the height and angle for camera installation to ensure optimal coverage shall be determined in collaboration with BSEDC and other relevant stakeholders.

A comprehensive survey shall be conducted by the Service Provider, in coordination with the Authorized Personals, at each strategic location. This survey shall finalize the camera orientation, field of view, and placement of all field equipment. A snapshot of the field of view shall be taken using a handheld camera for future reference during the survey. Additionally, the surveyors shall determine the approximate locations for the foundations of outdoor enclosures and camera poles. The route for laying all underground cables shall also be established during this survey.

All finalized details from the survey shall be marked on a drawing by the Service Provider and submitted to BSEDC and other authorities in the form of a detailed site survey report for approval.

The Service Provider shall prepare a comprehensive report detailing field-level requirements, such as camera types and numbers, camera mounting specifications, power needs, and connectivity requirements, for review by BSEDC and other relevant authorities.

The indicative list of field-level hardware to be provided by the Service Provider includes the following:

- 1) Cameras (e.g., Fixed Cameras, PTZ Cameras, UHD Cameras, Fixed Box Cameras, etc.)
- 2) Public Address System (PAS) components (e.g., IP Speakers etc.)
- 3) Emergency Call Box Solution
- 4) Variable message Sign Board
- 5) Radar based Speed Display
- 6) Automatic Traffic Control System
- 7) IR Illuminators (as required)
- 8) Managed Switches
- 9) Outdoor Cabinets
- 10) Camera Poles
- 11) Junction Boxes / Enclosures
- 12) Power Backup (UPS)
- 13) Networking and power cables, along with other related infrastructure

The indicative list of locations for the IP PTZ, Fixed Cameras, and ANPR Cameras, along with the minimum technical requirements for the associated hardware to complete the surveillance system, are provided in the RFP. However, the SI shall conduct a detailed assessment of all locations and prepare

a comprehensive list of required components. The SI shall then submit the assessment report and equipment list to BSEDC and other relevant authorities for review.

Installation of surveillance cameras

The Service Provider shall adhere to industry's best practices when positioning and mounting cameras during installation and commissioning.

The following checkpoints shall be followed:

- a) Ensure the surveillance objectives are met by positioning the camera to capture the required field of view as determined in the primary survey.
- b) Ensure the camera is protected from environmental challenges, physical damage, and theft.
- c) Make necessary adjustments to optimize the image and video quality captured.
- d) Ensure the pole is securely placed to resist vibration, in compliance with road safety norms.
- e) Use appropriate branding or color coding (e.g., Bihar Police branding) on poles and outdoor enclosures to deter tampering by unauthorized individuals.
- f) Provide safety awareness stickers and signage at every camera location to educate the public.

Installation of Poles/Cantilevers/Gantry

- a) The Service Provider must ensure that all installations comply with the guidelines of Bihar Police and meet the satisfaction of local municipal bodies. The Service Provider is responsible for obtaining the necessary No Objection Certificates (NOCs) from the respective agencies and municipal bodies.
- b) For the installation of various types of surveillance cameras, the Service Provider shall provide appropriate poles, cantilevers, and any supporting equipment.
- c) The Service Provider must ensure that the poles used for mounting cameras are of the highest quality, both in terms of material and aesthetics.
- d) The poles shall be installed with a base plate, pole door, J-Bolts etc.
- e) The poles shall be heavy-duty, galvanized metal, and completely stable. The camera placement must be high enough to prevent tampering or physical damage, while ensuring it does not interfere with the field of view (FOV).
- f) If cameras need to be installed beside or above signal heads, the Service Provider must provide and install suitable pole extensions to ensure a clear line of sight.
- g) The Service Provider is responsible for conducting a structural analysis to account for regulated load conditions and local wind velocities when installing poles or cantilevers for surveillance cameras or related

equipment.

- h) The Service Provider must provide structural calculations and drawings certified by a registered designer for approval by Bihar Police/BSEDC. The design shall conform to common design standards applicable under the jurisdiction of Bihar Police, NHAI, BRO, local municipal bodies, etc.
- i) Poles and cabinets shall be designed in a way that allows easy installation and removal of all field equipment components.
- j) The Service Provider must ensure that the installation area is restored to a neat and tidy condition after installing the poles, cantilevers, and other equipment. The placement must be done in a manner that does not disrupt the normal flow of vehicular traffic or pedestrian movement.
- k) The Service Provider is responsible for maintaining the poles and cantilever, regardless of their height, and must provide high-reach vehicles or equipment for maintenance tasks.
- l) The Service Provider must follow industry best practices when positioning and mounting cameras, ensuring that the pole or mast implementation is vibration resistant. Additionally, bird scare spikes shall be installed on top of the camera boxes to prevent birds from sitting on them.
- m) The Service Provider must coordinate with all relevant stakeholders and departments involved in the installation process.

UPS installation for field locations

- a) The UPS shall act as a backup power source for commercially available utility power at the intersections, ensuring uninterrupted functioning of all field components in the event of a utility power failure.
- b) The Service Provider shall install UPS units at all field locations specified in this RFP, ensuring they are housed in secure, tamper-proof, and corrosion-resistant cabinets.
- c) The Service Provider shall take necessary measures to protect the UPS units against environmental threats such as storms, power surges, and lightning.
- d) The UPS units shall be designed for efficient heat dissipation without the need for air conditioning, and they must be capable of withstanding the temperatures typically found in outdoor conditions 24/7 for the entire project duration.

Outdoor Cabinets / Junction Box / Enclosure

- a) Each location shall be equipped with outdoor cabinets designed to house all necessary

equipment for operating enforcement systems and traffic surveillance systems as specified in this RFP.

- b) The SI shall ensure that the height and foundation placement of the outdoor unit cabinets are sufficient to prevent water ingress during floods, particularly in flood-prone areas.
- c) The outdoor cabinets/enclosures shall be of an adequate size to accommodate all system components that may be installed at or near the intersection. These cabinets/enclosures shall be dustproof and impermeable to splash water, ensuring suitability for outdoor environmental conditions. The cabinets shall be divided into the following sections:
 - i. **Power Section:** This section shall house all power supply and power management equipment.
 - ii. **Control Section:** This section shall accommodate all data processing and network field components at that location, such as switches, telecom equipment, etc.
- d) The internal cabling of the cabinets shall be designed to facilitate easy connection and disconnection of the equipment and power supply.
- e) The cabinets shall be constructed with durability in mind, including security-locking mechanisms to prevent unauthorized access to the field equipment.
- f) Each enclosure compartment shall be equipped with a natural convection air circulation system, facilitated by air circulation filters that require no maintenance. This system shall allow for free circulation of air to prevent overheating and mitigate the effects of humidity and heat, while also ensuring that harmful elements cannot enter, thereby safeguarding the system's operation.
- g) The Service Provider shall ensure that all the hardware installed within the outdoor enclosures is designed to endure the temperature conditions typically encountered in outdoor environments.

Civil and Electrical Works

- a) The Service Provider shall undertake all necessary civil work for setting up the field components of the system, including:
 - b) Preparation of concrete foundations for MS poles and cantilevers.
 - c) Laying of GI pipes (B Class) along with required GI fittings.
 - d) Excavation of hard or soft soil and backfilling after cabling.
 - e) Installation of chambers with metal covers at every outdoor enclosure, pole, and road crossing.
 - f) Concrete foundations for junction boxes/enclosures.

- g) The Service Provider shall ensure the provision of electricity to the cameras through the electricity feeder aggregation point. As this requires approval from local authorities, it is advised that the Service Provider plans and submits the application to the concerned electricity distribution agency well in advance, along with any applicable fees.
- h) The Service Provider is responsible for executing all the electrical work necessary to power the system components.
- i) Electrical installations and wiring shall comply with the relevant electrical codes of India.
- j) The registration of electrical connections at all field sites shall be done in the name of Bihar Police, or as agreed upon and finalized in the contract document.
- k) The Service Provider shall ensure provision for alternate or redundant power supply, such as UPS systems, to ensure continuous operation of all surveillance equipment as detailed in the RFP in case of primary power failure.

Earthing and Lightning Protection

- a) The Service Provider shall comply with the technical specifications, ensuring the system structure, equipment type selection, earthing, and power/signal cable installation are lightning-proof and anti-interference. The Service Provider must detail the planned lightning-proof and anti-interference measures in the bidding documents.
- b) Lightning arresters shall be installed on the power line entrance cables, video lines, data transmission cables, and other related connections.
- c) Interface boards, function boards, and equipment interfaces shall incorporate high-speed photoelectric isolation to protect low-voltage devices from damage due to surge suppression.
- d) The SI shall install appropriate earthing devices for all equipment, including lightning earthing, protection earthing, and shielded earthing. All earthing installations must meet industry standards.
- e) Earthing cables shall be installed securely to prevent theft and must be rust-resistant. The earthing down lead and electrode shall be galvanized, and the earthing value must meet the required standards. The Service Provider shall provide an earthing test report.

Miscellaneous:

- a) The Service Provider shall be responsible for identifying and obtaining all necessary legal and statutory clearances required for erecting poles, installing cameras, and providing the necessary power supply. The Service Provider must manage and provide all necessary documentation to

secure these permissions from the relevant authorities.

- b) The Service Provider shall provide all materials required for the mounting of components such as cameras and other field equipment. This includes all mounting accessories, such as brackets for pan and tilt functionality, crossheads, cross arms, stainless steel bands, screws, and any other related accessories. These costs shall be included in the cost of the respective component.
- c) The Service Provider shall carry out all excavation, earthing, and backfilling work, ensuring that the site is restored to its original state. This includes the supply and installation of poles, enclosures, and any additional fixtures.
- d) To safeguard against theft, accidental damage, or vandalism, the Service Provider must implement appropriate security measures at their own cost. The cost of these measures shall be factored into the quoted rates.
- e) A sufficient spare inventory of all equipment shall be maintained to replace any items in the event of theft, vandalism, or accidental damage. In case of damage or theft, the Service Provider is responsible for repairing or replacing the equipment as per the timelines defined in the SLAs, at no additional cost to the BSEDC.
- f) The Service Provider shall ensure high operational integrity in maintaining various equipment, components, and installations for a defined period following the Go-Live date issued by the client.
- g) In addition to maintenance during the defined period, the Service Provider is fully responsible for all maintenance activities throughout the project duration. If any camera or field equipment requires realignment, reconfiguration, or adjustments in the field of view during the implementation phase, the Service Provider shall make the necessary changes at no extra cost.
- h) If any component is missing from the Bill of Quantities (BoQ) but is essential to meet the functional requirements of any system or element, the Service Provider shall provide and cover the cost of such components without any additional charges.

2.17 Warranty and AMC

The AMC/Warranty shall begin with the official Go-Live date. The System Integrator must provide a Warranty/AMC that covers the entire project duration for all supplied hardware, software, licenses, and non-IT components, with no additional cost included in the commercial bid. Installation shall be considered incomplete if any equipment component or associated documentation/media is not submitted to BSEDC. The System Integrator is responsible for maintaining the infrastructure and fulfilling necessary deliverables under the scope of work

throughout the entire AMC period.

3 Compliance to Requirement (Technical / Functional Specifications)

The bidder shall provide compliance to the requirement specifications (both technical and functional) specified in this RFP.

4 Project Milestones

Below is high level schedule for Supply Installation Commissioning and Operation for the BS MSSS Project:

#	Activity/Task	Timelines (in Weeks)	Deliverable/Milestone
1	Award of Contract	T0	
2	PBG Submission	To+1	
3	Contract Signing between BSEDC and successful Bidder	T0+1	
4	Kick Off Meeting: Team Deployment for the following: Project Planning Resource Scheduling Development, Implementation & Maintenance approach	T0+2	• Final detail project plan needs to submit to BSEDC • Project Inception Report
5	Submission and approval of Site-Survey Report (ICCC/NOC & Outdoor Locations)	T0 + 6	• Solution Design Document/ HLD • Detailed Survey Reports approved by BSEDC/ Other Authority

6	Supply and Completion of Prefabricated Structure including, Civil Works, HVAC Systems, Furniture and Electrical Work for NOC and ICC	T0 + 18	• Delivery Challan with Sign & stamp. • Approved Drawing for ICC and NOC by BSED/ Other Authority • Completion/Inspection Reports approved by BSED/ Other Authority
7	Supply of all equipment/ components (IT Hardware) including System Software Licenses at NOC and ICC	T0 + 19	• Delivery Challan with Sign & stamp. • Inspection Reports approved by BSED/ Other Authority • Warranty certificate issued by respective OEMs in the name of "BSED". • License in case of system software.

8	Supply of all field equipment/ components (Active + Passive Hardware)	T0 + 21	• Delivery Challan with sign & stamp • Inspection report from BSEDC/ Other Authority • Warranty certificate issued by respective OEMs in the name of "BSEDC"
9	Installation, Testing, Configuration and Operationalization of all equipment/components (Hardware) including system software licenses at the NOC and ICCC	T0 + 28	• Device-wise configuration report stating IP schema. • Installation, Testing and Commissioning Report. • Complete set of Technical, Operations & Maintenance Manual.
10	Installation, Testing, Configuration and Operationalization of all field equipment including System Software Licenses	T0 + 33	• Device-wise configuration report stating IP schema. • Installation, Testing and Commissioning

			Report. • Complete set of Technical, Operations & Maintenance Manual.
11	User Acceptance Testing, Training	T0 + 40	• Low Level Design (LLD) Document. • UAT Document • Training and Capacity Building includes all technical documents. • Defect Resolution Report • UAT (PAC & FAC) Certificate
12	Project Go-Live	T0 + 42	
13	O&M (After Go LIVE)	60 Months	SLA Adherence Report on a Monthly/ Quarterly basis

Note:

Bidder needs to arrange all the material delivery at a central location within the state of Bihar. After delivery of the material at central location, inspection for the supplied material would be performed by BSEDC/any nominated agency then the material transit to respective sites as per the requirement.

5 Training & Capacity Building

Training is important, leading to a more capable, efficient, and motivated workforce, contributing to the long-term success of the organization. To enhance staff capabilities, structured capacity-building

programs shall be implemented across various levels of the organizational hierarchy. These shall include foundational processes and soft skills training for staff over a set period. Additionally, refresher training shall be provided for Command Control Centre/City Operations Staff, as well as designated Authorities and Police personnel, as part of the capacity-building efforts. It is crucial to recognize that training has to be extended to every staff member involved in these operation centers, as these officers shall be managing emergency situations that require quick responses with minimal turnaround time.

1. SI shall develop and submit a detailed Training Plan and Training Manuals to BSEDC/authorized agency for review and approval. These manuals, along with operational procedures and visual help kits, shall be provided in English/Hindi.
2. A time schedule and detailed program shall be prepared in consultation with BSEDC and the respective authorized entity. When designing training courses and manuals, SI shall ensure training focuses on key system components to enable personnel to start working on the system as quickly as possible.
3. SI shall ensure that training will be around basic computer awareness, system fundamentals, and application usage at basic, intermediate, and advanced levels.
4. Training shall be conducted according to the User Training Plan, which shall outline the number of sessions per training batch, course content, delivery methods, and evaluation methods in detail.
5. SI is responsible for setting up the necessary demonstration environment for all ICT solutions outlined in this RFP to conduct end-user training. This shall cover all equipment, including but not limited to applications and infrastructure at ICC, NOC and field locations. End-user training shall take place at respective city or location identified by BSEDC with input from SI.
6. SI shall conduct end-user training and ensure the training module comprehensively covers all aspects of hardware and system applications used daily to operate the system.
7. SI shall provide operational and technical training to internal users on the implemented solutions to ensure effective and efficient use of the deployed system.
8. SI shall provide training to selected BSEDC officers, covering functional, technical, usage, and implementation aspects of the products and solutions.
9. Systematic training shall be provided to designated trainees to help them understand the solution, day-to-day operations, system maintenance, and updates, all under the guidance of SI trainers.
10. SI shall deploy a Master Trainer responsible for planning, designing, and conducting training sessions.
11. Training sessions and workshops shall include presentations, demonstrations, and mandatory hands-on activities for application modules.

12. BSEDC shall identify and nominate users for training, but SI shall be responsible for facilitating and coordinating the process.
13. SI shall provide feedback for the Authority/authorized entity to review and track progress. If more than 30% of the respondents indicate the training was unsatisfactory, SI shall conduct the same training again at no additional cost.

5.10 Training Categories

The following training requirements have been identified for all project stakeholders:

5.10.1 Basic IT Training

This module shall cover the fundamentals of computer usage, networking, desktop operations, user administration, application installation, basic troubleshooting, and more.

5.10.2 Functional Training

This includes basic IT skills, software applications for City Operation Centres and Command & Control Centres, networking, hardware installation, centralized helpdesk operations, and feed monitoring.

5.10.3 Administrative Training

Training shall cover system administration, helpdesk operations, FMS, BMS administration, and handling helpdesk requests with assistance from master trainers.

5.10.4 Senior Management Training

This module shall focus on using proposed systems for monitoring, tracking, reporting, generating MIS reports, and accessing various exception reports.

5.11 Post-Implementation Training

This shall include refresher training for senior management, functional and operational training for new operators, refresher courses on system administration, and change management programs.

5.12 Indicative Training Schedule

#	Name of the Training Program	No of days	No. of Personal
1	ICCC Monitoring & Operation	2	10
2	IT systems hardware and maintenance	1	2

3	Network Operation Centre & Network administration	2	5
4	Helpdesk & EMS for Monitoring & Reporting	2	5
5	All Proposed Equipment in field and their applications	3	10
6	Video Analytics	2	5
7	Management Information System (Senior Management)	1	5

6 Warranty & Maintenance

Bidder shall provide complete maintenance support for all the proposed integrated solution as outlined in this RFP for a period of Sixty months from the date of go-live i.e., “Go-Live” + 60 months. “Go-live” is the date on which the proposed solution is completely operational as per the requirements provided in this RFP and all the acceptance tests are successfully concluded to the satisfaction of BSEDC.

During the warranty period i.e., “Go-Live” + 60 months, the bidder shall confirm that the goods supplied under the contract are new, unused, of the most recent version/models and incorporate all recent improvements in design and materials unless provided otherwise in the contract.

During the comprehensive warranty period, the successful bidder shall provide all product(s) and documentation updates, patches/fixes, and free available version upgrades of their availability and shall carry out installation and make operational the same at no additional cost to BSEDC.

The successful bidder hereby warrants BSEDC that:

- a) The implemented integrated solution represents a complete, integrated solution meeting all the requirements as outlined in the RFP and further amendments if any and provides the functionality and performance, as per the terms and conditions specified in the contract.
- b) The proposed integrated solution shall achieve parameters delineated in the technical specification/requirement.
- c) The successful bidder shall be responsible for warranty services from licensors of products included in the systems.
- d) The successful bidder undertakes to ensure the maintenance of the acceptance criterion/standards in respect of the systems during the warranty period.

7 Force Majeure

Force Majeure is herein defined as any cause, which is beyond the control of the Service provider or BSEDC as the case may be which they could not foresee or with a reasonable amount of diligence could not have foreseen and which substantially affect the performance of the contract, it including but not limited to:

- a) act of God (such as, but not limited to, fires, explosions, earthquakes, drought, tidal waves and floods);
- b) war, hostilities (whether war be declared or not), invasion, the act of foreign enemies, mobilization, requisition, or embargo;
- c) rebellion, revolution, insurrection, or military or usurped power, or civil war;
- d) contamination by radio-activity from any nuclear fuel, or any nuclear waste from the combustion of nuclear fuel, radio-active toxic explosive, or other hazardous properties of any explosive nuclear assembly or nuclear component of such assembly;
- e) riot, commotion, strikes, go slows, lock outs or disorder, unless solely restricted to employees of the Supplier or his Subcontractors; or
- f) acts or threats of terrorism
- g) Pandemic

Force Majeure shall not include any events caused due to acts/omissions of such Party or result from a breach/contravention of any of the terms of the Contract, Bid and/or the tender. It shall also not include any default on the part of a Party due to its negligence or failure to implement the stipulated/proposed precautions, as were required to be taken under the Contract. However, the Bidder shall note that cyber-attack, corruption of information, software corruption, destruction of information, virus attack in the system or any such software malfunction shall not constitute a Force Majeure event and the rectification of the same shall be borne by the Bidder. The Purchaser shall make the payments due for Services rendered till the occurrence of Force Majeure. In case of a Force Majeure, all Parties shall endeavour to agree on an alternate mode of performance in order to ensure the continuity of Service and implementation of the obligations of a party under the Contract and to minimize any adverse consequences of Force Majeure

If a Force Majeure arises, the Service Provider shall notify promptly within a 72 hours of event occurrence to BSEDC in writing of such condition and the cause thereof. Unless otherwise directed by BSEDC, Service Provider shall continue to perform his obligations under the Agreement as far as is reasonably practical and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.

8 Service Level Agreement

Service Level Agreement (SLA) shall become the part of the Contract between the Client and the SI. SLA defines the terms of SI's responsibility in ensuring the timely delivery of the deliverables and the correctness of the deliverables based on the agreed performance indicators as detailed in this section.

The SI shall comply with the SLAs to ensure adherence to project timelines, quality and availability of services throughout the duration of the Contract. For the purpose of the SLA, definitions and terms as specified in the document along with the following terms shall have the meaning set forth below:

- a) "Total Time" – Total number of hours in consideration for evaluation of SLA performance.
- b) "Downtime" – Time period for which the specified services/components/system are not available in the concerned period, being considered for evaluation of SLA, which shall exclude downtime owing to Force Majeure and reasons beyond control of the SI.
- c) "Scheduled Maintenance Time" – Time period for which the specified services/components/system with specified technical and service standards are not available due to scheduled maintenance activity. The SI shall take at least 7 days prior approval from the Client for any such activity. The scheduled maintenance shall be carried out during nonpeak- hours and shall not exceed more than four (4) hours.
- d) "Uptime" – Time period for which the specified services are available in the period being considered for evaluation of SLA.
- e) "Availability": When the system is working properly performing all business and functional requirements as defined in this DPR.
- f) Penalties shall be applied for each criteria individually and then added together for the total penalty for a particular quarter.
- g) "Incident" – Any event/abnormalities in the service/system being provided that may lead to disruption in regular/normal operations and services to the end user.

- h) “Response Time” – Time elapsed from the moment an incident is reported to the Helpdesk either manually or automatically through the system to the time when a resource is assigned for the resolution of the same.
- i) “Resolution Time” – Time elapsed from the moment incident is reported to the Helpdesk either manually or automatically through system, to the time by which the incident is resolved completely and services as per the Contract are restored

a) Implementation Phase related to SLAs

- a) During Implementation phase any delay in deliverables and milestones shall attract penalties as per Implementation Phase SLA mentioned in this RFP.

b) Operations & Maintenance Phase related to SLAs

- a) These SLAs shall be used to evaluate the performance of the services post the Implementation Phase and commencement of the O&M Phase. These SLAs and associated performance shall be monitored on a quarterly basis. Penalty levied for non-performance as per SLA shall be deducted through subsequent payments due from the BSEDC or through the Performance Bank Guarantee.
- b) The Scheduled Maintenance Time shall be approved by BSEDC in writing. The scheduled maintenance request shall be submitted to the BSEDC 7 days in advance.

8.10 Measurement of SLA

The SLA metrics define performance parameters, including baseline performance, lower performance, and breach, with calculations conducted quarterly. Penalties are applied for lower performance and breach conditions as mentioned in the RFP document.

Payment to the successful bidder is link to these SLA metrics based on Quarterly Performance. The performance matrix outlines two levels:

- a) The Bidder receives 100% of the contracted value if all baseline performance metrics are met.
- b) If performance falls below baseline, payment is adjusted according to the penalty clause.

The SLA parameters will be assessed according to the specific requirements and measurement methods for each parameter, using EMS/ Any other SLA measurement tool provided by the System

Integrator (SI). These tools will be audited by BSEDC or its appointed agency to ensure accuracy and reliability. The SI has to track all parameters outlined in the SLA matrix and generate relevant reports for monitoring compliance.

BSEDC reserves the right to revise SLA parameters either directly or through an appointed agency. The defined SLAs will undergo an annual review by BSEDC in collaboration with the SI, Project Management Consultants, and other experts. Any necessary adjustments will be made after consultation with the SI, including refinements to prevent excessive leniency in service levels or to avoid unrealistic penalty impositions that may become evident after the project goes live.

The bidder must note that even in cases where SLA penalties do not apply due to circumstances considered "beyond the bidder's control," they are still required to resolve issues on high priority.

BSEDC retains the right to “terminate the contract or blacklist” under the following conditions:

- a) If the overall penalty reaches more than 20% in each of any two consecutive quarters during the contract period.
- b) If during the entire contract period, the overall penalty applicable for 6 quarters is more than 20% in each quarter.

Planned Downtime

- 1. Planned application or system downtime such as patch upgradation, configuration change, path change, preventive maintenance of field equipment, etc. will be excluded from the SLA measurement calculations. However, this needs prior approval from stakeholders. Planned downtime should be carried out during the lean period (Such as midnight).
- 2. If any Downtime caused due to non-availability of raw power from the source due to some maintenance works, the outage is not attributable to Successful bidder. However, any power outage due to UPS failure, poor cabling/earthling or failure of any system will be a part of SLA calculation.

8.11 SLA for Implementation Phase

Activity / Milestone	Timelines (in Weeks)	Documents Required	Penalty
Award of Contract	T0		
PBG Submission	To+1		

Contract Signing between BSEDC and successful Bidder	T0+1		
Kick Off Meeting: Team Deployment for the following: Project Planning Resource Scheduling Development, Implementation & Maintenance approach	T0+2	- Final detail project plan needs to submit to BSEDC - Project Inception Report	
Submission and approval of Site- Survey Report (ICCC/NOC & Outdoor Locations)	T0 + 6	- Solution Design Document/ HLD - Detailed Survey Reports approved by BSEDC/ Other Authority	The LD will be deducted @ 0.5 % per week of the total CAPEX value of the project. LD will be deducted from the upcoming next invoice under this project.
Supply and Completion of Prefabricated Structure including, Civil Works, HVAC Systems, Furniture and Electrical Work for NOC and ICCC	T0 + 18	- Delivery Challan with Sign & stamp. - Approved Drawing for ICCC and NOC by BSEDC/ Other Authority - Completion/Inspection Reports approved	The LD will be deducted @ 0.5 % per week of the total CAPEX value of the project. LD will be deducted from the upcoming next invoice under

		by BSED/ Other Authority	this project.
Supply of all equipment/ components (IT Hardware) including System Software Licenses at NOC and ICC	T0 + 19	• Delivery Challan with Sign & stamp. • Inspection Reports approved by BSED/ Other Authority • Warranty certificate issued by respective OEMs in the name of "BSED". • License in case of system software.	The LD will be deducted @ 0.5 % per week of the total CAPEX value of the project. LD will be deducted from the upcoming next invoice under this project.
Supply of all field equipment/ components (Active + Passive Hardware)	T0 + 21	• Delivery Challan with sign & stamp • Inspection report from BSED/ Other Authority • Warranty certificate issued by respective OEMs in the name of "BSED"	The LD will be deducted @ 0.5 % per week of the total CAPEX value of the project. LD will be deducted from the upcoming next invoice under this project.

Installation, Testing, Configuration and Operationalization of all equipment/component s (Hardware) including system software licenses at the NOC and ICC	T0 + 28	• Device-wise configuration report stating IP schema. • Installation, Testing and Commissioning Report. • Complete set of Technical, Operations & Maintenance Manual.	The LD will be deducted @ 0.5 % per week of the total CAPEX value of the project. LD will be deducted from the upcoming next invoice under this project.
Installation, Testing, Configuration and Operationalization of all field equipment including System Software Licenses	T0 + 33	• Device-wise configuration report stating IP schema. • Installation, Testing and Commissioning Report. • Complete set of Technical, Operations & Maintenance Manual.	The LD will be deducted @ 0.5 % per week of the total CAPEX value of the project. LD will be deducted from the upcoming next invoice under this project.

User Acceptance Testing, Training	T0 + 40	• Low Level Design (LLD) Document. • UAT Document • Training and Capacity Building includes all technical documents. • Defect Resolution Report • UAT (PAC & FAC) Certificate	The LD will be deducted @ 0.5 % per week of the total CAPEX value of the project.
Project Go-Live	T0 + 42		

Note:

1. If the Bidder fails to complete the work within the agreed time schedule (Project Timeline) as specified in the agreement or any extension thereof, BSEDC shall recover penalty from the Bidder as per calculation detailed in the table mentioned above.
2. If the successful Bidder fails to achieve any milestone within the designated timeline and the delay exceeds 8 weeks, BSEDC will issue a "Letter of Default" seeking an explanation for the delay and proposed corrective measures. If the delay extends beyond 16 weeks, BSEDC reserves the right to terminate the contract with the successful bidder and award the order to the next eligible bidder. The remaining work will be completed by the next eligible bidder or by BSEDC at the cost comparable to that quoted by the successful bidder.
3. The recovery against aggregated Liquidated Damage (LD) shall not exceed 20% of the Total CAPEX Value for the implementation phase.
4. After completion of each milestone, the successful Bidder will submit their invoice with required documents mentioned in above table to BSEDC marking copy to other authority (If any). Hard Copy to be submitted separately.

5. If any delay occurs due to any dependencies on client or on BSEDC side then the Bidder needs to communicate/inform/explain/ to BSEDC in advance through letter with all the required detail, then only the Bidder will be entitled for extension of timelines and exemption of penalties for that affected work.

8.12 SLA for Operation Phase

8.12.1 SLA Parameter for all Network and IT Equipment at NOC/ICCC

Service Matrix	Measurement	Uptime Target	Penalty
Availability of IT equipment Server/Storage)	Quarterly (The quarterly average availability of all	>= 99.00%	No Penalty
		<99.00% to >= 98.25 %	1% of total QGR value
		<98.25% to >= 97.50%	2% of total QGR value
		<97.50% to >= 97.00%	3% of total QGR value
		<97.00%	5% of total QGR value
Availability of IT equipment (Network, Security, etc.)	Quarterly (The quarterly average availability of all	>= 99.00%	No Penalty
		<99.00% to >= 98.25 %	1% of total QGR value
		<98.25% to >= 97.50%	2% of total QGR value
		<97.50% to >= 97.00%	3% of total QGR value
		<97.00%	5% of total QGR value
Workstations/ Laptops/ Multifunctional Printer / Monitors/ IP Phones/ Joysticks	Quarterly (The quarterly average availability of all	>= 99.00%	No Penalty
		<99.00% to >= 98.25 %	1% of total QGR value
		<98.25% to >= 97.50%	2% of total QGR value
		<97.50% to >= 97.00%	3% of total QGR value
		<97.00%	5% of total QGR value
ICCC Software Platform	Quarterly (The quarterly average availability of ICCC	>= 99.00%	No Penalty
		<99.00% to >= 98.25 %	1% of total QGR value
		<98.25% to >= 97.50%	2% of total QGR value
		<97.50% to >= 97.00%	3% of total QGR value
		<97.00%	5% of total QGR value
Video Wall & Management System	Quarterly (The quarterly	>= 98.90%	No Penalty
		<98.90% to >= 98.00	1% of total QGR value

	average availability of Video Wall & Software)	%	
		<98.00% to >= 97.10%	2% of total QGR value
		<97.10 to >= 96.90%	3% of total QGR value
		<96.90%	5% of total QGR value
BMS for ICC/ NOC	Quarterly	>= 98.00%	No Penalty
	(The quarterly average availability of BMS equipment)	<98.00% to >= 97.75 %	1% of total QGR value
		<97.75% to >= 97.00%	2% of total QGR value
		<97.00% to >= 96.00%	3% of total QGR value
		<96.00%	5% of total QGR value
UPS	Quarterly (The quarterly average availability of UPS)	>= 99.00%	No Penalty
		<99.00% to >= 98.25 %	1% of total QGR value
		<98.25% to >= 97.50%	2% of total QGR value
		<97.50% to >= 97.00%	3% of total QGR value
		<97.00%	5% of total QGR value
Diesel Generators	Quarterly (The quarterly average availability of DG)	>= 99.00%	No Penalty
		<99.00% to >= 98.25 %	1% of total QGR value
		<98.25% to >= 97.50%	2% of total QGR value
		<97.50% to >= 97.00%	3% of total QGR value
		<97.00%	5% of total QGR value
Application Portfolio- VMS/VA/FRS/ANPR/RLVD/ATCS	Quarterly (The quarterly	>= 98.00%	No Penalty
		<98.00% to >= 97.75	1% of total QGR value

	average	%	
	availability of all	<97.75% to >=	2% of total QGR value
	Software)	97.00%	
		<97.00% to >=	3% of total QGR value
		96.00%	
		<96.00%	5% of total QGR value

SLA Parameter for all Field Equipment

Service Matrix	Measurement Interval	Uptime Target	Penalty
IP Camera (Fixed & PTZ)	Quarterly (The quarterly average availability of all IP Camera)	>= 98.00%	No Penalty
		<98.00% to >= 97.75 %	1% of total QGR value
		<97.75% to >= 97.00%	2% of total QGR value
		<97.00% to >= 96.00%	3% of total QGR value
		<96.00%	5% of total QGR value
IR Illuminator	Quarterly (The quarterly average availability of IR Illuminator)	>= 94.00%	No Penalty
		<94.00% to >= 93.25%	1% of total QGR value
		<93.25% to >= 92.50%	2% of total QGR value
		<92.50% to >= 92.00%	3% of total QGR value
		<92.00%	5% of total QGR value
Industrial Switch	Quarterly (The quarterly average availability of Industrial Grade Network Equipment)	>= 98.00%	No Penalty
		<98.00% to >= 97.75 %	1% of total QGR value
		<97.75% to >= 97.00%	2% of total QGR value
		<97.00% to >= 96.00%	3% of total QGR value
		<96.00%	5% of total QGR value
Junction Box (including earth, Power Backup etc.)	Quarterly (The quarterly average availability of Junction Box along with other equipment's)	>= 98.00%	No Penalty
		<98.00% to >= 97.75 %	1% of total QGR value
		<97.75% to >= 97.00%	2% of total QGR value
		<97.00% to >= 96.00%	3% of total QGR value
		<96.00%	5% of total QGR value

8.12.2 SLA Parameter for Resource Availability

Service Matrix	Measurement	Uptime Target	Penalty
Manpower Availability	Quarterly (The quarterly average availability of Human Resource)	Above 99.90%	No Penalty
		Between 99.90% to 97.01%	1.0% of QGR value of Manpower
		Between 97.00%-95%	3.0% of QGR value of Manpower
		Less than 95%	5.0% of QGR value of Manpower

Note:

1. Penalty for the breach of SLA shall not exceed more than 20% of the QGR value during Operation Phase.
2. Total QGR value means “25% of total Yearly-OPEX + 0.5% of CAPEX ”. The Yearly-OPEX will comprise total AMC cost of all IT, Non-IT and other equipment for the year, yearly service charges excluding the cost of all human resources for the same year and connectivity cost.
3. The successful bidder shall submit all the supporting documents along with the quarterly invoice.
4. If the successful bidder fails to achieve any milestone within the designated timeline and the delay exceeds 8 weeks, BSEDC will issue a "Letter of Default" seeking an explanation for the delay and proposed corrective measures. If the delay extends beyond 16 weeks, BSEDC reserves the right to terminate the contract with the successful bidder.

9 Payment Schedule

Payment schedule - Payments to the bidder, after successful completion of the target milestones (including specified project deliverables), would be made as under: -

#	Category	Milestone	Payment	Requirement
1	Procurement & Delivery Phase	After Delivery of IT, Non-IT and other material for ICCC, NOC and Field locations: (Non-IT and other material with all required accessories and IT Equipment with all required software and licenses on pro-rata basis) Inspection of delivered material would be done by BSEDC or it's designated agency. MSA signing by both parties and PBG @ 10% of the TCV (Total Contract Value) must be submitted before any payment process.	70% of Capex Value	• Final Bill of Material • Procurement & Delivery Report • Signed Material Inspection Report with the Item details like Item Description, Serial No., Part Code no., Qty., HSN Code, etc.
2	Implementation Phase & Go Live	Installation & commissioning & operationalization of Hardware and Software at site and after verification of such items by BSEDC and authorized agency.	20% of Capex Value	• Installation & Commissioning Report • Training Plan and Training Completion Report

				FAT certificate issued by BSEDC/ or any authorized agency.
3	Operation & Maintenance (O&M) for 5 Years	Total AMC cost of all IT, Non-IT and other equipment, service charges and the cost for human resource and Connectivity Services for five (5) years	10% of remaining capex value + opex cost divided equally in 20 quarters	- Quarterly submission of Invoice, SLA, Report and Supporting Document by SI. - Verification by BSEDC or any authorized agency against submitted documents.

Note:

- CAPEX includes the supply, installation & commissioning of all Non-IT & IT equipment and associated work required for completion of the project under Bihar MSSS project.
- OPEX includes operational expenditure as O&M cost of all the equipment/devices, Manpower cost and Connectivity services for the next 05 (Five) years after FAT.
- The CAPEX (Capital Expenditure) and Operational Expenditure (OPEX) ratio should not be greater than 70:30 of the total quoted value inclusive of all taxes.
- After the end of each milestone/ QGR the Successful Bidder (SI) will submit their invoice with detailed SLA document / report to BSEDC or any authorized agency within 30 days. Hard Copy to be submitted separately. BSEDC will process the payable amount after necessary penalty deduction within 60 days from the submission of Invoice along with all required documents.

10 Structure of Solution Document

Bidders are required to provide a detailed approach & methodology to execute the entire project. Bidders are advised to comply with the below provided headers/Approach components while detailing out their solution.

#	Solution Description
1.	Understanding of requirement and Implementation approach • Understanding of requirements • Work Plan & its adequacy
2.	Robustness and quality • End to end integrated solution proposed • Hardware deployment and integration approach encompassing all solutions • Timelines and modalities for implementation in a time-bound manner • Project implementation approach or strategy and operations and maintenance plan including comprehensiveness of fallback strategy and planning during rollout • Any other area relevant to the scope of work and other requirements of the project
3.	Assessment of Manpower deployment, Training and Handholding plan • Deployment strategy of Manpower • Contingency management • Mobilization of resources for any additional activity as required for successful implementation of project • Training and handholding strategy

11 Implementation – Project Plan

SI shall submit the Project Plan within two (2) weeks after receiving Lol/project awarded, to BSEDC for its approval. The Plan so submitted by SI shall conform to the requirements and timelines specified in the Contract. BSEDC and SI shall discuss and agree upon the work procedures to be followed for effective execution of the works, which SI intends to deploy and shall be clearly specified.

The Project Plan shall include but not limited to project organization, communication structure, proposed staffing, roles and responsibilities, processes and tool sets to be used for quality assurance, security and confidentiality practices in accordance with the industry's best practices, and delivery schedule in accordance with the Contract. Approval by BSEDC's Representative of the Project Plan shall not relieve SI of any of his duties or responsibilities under the Contract.

A Detailed Project Plan covering break-up of each phase into the key activities, along with the start and end dates has to be provided as per format given below.

Activity-wise Timelines											
#	Item of Activity	Day wise Program									
1	Project Plan										
1.1	Activity 1										
1.2	Sub-Activity 1										

Note: The above activity chart is just for the purpose of illustration. Bidders are requested to provide Detailed activity & phase wise timelines for executing the project with details of deliverables & miles -tones as per their bid.

12 Manpower Plan

12.10 Key Personnel

SI to deploy adequate required manpower for the time bound success of project implementation along with sufficient helpdesk, Technical Support, training and facility staff to bring efficient outcomes of the system operability.

Details of these key positions are provided in RFP document

BSEDC reserves the rights to ask for immediate replacement of the deployed manpower with regards to the inefficient performance as per the requirement of the project. Key Personnel (Manpower) shift to Scope of Requirement

BSEDC has identified certain key positions and minimum qualifications for each of the positions that shall be part of project team of the bidder (hereby referred to as “key personnel”).

SI shall provide adequate number of personnel, each responsible for a specific role within the project.

SI shall provide clear definition of the role and responsibility of each individual personnel.

All the proposed positions shall be Onsite throughout the entire project implementation phase as well as operation phase. Manpower plan for Implementation Phase & Operation phase to be provided by SI.

Any additional or support manpower shall be estimated and shall be accounted for in the Commercial Proposal by the selected bidder, so that, the project as per the scope defined and agreement are fulfilled, and the project objectives are met.

SI shall have a defined hierarchy and reporting structure for various teams that shall be part of the project. SI has to provide the list of proposed resources for the project. Any changes in resource deployment shall have to be approved by BSEDC.

12.11 Initial Composition; Full Time Obligation; Continuity of Personnel

Bidder shall ensure that each member of the Key Personnel devotes substantial working time as per the staffing schedule/ manpower plan to perform the services to which that person has been assigned as per the Bid.

Bidder shall not make any changes to the composition of the Key Personnel and not require or request any member of the Key Personnel to cease or reduce his or her involvement in the provision of the Services during the defined term of the engagement unless that person resigns, is terminated for cause, is long-term disabled, is on permitted mandatory leave under Applicable Laws or retires. In any such case, BSEDC's prior written consent would be mandatory.

12.12 Compliance with labour law regulations

The SI shall pay fair and reasonable wages to the workmen employed by him, for the contract undertaken by him and comply with the provisions set forth under the Minimum Wages Act and the Contract Labor Act defined by Govt of India (GoI) and other relevant provisions of the Law.

12.13 Scope of Supply of Manpower

#	Resource Type	Quantity	Min Qualification	Minimum Experience
1.	Project Manager	1	BE/B.Tech/MCA/MB A with PMP/Prince2/ITIL Certification	Total Ten (10) years with min 05 years of experience in Safe City/ Smart City/ Other Surveillance Projects
2.	System Administrator	1	BE/B. Tech/MCA with ISACA/Linux/Microso ft Professional	Total Eight (8) years min 05 years of experience in Safe City/ Smart City/ Other Surveillance Projects

3.	Network & Security Engineer	1	BE/B. Tech/MCA with CCNA/CCNP/ CISSP / CISM / CISA	Total Eight (8) years 03 years of experience in Safe City/ Smart City/ Other Surveillance Projects
4.	Application Engineer	1	BE/B. Tech/MCA	Eight Years
5.	IT Support Engineer	2	BE / B.Tech/MCA /Diploma	Five Years
6.	Field Engineer	3	BE / B.Tech /MCA/Diploma	Five Years
7.	Field Technician	6	ITI/Diploma	Three Years
8	Helpdesk Engineer	3 (1 Nos in each Shift)	Graduation	Three Years

12.14 Curriculum Vitae (CV) format of Team Members

Bidders are required to provide CV for Manpower as per below format.

Name					
1.	Proposed position or role	(only one candidate shall be nominated for each position)			
2.	Date of Birth		Nationality		
3.	Education	Qualification	Name of School or College or University	Degree or Obtained	Year of Passing
4.	Years of Experience				
5.	Areas of Expertise and no. of years of experience in this area	(as required for the Profile)			
6.	Certifications and Training attended				

		Employer	Position	From	To
7.	Employment Record				
		<i>[Starting with present position and last 2 firms, list in reverse order, giving for each employment: dates of employment, name of employing organization, positions held.]</i>			
8.	Detailed Tasks Assigned	(List all tasks to be performed under this project)			

Relevant Work Undertaken that best illustrates the experience as required for the Role of Candidate

Project 1	
Name of assignment	
Year	
Location	
Employer	
Main project features	
Position held	
Activities performed	
Project 2	
Name of assignment	
Year	
Location	
Employer	
Main project features	
Position held	

Activities performed	
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13 **Mandatory MAF**

As part of the eligibility and technical compliance requirements of this Tender/RFP, all Bidders shall mandatorily require submitting a valid and original Manufacturer Authorization Form (MAF) for each of the specified products listed below.

The MAF shall be issued by the respective Original Equipment Manufacturer (OEM) and shall unambiguously authorize the Bidder to supply, install, configure, and provide ongoing technical support for the specified products within the scope of this procurement. Failure to submit the required MAF(s) shall result in the rejection of the affected product(s) from technical and commercial evaluation.

1. IP Cameras
2. ICCV Application
3. Video Management Software Application
4. Analytics Application
5. ITMS Application
6. ATCS Solution
7. Server
8. Storage
9. Backup Solution
10. Network components Like Router, Switches etc.
11. Security like Firewall, SLB, AV etc.
12. Ruggedized/Field Switches
13. System Management & Monitoring Application Like EMS, BMS etc.
14. Video Wall & Display Solution
15. Workstation, Desktop
16. Radar Speed Display warning system
17. VMD Solution
18. PAS & ECB Solution
19. LPU Solution
20. Telephony System
21. UPS Systems

- 22. DG Set
- 23. Racks
- 24. Passive Components (Cat 6 and OFC)

14 Minimum Technical & Functional Specification

14.1 55"-Video Wall (4x4) with Controller

Functional & Technical Requirements for Video Wall with Controller		
#	Parameters	Minimum Specifications
1	Configuration	Video wall of Size: 4.84m W x 2.72m H.
2	Panel Technology	IPS
3	Back Light Type	Direct
4	Aspect Ratio	16:09
5	Native Resolution	1920 x 1080 (FHD)
6	Refresh Rate	60Hz
7	Brightness	500nit (Typ.)
8	Contrast Ratio	1,100:1
9	Dynamic CR	500,000:1
10	Color Gamut	NTSC 72%
11	Viewing Angle (H x V)	178° x 178°
12	Color Depth (Number of Colors)	1.07 billion colors
13	Response Time	8ms (G to G)
14	Surface Treatment (Haze)	Haze 28%
15	Lifetime	60,000Hrs (Typ.)
16	Operation Hours (Hours/Day)	24/7
17	Portrait / Landscape	YES / YES
18	CONNECTIVITY	
a	I/P	HDMI, DP, DVI-D, RJ45, USB, Audio In, RS232C
b	O/P	DP, Audio, RS232C, RJ45, Daisy Chain

19	MECHANICAL SPECIFICATION	
a	Bezel Width	Even bezel : 0.44mm
20	FEATURE - HARDWARE	Internal Memory (eMMC)-8GB, Temperature Sensor, BLU Sensor, Acceleration Sensor, Local Key Operation
21	FEATURE - SOFTWARE	Local Contents Scheduling, Group Manager, USB Plug & Play, Fail Over, RS232C Sync, Play Via URL, Screen Rotation, Tile Mode Setting, SNMP, Control Manager, Smart Energy Saving, Wake on LAN
22	ENVIRONMENT CONDITIONS	
a	Operation Temperature	0 °C to 40 °C
b	Operation Humidity	10 % to 80 %
23	POWER	Built-In Power, AC 100-240V~, 50/60Hz
24	POWER CONSUMPTION	Typ. 200W
25	CERTIFICATION	CB/FCC/CE, Energy Star 8.0, IP5X
26	ACCESSORY	Remote Controller (include battery 2ea), Power Cord, RS232C cable, Lan cable, DP cable, IR Receiver, Guide Bracket, Screws, Manual
27	OEM Criteria	Manufacturer Authorization is mandatory on OEM Letterhead
		Manufacturer of Video Wall should have presence in India for more than 10 years (Certificate of Incorporation required).
		Manufacturer of Video Wall should have own Functional Service Branch in the same state from last 5 years with Shop license and GSTN copy as proof with Skilled manpower, with toll free Number for Call logging.
		Manufacturing address and Brand/Make/Company should not be from land border countries
Functional & Technical Requirements of Video Wall Processor		

#	Parameters	Minimum Specifications
1	Product Build	Min. I7 processor, 16 GB RAM and upto 4U Standard Server Rack Mountable Cabinet, Windows 10/11 OS
		Turbo cooling fans for ventilation, 1 GBPS Dual Ethernet ports, Built in Redundant Power Supply
2	INPUTS	Desktop Capture from monitors (single desktop from multi- monitor PC) using LAN over IP network. Desktop capture should support RDP protocol
2.1	Wired Inputs	Support for 12 numbers of FHD HDMI Input, Facility to crop and adjust the input
2.2	Streaming Inputs	Support for network streams in H.264 through streaming server
		Support for network streams in H.264 protocols through hardware encoder, Support for YouTube content display, Streaming Video Integration, Hardware / Software Decoding
2.3	URL display	Capability to auto authenticate URLs with specified credentials for web application pages.
		Browser zone should support proxy authentication, Zoom support
		Browser compatibility for IE and Chrome pages, Facility to hide and show scroll bars and/or icons
		Browser refresh support at specific intervals, user can define scheduling to browsers and provide timer for auto refreshing browsers at specific intervals
		Support for video files, Image files, content preview for media files and tickers
2.4	Office documents	Support for opening MS office document formats in Excel, Word and PowerPoint on the video controller directly. Open PDF files directly on the video processor

3	OUTPUTS	4*4K output for video wall in HDMI format, vertical LCDs in the video wall should be supported.
3.1	Connectors	Connectors to be supplied to convert display in and out signals from processor to HDMI input and HDMI outputs of same make of controller
4	User management	Administrator to define users in the system and assign rights
		User rights to access features limited to as allocated by the administrator. Limit use to control specific area of video wall
4.1	Environment Management	Monitor real time temperature of the processor unit and initiate a warning or shutdown in case of exceeding threshold values set.
4.2	Backup and Restore	Facility to backup and restore data by the administrator
4.3	Configuration	Extensive options for configuration of the processor parameters like ip address, communication port numbers, processor name, paths, log sizes.
5	Preset Management	Changing/loading of pre-sets after predefined time in a loop one after the other.
		Run a particular preset in a single preset mode. Load and auto start the last saved layout on power on.
		Support for handheld devices with browser interface on wireless networks for pre-set selection. Web interface for pre-set selection to be accessed by authenticated users
		Should support Unlimited number of Pre-sets. Pre-set designer should be accessible by authorized persons in the network. Pre-set designer should not disturb the data wall during pre-set designing.

5.2	Zones	Instead of presets, the processor to be able to operate in zones. Zones to be defined as a single panel or a group of panels to display information
		Ability to map zones to inputs on the video wall. Use zones to display full/part of the source.
		Stretch and fit contents with/without aspect ratio being maintained.
6	Annotation and Remote Control	User should be able to annotate on the screen from their desktop or laptop using mouse and keyboard, User can place text labels on zones for easy identification
		User should be able to take control of the wall from their laptop or desktop to directly operate the content on the video wall like URL pages, and applications.
7	Operator Console (Windows executable)	Control predefined presets, Monitor set of preset in loop, defining different duration for each duration, Switch live input, URL, Desktop, Application on live screen
		Download save snapshot, Control Video wall, Save snapshot and annotate on video wall
		Display video process status, Restart/shutdown video process from operator console, push any url from the operator console to a specific zone of screen with system supported authentication
8	Interfaces	Interface to display alert as popup in defined area on the video wall based on api triggered by third party application.
		Standard command library for interface to third party devices
		Support for TCP/IP and RS-232 commands for pre-set selection.

9	Data Security and Service Support	Controller software to be developed by wholly owned Indian product development company. Controller OEM should have inhouse development and Service Support with India registered office
10	Wall and Controller compatibility	The Video Wall / Active LED and Controller OEM to authorize compatibility with each others make with reference installation
11	Compatibility	Video Wall Processor, Wall management software, Control processor for programming, cables, convertors, Encoder, Decoder to be of same make as of Controller to provide seamless integration and connection with lossless programming
12	Distance Connectivity	Controller OEM to provide 4 Inputs to be connected using their own Make HDMI Transmitters and Receiver for seamless and no signal distortion connectivity, Server Rack for Devices, Network Switch to be considered as per devices and site in the deliverables
13	Programming and Presets	IP Control Processor for Programming, Bidirectional control of IP enabled devices via ethernet port, Bidirectional Serial RS- 232/485 Min. 3 ports, provide wired 10/100BASET ethernet connection, easy control via IR remote, Versatile I/O ports 8, compatible with tablet or smartphone, Network RJ45, control processor for programming layouts and presets of video wall of same make of LED / Controller

14.2 65" LED Display

Smart LED Television size 65"		
#	Parameters	Minimum Specifications
1	Screen Size	65 Inch or Higher LED Back Lit Smart TV
2	Panel Technology	In plane Switching (IPS)
3	Native Resolution	3840x2160 (UHD)4K
4	Brightness	400 cd/m2
5	Contrast Ratio	1200:01:00
6	Dynamic CR	450000:1 or better
7	Orientation	Landscape
8	Viewing Angle (H x V)	178 x 178
9	Response Time	8 ms or better
10	Operation Hours	16 Hrs support
11	Connectivity - Input ports	
12	Digital	HDMI -3, RF -1
13	External Control	RS232C -1, RJ45 -1
14	USB	USB -1
15	Output Ports	
16	Optical Output -1 for digital audio	Yes
17	Built in Wi-Fi	Yes
18	Bluetooth	Yes
19	HDR	HDR10/HDR+/HDR Pro
20	Special features	WI-FI, Smart Share /Screen Share , Fail over , Wake on LAN , Wireless access point/Hotspot , Pre-loaded YouTube app , Play via URL, Audio Playback
21	Audio Power	20W(10W x 2)
22	Power Type	Built –In-Power

23	Power Supply	100 – 240 V, 50/60 Hz
24	Power Consumption	170 W or less (Typical)
25	Certificates	BIS
26	Accessories	Table stand/Wall mount, Remote, IR remote, User manual

14.3 Monitoring Workstations with Two Monitors for ICC operator

Workstations with Screen – 23.8-inch LED Monitor:		
#	Parameter	Minimum Specifications
1	Operating System (OS)	Windows 11 Professional or latest
2	CPU	Latest Intel Core i7 processor or higher
3	Memory	32GB @4400MT/s or higher DDR5 or latest ECC Memory
4	Drive	1TB or higher M.2 2280, Gen4 PCIe NVMe SSD Drive
5	Graphics Card	Nvidia RTX A1000, 8GB or higher GDDR6 Graphics Card, with mDP/DP/HDMI Ports.
6	Network connection	Gigabit Ethernet (GigE) network connection required
7	PCIe Slots	Minimum 1- Gen5 PCIe x16 slot with additional 2- or more Gen3/Gen4 PCIe slots
8	I/o Ports, Security & Misc	DP Port-2, Audio out Port, USB Port- minimum 6 (out of this minimum 4 USB 3.2), minimum Type C port-4, Discrete TPM 2.0 or higher
9	Power Supply	Sufficient Power Supply with min 80% or higher Power Efficiency

10	Monitor	Dual Height, Swivel, Tilt adjustable monitor with inbuilt speaker: 23.8-inch LED or higher size with 1920x1080 resolution @75Hz or higher having min 1DP/ 1HDMI/ 1VGA or higher for Command Centre. (Offered Workstation and Monitor should be of same make)
11	Keyboard/Mouse	USB Keyboard/ Mouse (Offered Workstation and Keyboard/ Mouse should be of same make)
12	PTZ joystick controller Compatible	Workstation should be compatible to integrate with third party PTZ Joystick controller
13	Anti-Virus	Latest Antivirus
14	OEM Criteria	OEM Warranty should be visible in the OEM website in respect to each product serial number
		The OEM should have the Technical Assistance Centre (TAC) support in India. OEM must provide toll free phone number and email ID for service & support.
		The OEM should have the presence in India from at least past 5 years.

2. Desktop-PC for officials

Minimum Technical Specification for Desktop		
#	Parameters	Minimum Specifications
1	Form factor	Small Form Factor
2	Chassis	Standard chassis
3	Chipset	Intel Q670 Chipset
4	Processor	Latest Intel Core i7 processor or higher

5	RAM	Minimum 16 GB DDR5 4400 MT/s or higher
6	Storage	NVMe 512 GB SSD
7	Operating system	Windows 11 Professional or latest (Windows Certification for the offered Model should be available on the Microsoft website)
8	Graphics	Integrated Intel® UHD Graphics 770
9	Networking	Integrated 10/100/1000 Ethernet Controller
		Integrated Intel WI-FI 6 with Bluetooth 5 and above
10	Ports	Minimum 8 USB Ports (Including 1 x USB 3.2 Type C Port and 2 x USB 3.2 Ports), 1 x HDMI Port , 1x Display Port and 1 x VGA Port , 1 x Ethernet Port and 1 x Universal Audio Port with Internal speaker in the CPU
11	Keyboard	USB Wired Keyboard (Same OEM as Desktop)
12	Mouse	USB Optical Wired Mouse (Same OEM as Desktop)
13	Certifications	RoHS, FCC, UL, CE, Energy Star 8.0, EPEAT India registered, Desktop must Windows 11 /Ubuntu / Red hat / SUSE Linux certified (Certifications must be available in the public domain against the quoted Desktop model name), TCO certifications for Monitor model (Minimum TCO 8.0 or higher)
14	Power supply	Minimum 280W or higher with min 80% or higher energy efficient power supply
15	Display	One Height, Swivel, Tilt adjustable monitor with inbuilt speaker: 23.8-inch LED or higher size with 1920x1080 resolution @75Hz or higher having min 1DP/ 1HDMI/1VGA or higher for other requirement except Command Centre (Offered Workstation and Monitor should be of same make)

16	OEM Criteria	OEM Warranty should be visible in the OEM website in respect to each product serial number
		The OEM should have the Technical Assistance Centre (TAC) support in India. OEM must provide toll free phone number and email ID for service & support.
		The OEM should have the presence in India from at least past 5 years.

14.4 Color Laser printer with scanner

Technical Specification for Color Laser Printer		
#	Parameters	Minimum Specification
1	Technology	Laser - Composite Cartridge
2	Functions	Print, Scan, Copy
3	Print speed black (ISO, A4)	Color (A4, normal) Up to 25 ppm ; Black (A4, duplex): Up to 15 ipm & Above
4	Duty cycle (monthly, A4)	Up to 40,000 pages A4; Recommended monthly page volume: 150 to 2500 pages
5	Print quality black (best)	Black (best): Up to 1200 x 1200 dpi ; Technology: 600dpi with Resolution Enhancement technology (REt); ProRes 1200 & Above
6	Print languages	PCL5c; PCL6; PS; PCLmS; PDF; URF; PWG; PCLm
7	Optical scan resolution	Up to 300 dpi (color and monochrome, ADF); Up to 1200 dpi (color and monochrome, Flatbed)
8	Connectivity, standard	1 Gigabit Ethernet 10/100/1000 Base-TX network; 1 Hi-Speed USB 2.0 (device); 1 Hi-Speed USB 2.0 (host); 1 Wi-Fi 802.11ac (dual band); Auto-crossover Ethernet
9	Memory	512 MB & Above

10	Input capacity	Tray 1 Sheets : Upto 250; Envelopes : up to 10, Maximum: Up to 250 sheets, ADF: Standard, 50 sheets
11	Output capacity	Standard: Up to 100 sheets s @ 75gsm & Above
12	Duplex printing	Automatic (standard)

14.5 Indoor Fixed Dome/Bullet camera

Indoor Vandal Dome Camera Specification		
#	Parameters	Minimum Specifications
1	Type of Camera	Vandal Dome
2	Image Sensor	1/2.7" or better progressive Scan CMOS with starlight function to get colour image even at night condition
3	Signal System	PAL/NTSC
4	Resolution & frame rate	2MP @ 25/30fps@1080P (1920×1080)
5	Minimum Illumination	0.01 Lux@ F1.6, AGC ON, 0 lux with IR or better
6	Imaging	1/3s to 1/100000s, Auto Gain Control, White Balance-Auto, Back Light Compensation, Image Rotation, Image Mirror, Multi zone Privacy Masking (4 Area), HLC, Defog, Region Of Interest (4 Areas, Rectangular) and EIS features.
7	Signal to Noise Ratio	> 56 dB or more
8	Lens Type & Focus	2.7mm ~13.5mm Motorized lens, Vari Focal
9	Angle of View	H: 109°–30°; V: 56°–17°; D: 131°–35°
10	Day & Night	True Day & Night High Performance Mechanical IR cut filter with auto switch, IR Source- Inbuilt Smart IR LED's with effective distance upto 40 Mtr or better with the help of Integrated IR.

11	Video Compression (Minimum)	H.265+/ Instastream, H.265, H.264H, H.264
12	Audio Compression	G.711a, G.711Mu, PCM, G.726
13	Wide Dynamic Range	WDR (120db or more)
14	Digital Noise Reduction	DNR (3D) On/Off
15	Video Streaming & Frame Rates	Quad streaming, configurable
		Main Stream: 1080p@(1–25/30 fps)
		Sub stream1:1080p@(1–25/30 fps)
		Sub Stream2: D1@(1–25/30 fps)
		Sub Stream3: D1@(1–25/30 fps)
17	Image Setting	Rotate Mode, saturation, brightness, contrast, sharpness adjustable through client software or web browser
18	Privacy Mask	Upto 4 Areas
19	Cyber Security	Configuration encryption, AES 256-bit Encryption, Digest, WSSE, account lockout, video encryption, IP/MAC filtering, trusted boot, trusted upgrade, trusted execution
20	Onboard Storage	Camera should support built-in Micro SD/SDHC/SDXC Card slot upto 512 GB. It should be supplied with minimum 128GB memory Card.
21	Recording Management	Format SD, overwrite, storage management, video to NAS device, remote archive access via FTP login

Indoor Vandal Dome Camera Specification		
#	Parameters	Minimum Specifications
22	Alarm Trigger & Edge Analytics	Motion/tampering detection; audio detection; network disconnection detection; IP conflict detection; memory card state detection; memory space detection, Tripwire/Intrusion. Object Abandon/

		Missing, SMD, Face Detection
	Network Compatibility	
23	Network Protocol	SFTP, IPv6, IPv4, DNS,RTCP, NTP, RTP, HTTP, HTTPS, SNMP, TCP/IP, PPPoE, NFS, UDP, ICMP, SSL, DHCP, SMTP, RTSPS
24	User Support	Minimum 20 Users
25	System Capability	ONVIF Profile S, G, M & T.
		CCTV Camera OEM should be fulltime member of ONVIF and quoted models should be listed on ONVIF official website (All the certifications & Credentials should be valid on the date of technical evaluation). The CCTV OEM should not be suspended/ blacklisted by ONVIF.
26	VMS	Camera shall support open source VMS
27	Ethernet	1 RJ 45 10/100 Ethernet port
28	Audio In/ Out	Mini. 1 Input & 1 Output port for external Mix & Speaker and 1 x Built-In Mic.
29	Alarm In/ out	Mini. 1 Input & 1 Output port for external sensors etc.
30	Power Input	Standard DC Jack
31	Power Requirement	12VDC/24 VAC/PoE (802.3af)/ePoE
32	Power Consumption	Max 10 W
33	Housing/ Enclosure	IP67 weather proof, IK10, Metallic body
34	Operating Condition	-10°C to 60°C, humidity 95% (max) (non-condensing)
35	Standards	BIS, CE, FCC, RoHS certified & ISO/IEC 27400 (OWASP Application Security verification stand. V4.0) Certified with ER

14.6 Furniture & Fixtures for ICC/DC

Minimum OEM Criteria	
1	The bidder firm shall be Original Item Manufacturer (OIM) or Authorized Representative (AR) or System Integrator (SI).
2	In case of OIM firm, proof of being Original Item Manufacturer (OIM) shall be submitted.
3	In case of SI firm, authorization of OIM(s) Original Item Manufacturer firm for their product(s) for the current tender shall be submitted (Tender number to be mentioned in authorization form).
4	Bidder firm shall obtain certificate / undertaking from the respective OIM(s) to ensure availability of spares component for entire life of the item (estimated to be 10 years)
5	Bidder firm shall submit an undertaking stating its firm or its partners or its Directors have not been blacklisted or any case is pending or any complaint regarding irregularities is pending in India or World Bank etc., or any Indian State/Central Governments Departments or Public Sector Undertaking of India.
6	Experience: Original Item Manufacturer (OIM) shall each have successfully executed minimum 10 similar orders for Control Room / NOC Rooms / Mission Critical Application in line with any of the following during last five years (Necessary proof of completion to be produced).
	a. One order of value more than or equivalent to INR 3 Cr OR b. Two orders each of value more than or equivalent to INR 1.75 Cr OR c. Three orders each of value more than or equivalent to INR 1.5Cr

	Performance Certificate: Bidder shall submit performance certificate(s) in respect of the works claimed by it against "Experience" above. These certificates duly attested and issued by the end user agencies and endorsed by the bidder, shall clearly indicate:
7	a. Name & Scope of work. b. Date & No. of Contract / Order. c. Contract Value / Quantity. d. Date of Completion of Works e. Supplied or Installed or Integrated consoles have been performing satisfactorily after completion of work.
8	GENERAL REQUIREMENTS AND SPECIFICATIONS FOR CONSOLE SYSTEM
	The following specifications detail the minimum requirements of the Console System. Bidders must respond on the enclosed chart. This allows for a point-by-point technical response stating compliance, taking exception or providing requested information. Bids submitted without this chart will be considered non-responsive.
9	Vendor shall supply the following to obtain project level approval:
a	Copy of ISO 9001:2008 Certification & ISO 14001:2004 & ISO 45001
b	Copy of Green guard certifications for full console.
c	Copy of FSC certification (Forest Stewardship Council) for Wood Components. Certificate for compliance towards sustainable forest initiative ensuring wood used is from sustainable forest harvesting.

Minimum OEM Criteria	
d	Detailed CAD (PDF format) drawings of console and equipment layouts for coordination of site measurements, architectural, mechanical, and electrical project elements for each console type.
e	Copy of test certification for the following ANSI/BIFMA test procedures performed by an independent testing laboratory or approved by a professional engineer:
	a. Concentrated Functional Load Test
	b. Distributed Functional Load Test
	c. Concentrated Proof Load Test
	d. Distributed Proof Load Test
	e. Leg Strength Test
	f. Stability under Vertical Load Test
f	Detailed CAD (PDF format) drawings of each console type with its specific equipment per application.
g	Renderings of consoles and room upon request.
h	Pre-production review, to include a drawing submittal and component listing complete with samples of selected finish materials upon request.

Minimum Specifications for Furniture & Fixtures	
#	Minimum Specifications
Furniture and Fixture	
1	Furniture and Fixture
	Console Manufacturer should have minimum below certifications a) ANSI / BIFMA Certificate for Consoles b) ISO 9001, ISO 14001 & OHSAS 18001 Certificate c) Green Guard Certificate for low emissions d) ROHS Compliance

	e) Seismic Zone 5 f) ASTM E84
2	Structure
	Console System must be of modular design. The Console design shall address the functional, ergonomic and aesthetic requirements of the particular working environment while complying with accepted human factor design and ergonomic standards for viewing distance, angle, keyboard height, and knee space requirements.
	a) Standard top height of modular control desk shall be 750 mm. The Console Table Top / Working Surface should be made of 25mm MDF Board FR+ Laminate with Polyurethane Nosing.

Minimum Specifications for Furniture & Fixtures	
#	Minimum Specifications
	b) The Basic Structure should consist of Extruded AL Profiles (6063T6 grade) binded by Top & Bottom (min 2mm) MS Frames formed in such a way as to provide maximum buckling and torsion resistance. The Front & Back Panels should be openable / removable (with Push Lock Mechanism) made of laminated MDF Board in min thickness of 18mm. The Side Panels should be fixed type, made in 26mm MDF Board Cladded on 18mm MDF Board. All panels must be attached to the frame with concealed fasteners. Console access panels (Front & Rear Panels) must be removable without the use of tools. The Front panel should be positioned in such a way that there should be sufficient leg space (min of 400mm from the front edge of the Table Top).
	c) All sheet metal / aluminium parts must be finished with electrostatic powder coating with average of min 80 microns over all surfaces.
	d) The console frame shall have provisions for leveller legs to be incorporated into the frame.
3	Work Surface/Console
	a) Table Top-The Console Table Top should be made of 25mm MDF Board with FR+ Laminate with Polyurethane Nosing. The work surface platform shall have smooth edges and transitions, thus avoiding sharp corners or potential rib catchers for operator safety.
	b) Modular Rear Wall (Slat Wall) Wall should be of min 86 mm (Height) and approx. 200-300 mm high from the Monitor Base. Modular walls shall be made of 2mm thick Extruded Aluminium (6063T6 aluminium alloy). It should have high Load bearing capacity. Minimum weight carrying capacity has to be 20 KGs per Meter.

	c) Monitor Arms It shall be capable for mounting all type of existing LCD monitor with dimensions between 17" to 27" using suitable adopter/additional base plate, if required any. Vendor shall provide the suitable adopter/additional base plate for mounting the existing LCD monitors. It shall allow the rotate/ tilt/ raise/the monitors as well as fix their adjustment. The monitor arm should be Articulating monitor arm
4	Miscellaneous: -
	a) There shall be a closed cabinet below the modular control desk for placing of CPUs on Sliding trays. Cabinet should have proper cooling system. CPU needs to be accessible from front as well as rear side of control desk for easy working and maintenance.
	b) The cabinet shutters shall be of Butt Hinged type with 18mm thick MDF.
	c) Rear shutters of each console should have provision of Airflow opening for cooling and heat dissipation effect.
	d) Rear panel shall have ventilation fans mounted on it.
	e) It shall have proper arrangement for flow of cables i.e. LAN Cable, Power cable, VGA cable, Mouse cable, Keyboard etc.
	f) Design of control desk shall allow cables from the floor cable channel.

Minimum Specifications for Furniture & Fixtures	
#	Minimum Specifications
	g) Control desk shall be equipped with individual power distribution unit (PDU) (05 no for one Bay of Single User) and capable of being switched on/off individually. Power supply socket should be 6/16 AMP type.
	h) All bolts must be of SS material to avoid rust due to environment.
5	Chairs
a	MEDIUM BACK CHAIR
b	Structure: Medium back chair
c	Mechanism: Recline-Glide Motion MB Mechanism
d	Armrest: Adjustable Armrest
e	Base: Grey Epoxy Aluminium Base (VG)
f	Base: V Base for Mesh Series
g	BIFMA & GREEN GUARD certified
h	Seat Back Adjustment, Height Adjustment, Button less chair
6	Conference/Meeting room table:
a	Conference/Meeting room table must be for 8 seater with provisions for power and data outlets. The top surface of the table must be water spill proof and smooth finish with matching laminate. The colour, size and design will be decided by customer prior to the delivery by the bidder.
7	Cabin Desk/Table for Officials
a	Each cabin will have a table for the officer/PMO etc. who will use this for day work purpose. The top surface must be made of MDF / Commercial board with laminate for a smooth finish. A side table with 3 drawers, a computer stand, bookshelf etc. The colour, size and design will be decided by customer prior to the delivery by the bidder.
8	Office area Furniture for Staffs

a	Office area furniture should be modular type. This bidder must select the furniture which has to be factory made. All modular desks must have cable management system and raceways concealed inside the desk. The colour, size and design will be decided by customer prior to the delivery by the bidder.
9	Reception Table:
a	Reception table must be for seating of 2 people with adequate size. it must have provisions for power and data point with concealed cable management system. The colour, size and design will be decided by customer prior to the delivery by the bidder.

Minimum Specifications for Furniture & Fixtures	
#	Minimum Specifications
Minimum Specification for Interior	
1	This facility being the first of its kind, scale & prestige it is mandatory for the bidder to provide Designer Control Room Solutions without compromising on the safety and functionality of the facility. Materials having the adverse impact on the environment and nature shall not be used. To ensure an integrated solution, to qualify as per the international control room design & safety norms; main bidder shall bring professional Control Room Interior Solution Provider on board with an experience of designing & manufacturing Control Rooms.
2	The scope of the project includes designing; engineering, supply & installation of 24X7 mission critical Control Centre Interiors. As this is a project of National repute, this state-of-the art facility & all its components viz Frameless glass partition, modular ceiling, flooring, modular panelling, ceiling luminaries' and its wiring etc. shall be treated as a part of one single solution.
3	The entire design proposal must be modular, Flexible, Dynamic, Scalable, Expandable and re- deployable to accommodate any technological changes / future needs which are not envisaged now. Modularity enables in quick and easy up-gradation. It is mandatory for the main bidder that the control room interior solution provider supplies all elements & executes all the activities like ceiling, flooring, panelling, partitions & illumination to avoid interface & quality related issues.
4	Modular Panelling - Self inter lockable metal panels with front sheet of Preformed Textured galvanized sheet with a coating to avoid rust.
5	It is recommended that all components which will be used in Control Room shall be Green guard Certified.
6	The Modular Metal Panelling, Modular Control Desks and Designer Metal Ceiling shall be RoHS certified to ensure restriction of hazardous substance so that the final product does not contaminate the environment.

7	Sound transmission class (STC) value should be 35 for Wall Panelling & Partition test report from reputed agency to be submitted during execution
8	Tiles Perforation – Modular wall panelling tile having clean perforations and providing smooth finish on front fascia of tiles.
9	Panelling structure shall have load carrying capacity of 300 Kg
10	Modular wall Panelling tile will have secure locking arrangement for equidistant mounting.
11	The control room solution provider shall propose three colour options in advance during approval stage and shall change the approved colour scheme in future at no cost.
12	Panelling/cladding tiles shall be designed to achieve shape and design as per the design consultant with the combination of acrylic panels with lights, designed to enhance visual feel, with provision for easy installation and maintenance.
13	Ceiling Material - Factory made acoustic modular metal false ceiling of powder coated panels.

Minimum Specifications for Furniture & Fixtures	
#	Minimum Specifications
14	Factory made acoustic modular metal false ceiling of powder coated panels. Make shall comprise of perforated and non-perforated metal panels made through CNC laser Cutting, bending & punching.
15	Ceiling in viewing gallery: The baffle ceiling shall be made of GI/MS sheet or extruded Aluminium. The ceiling baffles planks shall have integrated illumination channel which shall be processed on Machine to have dimensions to suit control room illumination requirement.
16	Modular perforated metal plank false ceiling should have Noise absorption coefficient (NRC) value 0.60 per IS:8225-1987, test report from reputed agency to be submitted during execution

17	The non-uniform gaps (up to 750mm) between the designer metal Ceiling and the adjacent walls / partition shall be covered with calcium silicate ceiling.
18	False Flooring: Top surface shall finish with Carpet flooring. Top surface should be finished with durable & environment friendly acoustic carpet pasted with special glue.
19	Carpet flooring- Minimum 4 mm thick acoustic carpet flooring shall meet the requirement of EN 1307 (shall have Impact sound of minimum $L_w = 19$ dB as per (ISO 717-2)). Flooring shall be decorative type of approved shade, pattern, texture and design and of approved manufacturer with sound absorption of 0.1 as per ISO 354. Dimensions shall be as per the final approved design and site requirement.
20	Metal Doors (with OR without Vision Panel): - With door hinges and locking arrangements and both way handle. Prepare with rigid thermos fused film metal panels. Specification: 0.6mm thick Metal panel sheets, cavity filled with honeycomb inside adequate quantity. Material of the partition and that of metal door will remain the same.
21	12mm thick frameless tempered clear glass door: - With door spring and locking arrangements and both way handle and patch fittings.
22	Illumination: - Control Room illumination shall be designed as per ISO 11064 norms.
23	Modular metal wall panels (at a height of 1.2 meters from floor) and peripheral metal ceiling tiles shall have integrated illuminated indicators. These indicators can be changed to different colours like blue, green and red during different control room scenarios viz. VIP visits, shift change and emergency respectively.
24	To achieve acoustics without deteriorating the aesthetical appeal of the control room it is necessary that the wall panelling tiles have clean micro-perforations all over the surface.
25	Material like wall paint, gypsum, wood, laminate cladding and fabric should not be used in control room interiors. Conventional office interior shall be deemed unacceptable.

Minimum Specifications for Furniture & Fixtures	
#	Minimum Specifications
26	A prototypical design approach must be adopted for design of control centres, it must be prepared in strict compliance to ISO 11064 i.e. Ergonomic Design of control centres. Professional control room interior solution provider to consider all ergonomic parameters and should cover, Lux level as per industry acceptable illumination levels, spatial arrangement for efficient & safe movement of operators within the control room during normal and emergency situations, Ideal viewing angles (of operators) to ensure little head movement and minimal eye movement.

14.7 250 KVA Online UPS with 30 min Backup

Technical Specification for 250 KVA UPS (1+1) with 30 min Backup		
#	Parameters	Minimum Specifications
1	UPS Capacity	250 KVA/ KW (3-Phase Input & 3-Phase Output) in 1+1 configuration
2	System Configuration	Modular 250 KVA On Line UPS in 1 + 1 configuration along with common Battery Bank to provide 30 minutes Battery Back up on full load. Each 250 KVA UPS should consists of minimum 5 nos. hot swappable modules of 50 KVA / KW.
		Each module shall be of double conversion, continuous duty (true on-line), hot swappable technology, in redundant- parallel operation, accommodated in the UPS system cabinet. UPS module shall consist of an individual rectifier/charger, inverter, static transfer switch and its controller. If one UPS module fails, the UPS system shall have the capability to replace the faulty UPS module

		without transfer the load on by-pass. UPS shall not have any single point failure
3	Technology and Capability	True Online configuration with double conversion IGBT based UPS without inbuilt transformer.
		DSP based technology with reduction in electronic components.
		Each 250 KVA UPS should have its independent frame with common external battery bank.
		UPS shall be Modular with Hot Swappable Identical modules. Modules shall operate in load sharing.
4	UPS Topology	3 Level IGBT
5	Input	
	Input facility -Phases / Wires	3-Phase / 5-Wires (3 Phase & Neutral + Ground)
	Nominal Input voltage	400 VAC/415 VAC (PH-PH)
	Input Voltage Range	305 VAC ~ 485 VAC (PH-PH)
	Nominal Input Frequency	50Hz (± 5 Hz)
	Input Frequency Range	40Hz to 70Hz

Technical Specification for 250 KVA UPS (1+1) with 30 min Backup		
#	Parameters	Minimum Specifications
	Input Power Factor	≥ 0.99
	Current Harmonic Distortion (THDi)	<3%

	Generator Compatibility	Compatibility to DG/Genset supply required
	Protection	UPS should have all 4 breakers (Input, Static Bypass, Output and Maintenance Bypass)
		UPS should be provided with external spike/surge protection at the input of UPS. It shall be integrated Class B (type 1) + Class C (type 2) type surge protection system. SPDs shall comply performance requirements of IEC 61643 or equivalent.
		UPS shall have built-in protection against under and over voltage, over load, including lightening surge introduced in primary AC & voltage and current surges on the output caused by load transfer
		Degree of protection IP21 or better.
		Short Circuit Protection
		Protection from deep discharge of Battery.
6	Output	
	Nominal Output voltage	380VAC/400VAC/415VAC (3Ph+N) – selectable
	Output Voltage Regulation	± 1 % or Better
	Nominal Output Frequency	50Hz
	Output Frequency Regulation	± 1% or Better
	Output Wave Form	Pure sine wave
	Output Voltage Distortion (THDv)	<1% (linear load) <3% (non linear load)
	Crest Factor	03:01
	Output Power factor	Unity (KVA = KW)
	Transient Response / Recovery	
	Transient Response	±5% (Dynamic Regulation for 10% to 90% step linear load)
	Transient Recovery	<1 cycle (steady state condition after 10% to 90% step

		linear load
	Transfer Time	Zero
	Static/Maintenance Bypass Switch	UPS shall have provision of Static & Maintenance Bypass as well.
	Overall Efficiency (AC to AC) - Online (Double Conversion)	96% or better
	Overall Efficiency (AC to AC) - ECO Mode (Bypass feeding the load under normal conditions)	98% or better
	Output Overload Rating	110% for 10min; 120% for 60 sec; 150% for 200ms

Technical Specification for 250 KVA UPS (1+1) with 30 min Backup		
#	Parameters	Minimum Specifications
	Display & Control Panel (LCD/LED Display)	
	Measurements (On LCD)	The UPS control panel shall provide a Touch Screen LCD Display of not less than 7" (7 Inches) for indication of UPS mimic diagram, status, metering, battery status, event log etc.
		a) Input: Voltage / Frequency,
		b) Bypass: Voltage / Frequency,
		c) Output: Voltage / frequency,
		d) Battery: Remaining time / Battery Level Indicator,
		e) Load: Percentage / Load Level Indicator,
		f) Battery Voltage Capacity/Status/Test-Result,
		g) System Date/Time Setting, Current Time,
		h) Individual Power Module status,
		i) UPS and Module Identification (with Serial No.)
		j) Battery nominal voltage, capacity, charging current
		k) Current & History Events
		l) Output Breaker Off,
		m) Output kVA, kW,
		n) output current,
	Fault Indication (On LCD)	a) Main Input Fault
		b) Power Module General Fault,
		c) Battery Fault,
		d) Bypass Static Switch Fault,
		e) System General Fault,
		f) Over Load Fault
		g) Over Temperature
		h) Bypass Temperature Fault

		i) Battery Open
		j) Battery voltage High
		k) Line Phase Error
		l) Bypass Phase Error
	Indications (LED)	a) Normal-Green/
		b) Battery-Orange/
		c) Bypass-Green/
		d) Fault-Red
	Alarms	a) Battery Low beep
		b) DC Fault beep
		c) UPS Overload beep
		d) o/p short circuit fault beep
		e) Shutdown beep
	Event Logs	≥ 1000 event logs

Technical Specification for 250 KVA UPS (1+1) with 30 min Backup		
#	Parameters	Minimum Specifications
	Control	Controls or programming functions are to be accomplished with the help of display unit.
		i) Silence audible Alarm
		ii) Display or set the date and time
		iii) Enable or disable the automatic restart feature
		iv) Transfer critical load to and from by pass
		v) Adjustment of upper/lower limits for different alarms
7	Battery Bank/ Battery Backup & Charger	
7.1	Battery Bank	Both 250 KVA UPS Frame should have common battery bank to provide minimum 30 minutes battery backup on full load through minimum 220800 VAH or more.
7.2	Isolator	Isolator between battery bank and UPS should be provided

7.3	Batteries Type	a) Each battery shall be SMF of 2 V Battery
		b) Battery should be warranted Onsite for 05 Years.
		c) Batteries shall have manufacturing date within 06 months from the date of supply.
		d) All batteries used in the battery bank should be of the same lot/batch.
		e) All batteries shall be of same voltage and AH capacity.
7.4	Battery Makes	Exide or Amara Raja or HBL or NED or equivalent make
7.5	Battery VAH	220800 VAH or more to provide 30 minutes battery back up.
7.6	Flexible DC Bus Voltage	DC Bus voltage should be flexible (i.e. UPS should work even after disconnecting minimum 10 Numbers of batteries from the bank)
7.7	Minimum Charger Rating (Including internal / external)	The charger should be able to deliver charging current equivalent to 10% of Battery Ah rating offered.
7.8	Charger type / Charging Method	Constant Voltage Constant Current Solid-state charger with the provision of Float Charge and Boost Charge.
7.9	Battery Housing	Should be compact and space saving MS steel open racks complete with interconnectors & accessible easily for battery maintenance.
8	Interfaces	
8.1	Interface to NMS (Network Management System)	RS232 / RS485 / MODBUS / SNMP.
9	Restart / Testing Capability	
9.1	Cold Start	UPS should start up On AC Supply (Mains) without DC Supply (Batteries). On DC Supply (Batteries) without AC Supply

		(Mains)
9.2	Automatic Restart	UPS should start up automatically on mains resumption after battery low shutdown.
9.3	Self-Diagnosis	UPS should be capable to carry out self-test of Rectifier / Charger / Battery & Inverter module during start-up.
	Self-Capacity test	Full load capacity test of the UPS at site, Load to be provided

Technical Specification for 250 KVA UPS (1+1) with 30 min Backup		
#	Parameters	Minimum Specifications
		by vendor.
	Sleep mode operation	When the load is minimum some of the modules should periodically go to sleep mode so that efficiency will increase & less Input Power is drawn.
	Intelligent Fan Regulation	Fan speed should be automatically controlled based on load / temperature inside the UPS.
10	Physical	
10.1	Cabinet	UPS shall be made of rugged enclosure made of M.S sheet of minimum 1.2 mm thick, aesthetically finished, duly preheated and powder coated.
10.2	Operating Temperature	°C to 40°C
10.3	Operating Humidity	Up to 95 % RH
10.4	Operating Altitude	0 to 1500 M without derating
10.5	Type of Cooling	Forced Air
10.6	Acoustic Noise Level @1 meter	≤ 65dBa or better

10.7	Air Filters	UPS should have internal anticorrosion air filters for dust filtration
10.8	Dimension (w x d x h) in mm	To be furnished by the vendor. Detailed Drawings with relevant details to be provided within technical bid.
10.9	Weight - in kg	To be furnished by the Bidder
11	Certifications	
11.1	Manufacturer Certification	ISO 9001, ISO 14001, ISO 45001, ISO 50001 & ISO / IEC 14025:2016 & EPR certification as per notification from Central Pollution Control Board (CPCB) under MoEFCC, Govt. of India.
11.2	Product Safety Compliance	Safety : As per IEC/EN62040-1
		EMC : As per IEC/EN62040-2
		Performance: As per UL 1778 or IEC/EN62040 -3
11.3	ROHS compliance	UPS should be ROHS compliance. Certificate / declaration to be enclosed
12	General	
12.1	Customer Support	24X7 Customer Support must be available
12.2	Minimum Eligibility Criteria:	1) Bidder should submit OEM's technical literature / brochure of the offered model, which should be fully complied with the specification as mentioned above otherwise the bid will be disqualified.
		2) The UPS OEM shall be an established UPS Manufacturing company registered in India under the Companies Act, 1956 having operations in India (Product should be made in India) with minimum 10 years of existence. Copy of Certificate of Incorporation shall be submitted.

Technical Specification for 250 KVA UPS (1+1) with 30 min Backup		
#	Parameters	Minimum Specifications
		3) The OEM should attached their proof of past experience during previous 10 years and more for supply and installation of On Line UPS / Modular UPS of minimum 100 KVA and higher ratings in India / Bihar - Jharkhand to prestigious Govt. / Defence / Research Institutions / PSU. Copy of P.O / Installation report / Work completion certificate / Performance certificates should be submitted towards evidence along with technical bid
		4) OEM must have deputed minimum one Service Engineers in all 38 Districts of Bihar and at least one Service Centers in all 9 Commissionaires /division of the state, to ensure and provide the prompt service support.

14.8 IPABX with 25 Phones

Minimum Technical & Functional Specifications for IP-PBX Solution	
#	Minimum Specifications
1	Proposed IP-PBX solution should have pure IP Platform. IP PBX must be having expandable Capacity of upto 1000 IP Extensions without cascading of hardware/appliances or virtual instances.
2	The solution should be processor based only. The software should be from indigenous and globally known OEM. No open source or Asterisk based solution is

	allowed.
3	Call Servers must support active-active redundancy.
4	The proposed platform should be scalable enough to support upto 100 CC session on a single Platform.
5	Protocol to be supported: SIP/H.323
6	Coder-decoder (codec) support for automated bandwidth selection: G.711 mu-law, a-law, G.729.
7	Should support appropriate Video Codec H.264 and H.263
8	The system should have IP architecture and provide support for integrated telephony solution for IP Phones, Video Phones, Mobile based SIP Client, all 3rd party Mobile SIP Client, E1 / PRI, SIP and all 3rd party SIP gateways, GSM Gateways.
9	Must be able to do bulk add and delete operations for devices and users.
10	Alternate Automatic Routing, Auto route selection and Least Cost Routing should be available.
11	The application should have inbuilt SIP / VOIP trunk facility without any additional module.
12	The system should support unlimited SIP Trunk functionality for trunking with SIP Supported Devices without the need of procuring any additional Licenses.
	The System must be able to integrate 3 rd Party SIP Phones without the need of procuring specific licenses.

Minimum Technical & Functional Specifications for IP-PBX Solution	
#	Minimum Specifications
13	System should have inbuilt facility for at least one PSTN SIP Trunk termination
14	Support for configuration database (contains system and device configuration information, including dial plan)

15	Digit manipulation and call treatment (digit string insertion, deletion, stripping, dial access codes, digit string translation)
16	Must provide Centralized call processing
17	The solution should support routing of incoming calls based upon caller input to menus, real-time queue statistics, time of day, ANI, etc.
18	Proposed IP-PBX Solution must support below Features Out-of the Box without any separate Hardware Module/Software Licensing:-
18.1	Abbreviated Dial
18.2	Call back if busy, no reply to station
18.3	Call forward—all (off net and on net)
18.4	Call forward—busy
18.5	Call forward—no answer
18.6	Call hold and retrieve
18.7	Call status per line (state, duration, number)
18.8	Calling Line Identification
18.9	Calling Line Identification Restriction call by call
18.1	Calling party name identification
18.11	64 Party Meet me conference bridge (Multiple Rooms)
18.12	Automatic Scheduled conference with moderator control Panel
18.13	Call Paging : Manual and IVR Driven
18.14	Direct inward dial (DID)
18.15	Extension mobility support
18.16	Immediate Divert to voicemail for all extensions
18.17	100% Voicemail to Email for all extensions without any additional hardware
18.18	Automatic Call back
18.19	Inbuilt 100% Call Recording for all extensions without any additional hardware.
	Recording of each call can be access over Admin Web GUI.
	- System must have the functionality to allow remote playback via internet browser and Windows Media Player.

	- System must have the functionality to archive and search both inbound and outbound call files according to parameters like: Date and Time, Caller ID, Name. - System should support functionality to archive voice recordings.
18.21	Call Monitoring
18.22	Call Barge in
18.23	Call Whispering
18.24	Inbuilt Rating and Charging for extension wise call control
18.25	Inbuilt SIP trunk ready platform
18.25	Proposed solution must have MLPP feature

Minimum Technical & Functional Specifications for IP-PBX Solution	
#	Minimum Specifications
19	Proposed IP-PBX Solution must provide below Administrative Features:
19.1	Should have “web-based administration UI with capability to delegate administrative specific task to designated users”
19.2	Call detail records (System wide, extension wise) must be available in the same interface as that of web based administrative UI
19.3	CDR should be downloadable in various formats like PDF, CSV, Excel
19.4	Configuration of all Class 5 features via Web based GUI
19.5	Recording File must be played on the GUI and should be downloadable by the administrator and shall be playable in any audio player.
19.6	Administrator should have access to Live Dashboard to see the details of Helpdesk Executive and Live call status.
CONTACT CENTER & IVR Helpdesk Software Specifications	
#	Minimum Specifications
1	The solution should support ACD based on algorithms such as longest available Helpdesk Executive, Circular Helpdesk Executive selection algorithms, Random selection and Most Idle Helpdesk Executive.
2	Supervisor/Admin should be able to see the real-time status of Helpdesk Executives, Live Calls, Calls in queue & break status.
3	Supervisor/Admin should be able to download all reports in PDF, CSV and Excel format.
4	IVR should Play welcome messages to callers Prompting to press and collect required input.
5	Multi-level IVR should be supported to route the call automatically.
6	Helpdesk Executives should be able to log the conversation by means of fields on his screen. This data should be saved and popped up if the call is received again.

7	All the existing/new Toll Free/GSM Numbers must be integrated with the proposed CONTACT CENTER Helpdesk Solution for Centralized Complaint Management so that the client can log the complaint over IVRS & can get expert support immediately.
8	Proposed System must support Multi-Level IVRS so that Incoming Calls can be greeted automatically as per treatment configured in the system and can be further routed to respective user as “Auto Attendant System”
9	Proposed system should have all the require API & Web Services available to integrate with 3rd party business applications like; SCADA,ERP
Reporting Specifications:	
#	Minimum Specifications
1	Platform should have built-in real time dashboard and historical reporting
2	It should be possible to assign threshold to real time on an agent screen for alert purpose
3	It should be possible to change the Agent state from real time display
4	It should be possible to see real time states of ongoing calls and agent state.

5	Common statics related to Agent state, Agent staffed, Idle Agents etc. on graphical real time displays
6	Inbound Call History
7	Inbound Call Received by Agents & Call Duration
8	Outbound Call History
9	Outbound Call Dialed Number with Duration
10	Agent Call Received History
11	Day/Month Wise Inbound/Outbound Call Details
12	Total Dropped call Details
13	Abandoned call report
14	Reporting, Real Time Displays
15	should provide CDR Report
16	should provide Agent performance report

17	should provide Abandoned calls details
18	Should provide agent-based reports
19	System should have predefined reports
20	Report should be exported to CSV and .XLS format
21	Should have Browser based Administration
22	Agent Performance
23	Advance Call Reports
24	Outbound Reports
25	CDR Reports
26	Call-By-Call Reports
IP Phone Specifications	
Sr. No.	Minimum Specifications
1	Display : 4 Inch plus Display Size with Color screen and high resolution
2	Supported Codecs:G.711a/u, G.729AB, iLBC, Opus
3	Call Logs: min 700 Entries for Incoming, Outgoing and Missed
4	Phonebook: Local Phone Book supporting 2000 Contacts in addition to remote Phonebook via XML/LDAP
5	Network Port: Should have dual port, one with PoE and other for Computer/Laptop
6	Network Speed: Dual Gigabit Ports
7	Supported IP Modes: IPv4/IPv6/IPv4&IPv6
	Supported IP Config Mode: Static IP/ DHCP / PPPoE
8	Headset: Should have RJ-9 supported Headset port. Should also Support EHS Wireless Headset
9	Handset: Should have separate port for Headset and Handset
10	Power: DC Power Input: 5V/2A, Should support PoE in addition to option of Power Adapter
11	Firmware Upgrade should be supported via Common methods such as HTTP/HTTPS/FTP/TFTP

12	Should support 6-party audio conference
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13	Configuration should Web Based config
14	Should have enhanced HD Audio Communication on Speakerphone and Handset
15	Phone should come with two adjustable angles for easier access
16	DTMF: In-band, Out-of-Band – DTMF-Relay (RFC2833) / SIP INFO
17	Supported Protocols: SIP2.0 over UDP/TCP/TLS, RTP/RTCP/SRTP, STUN, DHCP, LLDP, PPPoE, 802.1x, L2TP, OpenVPN, SNTP, FTP/TFTP, HTTP/HTTPS, TR-069
18	Must Support Auto-Provisioning via FTP/TFTP/HTTP/HTTPS/DHCP OPT66/SIP/PNP/TR- 069
19	Must have features of Syslog and Web-Based Packet Dump for Management/Troubleshooting
20	USB Port for connecting Wi-Fi Dongle or Flash Driver
21	Must have over 12 tricolored Programmable Physical DSS Keys
22	5 Dedicated Function keys (Hold, Call forward, Conference, MWI, Headset, Redial)
23	Voice Quality Enhancement: Full-duplex Acoustic Echo Canceller (AEC), Voice Activity Detection (VAD) / Comfort Noise Generation (CNG) / Background Noise Estimation (BNE) / Noise Reduction (NR)

14.9 Access Control System

Biometric Controller & Card and accessories		
#	Minimum Specifications	
Smart Reader cum Controller		
1	Type	Capable of reading contactless smart card (ISO 14443 1/2/3/4 A and B). 8 Kbytes storage on smart card
2	Read Range	Up to 10 cm
3	Memory	Hot List and Blacklist data
4	Memory	● Minimum 1000 and expandable up to 25000
5	Memory	● Entry / Exit data
6	Memory	● Minimum 1000 and expandable up to 50,000

7	Memory	Chip Serial No. (CSN) shall be used for hot listing & blacklisting. Entry/Exit data indicate Date & Time of Entry/Exit (Time stamp) corresponding to the card holder accessing the gate. Communication between Reader & Server shall be through SSL
8	RTC	Built in most accurate RTC (Real Time Clock) with Lithium Cell Backup
9	Communication	Ethernet (TCP/IP)
10	Outputs	Relay output

11	Cryptography	3DES/AES (with 128 bit encryption)/RSA Multiple Application Platforms should be supported by the Controller so as to avoid 'Proprietary Scenarios' . Application should support standard OS platforms such as Windows or UNIX or Linux etc
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Biometric Reader

1	Scanner Type	Optical
2	Sensing Area	As per ISO 19794-2
3	Response Time	Less than 2 seconds for single transaction
4	Operating Temperature	0 to 45 degree Centigrade
5	Storage Temperature	0 to 50 degree Centigrade
6	Humidity	10 to 80%
7	Reaction time	< 1.5 sec in 1:1 mode
8	Operating system	Application should support standard OS platforms such as Windows or UNIX or Linux etc
9	Keypad Reader type	Alphanumeric keys or touch screen
10	Display Type	LCD or equivalent

11	Network Controller	Biometric reader should be able to control single door'
12	Network Controller	Access decisions shall be made at each door controller, without reference to any other
13	Network Controller	control or monitoring equipment
14	Network Controller	The Access Controller shall continue to operate in the event of mains failure for not less than 2 hours.
15	Network Controller	fire input should be available in reader'
Other Features		
1	Device should support Vandal-proof IK09.	
2	Device should support Power over Ethernet POE (Optional).	
3	0.0001% FAR; 0.1% FRR in Ideal Conditions	
4	Device should support Dust/ Water Resistance IP65.	
5	Fingerprint Reader should have min 32 bit ARM9 CPU processor or better for fast processing.	
6	Fingerprint Reader should be able to download punch information of employees from the readers in real-time. There should be no batch process required.	

7	Fingerprint Reader shall be manufactured using the latest and most accurate state of the art technologies like reading Fake Fingerprint Detection, Auto Push, Server Authentication and shall support high speed processing.	
8	CE / FCC / BIS / ROHs / WPC.	
9	Reader should have min 128MB RAM; 32 MB Flash.	
10	System should give warning alarm in case of tampering with machine.	
11	Shall have UL Listed external power supply required for internal operations.	
12	Device should support Anti Pass back feature (Hard , Soft, User wise Antipas back)	

14.10 Fire and Smoke Detection and Alarm System

Minimum Specification for Fire Detection and Alarm System	
#	Minimum Specifications
1	The fire alarm control panel(s) shall be a multi-processor based networked system designed specifically for fire, one-way emergency audio communications and smoke control applications. The system shall be based on a microprocessor-driven control panel or better with the following capabilities and features: (i) Continuous monitoring of all fire alarm components. (ii) Supervision of all devices and circuits to ensure proper functionality. (iii) Efficient management of detection, alarm signalling, and evacuation processes.
2	The operating controls shall be located in a dead-front steel enclosure behind a locked door with viewing window. Communication between network nodes shall be supported, with each node functioning as a self-contained, intelligent control panel. These panels shall provide system-wide displays and be capable of networking with other nodes.
3	The local system shall provide status indicators and control switches for the following functions: (i) Audible and visual notification circuits for zone-specific alarm control. (ii) Monitoring of sprinkler system devices , including water-flow sensors and valve supervisory devices. (iii) Additional status indicators or control functions as specified in the system design, such as emergency generator monitoring, fire pump operation, door unlocking mechanisms, and security bypass capabilities.
4	Each addressable or conventional zone device on the system shall be identified and monitored at the main control panel, allowing for precise location reporting of alarms, supervisory signals, and fault

	conditions.
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5	Each control panel shall include the following capabilities: Support multiple languages / dialects. Supervision of the system electronics, wiring, detection devices and software Up to 2500 analog/addressable input/output points Network, a dedicated IPv6 configuration and support mesh configuration. Network configuration support for Class A, Class B, Class X, Class N. Network physical media connections via fiber, twisted pair, or CAT5 in any combination. Network distance between two panels up to 3,280ft using CAT5 wire, 5,000 feet using twisted pair wire Networks deployed with CAT5 wire shall support Class A, Class B, Class X, Class N, mesh wiring topologies. Network support for back-to-back pass through degraded-mode operation for media to media applications. Network back-to-back pass through shall maintain network connectivity on power down or catastrophic failure of a single panel. The ability to download all applications and firmware from the configuration computer at a single location on the fire network. The ability to upload project files from any location on the fire network Panel time, panel audible signal patterns, and indicator flash rates are synchronized across the network. Connections to outside systems shall be made via a listed for the purpose firewall interface. Support multiple dialers (DACTs) and modems, IP communication to the central station and cellular connections. Support multiple IP connections to external services including, central stations, email servers, web interfaces, and reports. Email messages support multiple languages in native characters and match the languages supported in the panel Email messages support symbolic and color alarm event high lighting. System reports provide a graphical representation of sensitivity thresholds, detector dirty level and CO Life left. An internal audible signal with different patterns to
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	distinguish between alarm, supervisory, trouble and monitor events Support multiple 24 VDC and Audio NACs Configurable switches and LED indicators to support auxiliary functions with software selectable LED colors of Red, Yellow, Blue, Green or White. User interface through color touch screen LCD display. Log up to 20,000 chronological events A real-time clock for time stamps and timed event control with onboard power back-up Electronic addressing of intelligent addressable devices Provide an independent hardware watchdog to supervise software and CPU operation The ability for “Dry” alarm, trouble and supervisory relay contacts Control panel modules shall plug into a chassis assembly for ease of maintenance Field wiring shall connect to the panel using removable connectors
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6	A color touchscreen / ALPHANUMERIC keypad user interface control/display that shall annunciate and control system functions. Provide discreet system control switches for reset, alarm silence, panel silence, drill switch, these system control switches shall be constructed of a silicon rubber to provide tactile feedback and include an accompanying indicator that shall provide additional visual feedback of switch activation. Overlay style embedded switches are not considered equal. The reset, alarm silence, panel silence and drill system control switches shall provide color coding for ease of distinguishing one from the other. display panel shall provide visibility of 8 events hands free. Each event can include a minimum 40 character site specific location text. The LCD/Display 7" allows the use of on screen scrolling via display switches or by 'swiping' the display screen. An authorized user shall have the ability to operate or modify system functions including system time, date, passwords, holiday dates, restart the system and clear control panel event history file. An authorized user shall have the ability to disable/enable devices, zones, actions, timers and sequences.
7	SLC loop controller diagnostics shall identify common alarm, trouble, ground fault, Class A fault, and map faults. Map faults include wire changes, device type changes by location, device additions/deletions and conventional open, short, and ground conditions. Ground faults on the supervised circuit wiring of remote addressable modules shall be identified by device. Systems that provide only device address are not considered equal. An authorized user shall have the ability to generate a report history for alarm, supervisory, monitor, trouble including restore activity. The panel history shall support storage of up to 20,000 events. History events shall include but not be limited to Event Type, System Command operations, Date and time of the event. Reports shall be displayed locally on the panel LCD display, printed to a system printer, review through a web browser and support exporting to .xml file format.

8	A Windows-based Configuration Utility (CU) shall be used to create the site-specific system programming. The utility shall facilitate programming of any input point to any output point. The utility shall allow customization of fundamental system operations using initiating events to start actions, timers, sequences and logical algorithms. · Zoning of initiation devices. · Initiation of events by time of day, day of week, day of year. · Initiation of events by matrix groups (X-Y coordinate relationships) for releasing systems. · Prioritizing system events. · Programmable activation of detector sounder bases by detector, groups of bases, or all bases. · Directing selected device messages to specific panel annunciators · Detector sensitivity selection by time of day · Support of 256 Central Monitoring Station accounts and directing selected device messages to any one of ten Central Monitoring Stations. · Support for event driven SMS notifications via SMTP servers
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Minimum Specification for Fire Detection and Alarm System	
#	Minimum Specifications
9	System power supply(s) shall be a high efficiency switched mode design providing multiple supervised power limited 24 VDC output circuits as required by the panel and external loads fed by the panel. Each system power supply shall be individually supervised. Power supply trouble signals shall identify the specific supply and the nature of the trouble condition
10	Each fire alarm control panel shall be capable of supporting a backlit color LCD display. The display on each system panel shall be configurable to display the status of any and/or all combinations of alarm, supervisory, trouble, monitor, or service group event messages on the network. Each LCD display on the system shall be capable of being programmed to allow control functions of any combination of panels on the entire network. All panel touch screen / Alphanumeric LCD displays shall use resistive technology, be a minimum of 5.7 inches in size and support a minimum of 256K colors. Each display shall support the display of a minimum of 8 events simultaneously without the need to scroll, or make manual selections at the display.
11	The LCD display shall provide a minimum of 10 separate event queues to minimize operator confusion by automatically categorizing event types, the queues shall include but not be limited to Alarm, Emergency, Supervisory, Disables/Bypasses/Test, Ground Fault, Monitor, and FirePhone call in. To further enhance the usability only queues with events shall display, queues without active events shall not be displayed. It shall be possible to scroll through and view specific alarm, trouble, supervisory and monitor events separately. Having to scroll through a mixed list of event types shall not be considered as equal. The total number of active and disabled events by type shall be displayed. Visual indication shall be provided of any event type that has not been acknowledged or viewed. It shall be possible to customize the designation of all user interface LEDs and Switches for local language requirements.

12	The display shall support Instructional text messages by event of up to 2,000 characters each. Receipt of alarm, trouble, and supervisory signals shall activate integral audible devices at the control panel(s) and at each remote annunciation device.
13	The LCD display shall contain the following system function Buttons System Event Message Queue Scroll Bar. Details Button (provides an additional 2000 character instructional text message about the device highlighted by the operator.) Print Button Action Bar
14	Provide a fully integrated one-way voice firefighter's telephone system between the main fire alarm panel remote fire panels, remote annunciators and remote firefighter's phone jacks and firefighters' telephone. The firefighter's telephone system shall provide 4-state supervised (opens, shorts, ground faults) two-way communications between remotely located fire panels, remotely located phones and the main fire alarm panel.

15	The network inter-panel wiring shall be designed to support the topologies required by the project including mixes of ring, bus, star and mesh. The network shall support physical media connections via fiber, twisted pair or CAT5 in any combination. Networks restricted to Class N wiring shall not be acceptable.
16	The Network shall support data transmission of panel-to-panel data, voice audio and firefighters' telephone data on a single twisted pair or single optical fiber. The system supplied under this specification shall utilize panel to panel, direct wired peer-to-peer IPv6 network operations. The network shall be 'plug and play' networking, not needing a network administrator to configure the network. The system shall utilize independently addressed, smoke detectors, heat detectors and input/output modules as described in this specification.

17	The signaling line circuit connecting panels/nodes to intelligent addressable devices including, detectors, monitor modules, control modules, isolation modules and notification circuit modules shall be <Class A>< Class B><Class X>. All signaling line circuits shall be supervised and power limited. When the addressable devices on a signaling line circuit cover more than one designated fire/smoke compartment, a wire-to-wire short on the circuit shall not affect the operation of the addressable devices in other fire/smoke compartments. Each SLC shall support 125 addressable detector addresses and 125 module addresses. The SLC shall support 100% of all addressable devices in alarm and provide support for a 100% compliment of detector isolator bases. Initial circuit loading shall not exceed 80% in order to allow for future system expansion. T-taps (branching) shall be permitted on Class B circuits. Where possible, the devices installed at the end of each branch should be easily accessible for troubleshooting, e.g. a pull station at normal mounting height. <The system shall support Class B T-taps (branching) from Class A risers.> The addressable device SLC module shall be UL Listed for use with code compliant, electrically sound existing wiring. Each intelligent addressable device shall transmit information about its location with respect to other devices on the circuit. This information shall be used to create an “As-Built” wiring diagram as well as provide enhanced supervision of a device’s physical location. The device message and programmed system output function shall be associated with the device’s location on the SLC circuit location and not a device address.
18	The SLC shall support 100% of all addressable devices in alarm and provide support for a 100% compliment of detector isolator bases. Initial circuit loading shall not exceed 80% in order to allow for future system expansion.
19	All notification circuits shall be supervised and power limited. All notification appliance circuits shall be Class B. Initial circuit loading shall not exceed 80% in order to allow for future system expansion.
20	Audio notification appliance circuits shall be polarized and have a minimum circuit output rating of 50 watts @ 25V audio, and 35 watts @ 70V audio

21	The emergency audio shall contain a paging microphone and zoned amplifiers capable of delivering multi-channel audio messages. The system shall support a minimum of 100 audio channels.
22	The audio system zoned amplifiers must be able to operate 25 VRMS or 70 VRMS speakers and be power limited and protected from short circuit conditions on the audio circuit.
23	The system shall provide off premises communications capability using a Digital Alarm Communications Transmitter (DACT) for sending system events to multiple Central Monitoring Station (CMS) receivers.
24	The dialer shall support up to 255 individual accounts and to send account information to eight (8) different receivers, each having a primary and secondary telephone access number. System events shall be capable of being directed to one or more receivers depending on event type or location as specified by the system design.
25	The main fire alarm panel shall have a UUKL listing for smoke control. The FSCS shall include switch/LED modules that provide three function (on/off/auto and open/closed/auto) switches and 4 LED's (normal, on, off, fault or normal, open, closed, fault) for each smoke control system.
26	The FSCS shall utilize a 3 function switch for each smoke control system. Each switch shall include On/Off/Auto function for control of smoke control fan systems and Open/Closed/Auto positions for Smoke Control Dampers systems.

27	General A. The entire system shall be installed in a skillful manner in accordance with approved manufacturer's installation manuals, shop drawings and wiring diagrams. B. All work shall be performed in accordance with the requirements of NFPA 70 and NFPA 72. C. Coordinate locations of all devices with all other divisions' drawings and specifications. D. All fire alarm devices shall be accessible for periodic maintenance. Should a device location indicated on the contract drawings not meet this requirement, it shall be the responsibility of the installing contractor to bring it, in writing, to the attention of the Project Engineer. E. Fasten equipment to structural members of building or metal supports attached to structure, or to concrete surfaces. F. All systems and system components listed to LPCB . G. No wiring except life safety system circuits and system power supply circuits shall be permitted in the control panel enclosures. H. Any low-voltage copper wiring that leaves the protection of a building shall be provided with a compatible LPCB listed transient protection devices where the circuit leaves the building and where it enters the next building. I. Devices containing end-of-line resistors shall be appropriately labeled. Devices should be labeled such that removal of the device is not required to identify the EOL device. J. Fiber Optic Cable 1. Only glass filament cable permitted. Plastic filament fiber optic cables are not acceptable. 2. LC connectors shall be used at all equipment terminations. K. Concrete floors shall be X-rayed prior to core drilling on post tension slabs. Verify with engineer on type of slab prior to bid.
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14.11 Cassette AC 4 Ton

Minimum Specification for Cassette AC- 4 TR	
#	Minimum Specifications
1	AC Unit with wireless remote & anti corrosion finish stand for outdoor unit. The AC units will be min 3 Star rated for energy efficiency.
2	4 TR Cassette AC
3	Copper refrigerant piping of required size with insulation making opening / cut-outs in partitions, brick walls as required complete.
4	Electrical Cabling for 4 TR AC unit indoor to outdoor making opening / cut-outs in brick walls, partitions as required complete.
5	Copper refrigerant piping with insulation making opening / cut-outs in brick masonry walls, partitions for 4 TR AC units
6	Electrical Cabling for 4 TR AC unit indoor to outdoor making opening / cut-outs in brick masonry walls, partitions
7	Drain piping for all AC units making opening / cut- outs in brick masonry walls, partitions

14.12 Split AC 2 Ton

Air-conditioning system-Split	
#	Minimum Specification
1	Capacity – 2 TR. With Remote control
2	Industry standard efficient Compressor
3	Power Supply – One Phase, 230 V, 50 Hz
4	Air Flow Rate – More than 500 CFM
5	Noise Level -34- 46 dB
6	Wall hanging Automatic Voltage Stabilizer having Delay timer, power indicator with Volt-

	Meter
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14.13 Integrated Command and Control Centre (ICCC) Software

Minimum Technical Specifications for Integrated Command and Control Center (ICCC) Software	
#	Minimum Specifications
1	The Integrated Command & Control Center Platform (ICCC) shall be an enterprise class IP-enabled application. The ICCC user interface (UI) applications shall present a unified security interface for the management, configuration, monitoring, co - relation, intelligence and reporting of various embedded systems and associated edge devices.
2	The Command & Control solution should be Cloud ready and has to be Cloud Agnostic.
3	System shall be able to normalize the data coming from different devices of same type or different data sources and should support Common Standard Open Data Models for data normalization (i.e. Different VMS from different OEMs, etc.) and display unified view of alerts
4	Command & Control Application must use the latest application architecture models for better interoperability and performance.
5	System must have load balancing and high availability to meet SLA.
6	The Command & Control Application must have the capability to perform collection of data from the devices or sensors through the APIs provided by the sub-systems.
7	The ICCC shall support the seamless unification of various Public Safety element CCTV Surveillance System Video Management Software, AI Based Video Analytics Software, Facial Recognition Software & Intelligent Traffic Management/Enforcement System (ITMS/ITES) under a single platform.
8	The ICCC user interface (UI) applications shall present a unified security interface for the monitoring, co - relation, intelligence and reporting of various Embedded Systems, Sub- Systems and associated edge devices.

9	The ICCC platform must be a true unified management experience for critical infrastructure Monitoring, simplifying control room operation and system integration, minimizing total cost of ownership, and increasing operational efficiency critical to rapid decision-making.
10	The Command & Control solution should be implemented and complied to the industry open standards based Commercial-of- the-shelf (COTS) products.
11	Platform shall be open architecture based, Highly Scalable and able to integrate multiple disparate Video Surveillance systems seamlessly on a common platform.
12	Platform system shall provide a real time Common Operating Picture (COP) of all areas involving all agencies using a simple GUI.

Minimum Technical Specifications for Integrated Command and Control Center (ICCC) Software

#	Minimum Specifications
13	System should provide tool to define/create any event/rule based Standard Operating Procedure (SOP) for decision making by optimizing the time to resolution for emergency and crisis situations.
14	Platform shall provide a dashboard functionality to manage workflows by integrating information from different agencies and systems to facilitate responsive decision making.
15	The CCC shall embody the following characteristics:
16	i. Client-server Architecture
17	iii. Provide clear scalability
18	iv. Central administration capability
19	v. Support local redundancy and high availability options
20	vi. Capable of running in a virtual environment
21	vii. Provide a mechanism to define key performance indicators, trends, leading indicators and visualize the indicators on a web based configurable dashboard infrastructure
22	viii. Display a configurable indication of overall situation threat level
23	ix. Provide communication capability to include email, mass notification, and application-based messages
24	x. Support the simulation of events, such as alarms, for training purposes.
25	xi. The System shall be Modular & Scalable & allows for customisation to meet precise need of customer's unique requirement.
26	xii. The System shall render services of Video Surveillance, Central Alarm, connection services to 3rd party data bases, Consume or Source web services.

27	xiii. The System shall have Graphical User Interface & tools to create Workflows & Rule Engine.
28	Integration Features
29	System must provide a comprehensive and industry accredited Unified Open Standard API (Application Program Interface) or SDK (Software Development's Kit) to allow interfacing and integration with existing systems, and future application and sensors which will be deployed on the field.
30	Command & Control Application should have the capability to be integrated with Video Management System (VMS) through SDKs and APIs shared by their provider and shall have the following functionalities:

31	All the alarms should be shown in same system. The systems should have ability to integrate with devices by either sending events from or receiving events from other devices. Event SDK support required. Events from Video System should be able to integrate with third party applications and devices.
32	Integrated Command, Control, and Information Management System (ICCC) for handling all security operations-related tasks and improve work efficiency
33	The ICCC system shall be able to integrate, connect, and correlate information from security data and information from the following security subsystems using Ethernet- based connectivity:
34	o CCTV Video Management Software
35	o AI Based Video Analytics Software
36	o Intelligent Traffic Management/Enforcement System (ITMS/ITES)
37	The ICCC system shall be able to integrate, connect, and correlate information from security data and information from the following security subsystems using Ethernet- based connectivity.
38	The ICCC system shall enable the operator to quickly visualize the environment and assess alarm by reviewing related security information.
39	Graphical User Interface (GUI) Display Functions
40	View and handle multiple alarms at one time.

41	View multiple video windows at one time. Operators shall be able to resize and move video windows.
42	View windows in a single monitor, across multiple monitors or video walls.
43	Access, display and manage events / alarms and related security data and information from subsystem based on priority and authority level.
44	GIS Maps
45	Shall have the capability to connect and bring the base map from online map sources (OSM Map, Google Map, Bing Map, etc..). Ability to add maps defined or given by customer through GIS Map server.
46	Each map should support multiple layers or hierarchy of Base Layer and Overlay layer. Execute Query on layers and export the results.
47	Shall allow all resources, objects, sensors and elements on the map to be georeferenced such that they have a real-world coordinate.

48	The GIS application shall enable real time information dissemination (Geo-Spatial and Non-Geo-Spatial data)
49	The GIS application shall enable users to open up a new incident and directly associate it with a map location or to associate an already opened incident with a new map location.
50	The system shall also be capable to receive an API call which will open up a new incident and automatically place it on the map using a map location passed via API / Web Services. The relevant map location shall be displayed on the map for as long as the incident is open.
51	Customized Dashboards based on widgets and user selected options
52	Shall visually display an alarming sensor on map.
53	Shall allow user to view sensor and related name from the displayed map.
54	Shall visually display an alarming sensor on map.
55	Shall visually differentiate sensor alarm on map through color and icon identifiers
56	Allow user to choose camera from map to view live video.

57	Shall allow user to choose camera to play, pause, stop, fast-forward, rewind, and play recorded video from preset time
58	Video Display Integration
59	Shall view live or recorded video from resizable and movable windows/Grid.
60	Should have an ability to perform video controls for video systems from workstation
61	Shall play, fast-forward, rewind, pause, and specify time to play recorded video
62	Shall take a video still image (snapshot) from live or recorded video
63	Shall allow user to choose camera from map to move PTZ cameras
64	Shall view Video in Video Matrix.
65	Shall display in 1x1, 2x2, 3x3 and 4x4 window formats
66	Shall enable operator to specify video windows to be displayed in matrix/ Video Wall.
67	Shall enable matrix settings to be saved per user
68	Shall be able to define view either live or recorded video or both Simultaneously can be displayed in the video matrix window.
69	Shall enable video snapshot to be taken and saved from any window pane in the matrix view

70	Shall enable the user to pause the rotation of video and resume the video rotation again
71	Shall enable times between new video to be adjusted
72	Shall view live or recorded video from CCTV Camera / VMS
73	Shall enable user to only view and control video for which they have been assigned permissions by the administrator
74	Shall manually create an alarm from the live or recorded video with specified severity and description
75	User Specific & Customizable Dashboard
76	Collects major information from other integrated sensors/platforms.
77	Multi-displays configurations

78	Shall have capability to connect and bring the base map from online map sources (OSM Map, Google Map, Bing Map, etc..)
79	Should provide tools to assemble personalized dashboard views of information pertinent to incidents, emergencies & operations of command center
80	Should provide historical reports, event data & activity log. The reports can be exported to pdf or html or any other format requested by the client.
81	Should provide dashboard filtering capabilities that enable end-users to dynamically filter the data in their dashboard based upon criteria, such as region, dates, product, brands, etc. and capability to drill down to the details
82	SOP's (Standard Operating Procedures)
83	Must have the Ability to define SOPs (Standard Operating Procedures) to effectively handle a security situation.
84	Command & Control Center should provide for defining un-limited number of configurable and customizable standard operating procedures through graphical, easy to use interface.
85	Standard Operating Procedures should be established, approved sets of actions considered to be the best practices for responding to a situation or carrying out an operation.
86	The users should be able to edit the SOP, including adding, editing, or deleting the activities. In run time, users shall be able to modify tasks statuses on the list. They should be able to complete tasks, cancel them and mark them as 'in progress'. Completing a task shall be as easy as checking a box.

87	The users should be able to also add comments to or stop the SOP (prior to completion). There should be provision for automatically logging the actions, changes, and commentary for the SOP and its activities, so that an electronic record is available for after- action review.
88	The SOP Tool should have capability to define the following activity types:

89	Manual Activity - An activity that is done manually by the owner and provide details in the description field.
90	Automation Activity - An activity that initiates and tracks a particular work order and select a predefined work order from the list.
91	If-Then-Else Activity - A conditional activity that allows branching based on specific criteria. Either enter or select values for Then and Else.
92	Notification Activity - An activity that displays a notification window that contains an email template for the activity owner to complete, and then sends an email notification.
93	SOP Activity - An activity that launches another standard operating procedure.
94	Command & Control Center should provide for defininig un-limited number of configurable and customizable standard operating procedures through graphical, easy to use interface.
95	Situation Management by defining appropriate actions, messages, and acknowledgement for alerts & events from various devices.
96	Define or customize rules(as per customer requirement) between different sensors and devices
97	The system will support post incident analysis through different reports generated that will enable the authorities to find gap/deficiency in the incident handling and help improve and/or rewrite SOPs
98	Load text, documents, images or other files or forms as instructions
99	Options to Forward alarms to other users in the system.
100	Incident Management Alarm reports including device status connect and disconnect Status reports.

Minimum Technical Specifications for Integrated Command and Control Center (ICCC) Software	
#	Minimum Specifications
101	Actions taken as part of SOP should be logged in audit trail with date time stamp and operator comments
102	Incident Management and Escalation Matrix
103	Any alarm or event can be made an incident either manually or automatic
104	Defining life cycle of incident from start to close. Assign incident to operators, field personnel.
105	Application should show the created incident in the Incident Register panel. Application Incident Register Panel should show the following details of the incident:
106	o Incident ID with GPS Coordinates
107	o Camera Location
108	o Type of Alert
109	o Alert Time
110	o Trigger option to initiate the SOP
111	o Status/ progress of the incident
112	The Software/ application shall be able to manually associate an incident to an asset and, vice versa, manually associate an asset to an existing incident.
113	Escalation of alerts to next level if not addressed in defined time limit
114	Escalation rules must trigger both notification and email to the users for which the escalation level is assigned so that appropriate action can be taken by the user on the alert instance that is escalated.
115	Should support for sudden critical events and linkage to standard operating procedures automatically without human intervention. Operator should be able to associate pre- defined forms and attachments while handling an Incident in runtime.

116	Should support for multiple incidents with both segregated and/or overlapping management and response teams.
117	Should provide facility to capture critical information such as location, name, status, time of the incident and be modifiable in real time by multiple authors with role associated permissions (read, write).
118	Incidents should be captured in standard formats to facilitate incident correlation and reporting.
119	The system must identify and track status of critical infrastructure / resources and provide a status overview of facilities and systems

120	Should provide detailed reports and summary views to multiple users
121	Alarm Centre
122	Should display the highest priority alarm and associated data / video in the queue as default, regardless of the arrival sequence
123	Alarm priority and alarm colour based on Severity
124	Ability to send SNMP messages on events
125	Central Control Features
126	Centralized as well as distributed architecture for Video and Alarm monitoring of Unlimited cameras and devices spread across multiple sites and places
127	Hierarchical and group view of all sites at centralized location.
128	Should have an ability to display alarm condition through visual display and audible tone
129	User Rights
130	Create users based on rights and roles.
131	Use authentication information to authenticate individuals and/or assign roles.
132	GUI User Interface control, look & feel configurable according to user role.
133	Setting up and configuration of alerts by authorized user
134	Mobile Interface
135	Any user can login and open application from Mobile phones or ipads.
136	Mobile User shall receive the alert from Operator to address the incident on field

137	Ability to See Videos and Incident Snapshots on Mobile Interface.
138	Send Video, Audio and pictures from Mobile Phone to Command Centre
139	Mobile user shall provide function to update the status of alert, share input via message and close alert activities are completed
140	Mobile apps shall communicate with the ICCC via a Mobile. Communication between the mobile device and the Mobile Server shall support encryptions.
141	Reporting
142	The system should provide Informative and aesthetic dashboards providing simple clicks and friendly visualization
143	The solution should generate reports of alerts/incidents based on the area, sensor type or periodic or any other customer reports as per choice of the administrators

144	Automatic and Manual reports generation of system status and export report in pdf, excel or html format.
145	Automatic logging of operator actions or response mechanism.
146	The reports shall be designed/ developed in hierarchical manner.
147	User can be able to view reports from summary to particular incident/ event/ alert/ case details
148	Filter details based on location, name, brand and display on dashboard
149	Should provide icon based user interface on the GIS map to report non-functional device.
150	The ICCC shall monitor the health of the system, log health related events, and calculate statistics like uptime, downtime.
151	Integration Scope for Current Project:
152	The Proposed ICCC Software must be integrated with following Sub -systems of the Project at API/SDK Level:
153	i. Video Management Software (VMS)
154	ii. AI based Video Analytics Software (VAS)
155	iii. Intelligent Traffic Management Software (ITMS)
156	iv. Face Recognition Software (FRS)

157	v. IP Public Addressing System Software (IP-PA)
158	vi. Variable Massaging Signage Board
159	Vii. Other Solution as per RFP
160	ICCC OEM shall have ISO 9001:2008/2015 or ISO 27001
161	The OEM of Command & Control Application should have quality certifications like CMMI 3, ISO 9001:2015, ISO 14001 / ISO 27001 to ensure only quality OEM participation, valid as on date of Bid Submission.
162	The Intellectual Property Rights (IPR) of Offered Integrated Command & Control Center (ICCC) Application Platform and other components as per BoQ must not reside in Country sharing Land Border with India.
163	The Integrated Command & Control Center (ICCC) Application Platform Offered should not be Developed/manufactured by an entity in which the majority shareholding of the entity is from a Country sharing a Land Border with India. OEM must provide with a Declaration about the Intellectual Property Rights (IPR) & Source Code Residence/Filing in the respective Country as a Documentary Evidence to be provided.

164	The Integrated Command & Control Center (ICCC) Application Platform OEM whose Intellectual Property Rights (IPR) & Source Code residing in India shall be Preferable.
165	The OEM who is Claiming to be Make in India OEM with Local Content greater than 50%, then their Intellectual Property Rights (IPR) & Source Code must reside in India only.
166	The ICCC Software OEM should have Performed Benchmark Appraisal & Achieved CMMI V2.0 Maturity Level - 3.
167	Appraisal Certificate of CMMI V2.0 Level - 3 to be Submitted as a Proof. The OEM should be in the Possession of the Appraisal Certificate on or before the Bid Publishing Date.
168	The proposed Integrated Command & Control Center (ICCC) should have been Implemented in at least 02 (two) projects in India related to Smart City / Safe City

	/ City Wide Surveillance / State-wide City Surveillance.
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14.14 Video Management System

Technical Specifications for Video Management Software (VMS)	
#	Minimum Specifications
1	The IP Video Management Software should allow Live Viewing, Recording and Management solution of Network Video surveillance systems & shall not have any Limit on the Number of Cameras to be Connected & shall be Scalable to Unlimited IP Cameras in Future by Augmentation of Camera channel Licenses & server Hardware Components.
2	The Open Platform Video Management Software (VMS) Application, should be Brand Agnostic, should not be from the same Camera OEM & should support various third Party ONVIF IP Cameras, this is Compulsorily required so that the Same VMS Applications can be scaled up in future by just Adding third Party IP Cameras & Additional Software Licenses.
3	The Video Management Software shall be Client-Server based IP Video security solution that shall provide seamless management of Digital Video, Audio and data across an IP network. The video management Software shall provide full virtual matrix switching and control capability. Video from sites shall be possible to view from single or numerous workstations simultaneously at any time. Cameras, recorders, and viewing stations may be placed across the terminal in the IP network.
4	The Proposed VMS Software should be ONVIF S, G, T & M Profile Compliant & should be a User Level ONVIF Member from the Last 5 years.
	The Declaration of ONVIF S,G,T & M Profile shall be available on ONVIF Official Website www.onvif.org in the Conformant Devices.

	VMS OEM to Submit a Valid Certificate to Substantiate the Proof.
	The Compliance/Conformance to the ONVIF Profile S, G, T and M should be available with the VMS OEM on or before the Date of Bid Publishing.
5	The IP Video Management Software shall be Licensed & Perpetual Licenses to be Provided, such that they are Valid for Lifetime.
6	The VMS shall be Windows based & shall be Compatible on Windows 10/11 Professional and Windows Server 2019/2022 Standard Edition
7	The VMS shall support iPad, Android and iPhone devices & shall also support web clients.
8	The Video Management System shall be a fully distributed solution, designed for limitless multi-site and multiple server installations requiring 24/7 surveillance with support for devices from different vendors. The Video Management System shall offer centralized management of all devices, servers and users and must empower a flexible rule-based system driven by schedules and events.
9	The VMS system shall be a scalable client – server architecture built using well known operating systems
10	The VMS management server shall be able to intelligently scan an IP network for new devices (cameras or servers) along with automatic model detection.

11	The VMS system shall provide an integrated secure, scalable and easily accessible software-based solution for the management of the existing & future physical security infrastructure
12	The VMS system shall provide a powerful and efficient management interface for all the security systems across all monitored sites.
13	The Video Management System shall contain recording servers used for recording video feeds and for communicating with cameras and other devices. The recording servers shall process the recordings and playback the video streams.
14	The management server shall allow access to a system manager in the form of Configuration Client from where the administrator can configure and manage all servers, cameras and users.

15	The Video Management System shall allow an unlimited number of cameras to be connected to each recording server and an unlimited number of recording servers to be connected to each management server across multiple sites, if required.
16	The Management Services of the VMS software MUST come as one unit and not multiple loadable units on Multiple Individually Configurable Servers, the Management Server shall be loaded on a Single Machine, from which all the Cameras, Additional Recording Servers, Video Analytics Servers & Viewing Clients, shall be managed Centrally.
17	A Single Management Server shall be capable of managing multiple recording manager systems or Recording Servers.
18	It shall be possible to assign encoders and IP cameras to recording manager/Server
19	The VMS shall be based on a true open architecture that shall allow the use of non- proprietary workstation and server hardware, non-proprietary network infrastructure and non-proprietary storage.
	Recording Parameters
20	The VMS must Support for recording of H.265+, H265, H.264, MPEG4 or MJPEG Video Streams in at minimum 1 fps to 60 FPS at minimum CIF to Full HD (1080p) and 4K resolution.
21	The VMS must support RTP over UDP Stream, RTP over TCP and HTTP Video streaming
22	The VMS must support multiple brands of IP cameras and encoders.
23	The VMS must support dual streaming Capabilities with Live Streaming and recording at different qualities of videos. (Min. different Streams should be available in the Cameras.)
24	The VMS should Support Multiple Storage Technologies like Network Attached Storage (NAS), Direct Attached Storage (DAS), Storage Area Network (SAN), local or network drives & S3 Block Storage.
	The VMS Application must Support for Defining different drive for each & every individual camera.
25	The VMS must have Option to define multiple recording paths

Technical Specifications for Video Management Software (VMS)	
#	Minimum Specifications
26	The VMS must have ability record audio along with video in same recording file. (For IP Cameras that Support Built in Microphone or an External Audio Input with an External Microphone connected to it).
27	The VMS must support for Pre-buffer and Post buffer recordings up to 10 minutes.
28	The VMS Application must have a Built in Storage and Bandwidth calculation tool, this shall Enable the Recoding size estimation for each hard disk attached to the server.
	This shall also enable to Option to check disk size requirement of individual camera based on the Current Camera Network Traffic/Bandwidth.
29	The VMS must have the Option to record at low frame(I-frame) and high frame rate on Motion
30	The VMS must have the feature to Export the desired portion of video in mp4, avi and asf formats in DVD/USB or any external device. Viewing of this recording must be playable on authorized player which shall be provided by software manufacturer or in media player on OS Windows, Linux/Unix or Apple Mac.
31	The VMS must have the feature to Export the recording in client and remote PC also with proper authentication.
32	The VMS must have the Functionality for Window-Pop up, Email, Sound alarm, SMS on recording/ video loss Event or any event.
33	The VMS must have the Functionality of email and SMS(Through SMS Gateway).
34	The VMS must Support for Automatic archiving of Video Recording after set number of days on First In First Out (FIFO) Basis and automatic recording deletion after disk full on FIFO Basis.
35	The VMS must Support for Edge Recording Synchronization: The VMS Server and Camera should sync recordings in case of network or other communication failure between camera and VMS, through ONVIF G Profile

36	The VMS must Support for Encryption with the Ability to encrypt video while exporting. Selectable options of 56 bit, 128 bit and 256 bit encryption shall be available to the Operator/User for Exporting with Password Protection
37	The VMS must Support for Export of Signed video using public/private key Exchange.
38	The VMS should Support Failover for both the Recording Servers as well as the Management Servers. The Proposed VMS Solution Shall support native Fail over with in the application with no dependency on any external application for both hardware and application redundancy. Solutions with external clustering like Windows Clustering, Microsoft SQL Clustering and VMware or Hyper-V etc. should not be proposed. The native failover architecture must be for both management and recording servers.
39	The Fail over and Fall-back management and recording Server shall be on hot standby, ready to take over during the primary management server fails. No manual action from the user shall be required. The fail over time should not be beyond 30 Seconds.
	Live, Playback & PTZ Control Parameters

40	The VMS Client Application should support for Live Streaming of more than 50 cameras simultaneously on 1 screen.
	In Addition to Live Streaming on a Single Display, the VMS Client must Support for Video Wall Functionality to display on Multiple Displays.
41	The VMS Client Application should have a feature of Configurable Matrix views with user define size and number of cameras. Pre-defined views from full screen, 1x1 to 8x8.
42	The VMS Client Application should support Pre-Defined Camera Views sequencing with user driven & Configurable time interval.
43	The VMS Client Application must Support for Dual Streaming and Automatic Switching from Low to High Quality on Full screen mode.
	In Addition to Dual Streaming functionality, the VMS must also Support Direct

	Camera Streaming or Thru casting from the VMS Client GUI.
	The VMS must have Options to change Live View directly from cameras or from VMS server using RTSP and HTTP options
44	The VMS Client Application must have the Option to change Live View directly from cameras or from VMS server using RTSP and HTTP options
45	The VMS Client Application should support live view and Playback from minimum 10 clients- Both local and remote
46	The VMS Client Application should support event based playback.
47	The VMS Client Application must have the functionality to search based on Date/Time/Camera, Name, ID and Location for more than one camera simultaneously.
48	The VMS Client Application must have Customized camera views based on :
	User input number of cameras.
	User chosen shape and size.
49	The VMS Client Application must have Digital Zoom Capabilities :
	Both complete live picture and Zoomed picture should be visible simultaneously while zooming.
	Should be available On Live and Playback Videos.
	Zoom available on snapshots too.
50	The VMS Client Application must have PTZ Controlling Capabilities with the Following Functionalities:
	PTZ option available through mouse and joystick
	Gaming joystick as well as PTZ joystick options available
	On screen PTZ control with Click and Zoom facility
	PTZ presets and tours setting
51	The VMS Client Application should allow for creation of multiple camera sequences. It should be possible to set the dwell time for the cameras within the sequence.
52	Software should allow sequences control (pause/play, skip forwards, skip backwards).

53	The VMS Client Application should support Live view and Playback available at the same time with Playback window running side by side with live view window.
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54	Event window with specific snapshot of that event should be shown simultaneously in Live view screen. Clicking on the event should play recording of that event time.
55	The VMS Client Application must have Playback Navigation Tree View with Recording server, camera list, year/months list and the date wise play list.
56	The VMS Client Application must have Playback option for frame-by-frame Playback.
57	The VMS Client Application must have Playback Video lock feature.
58	The VMS Client Application must have feature of Common Timeline for syncing of multiple cameras while playback.
59	The VMS Client Application must have Ability to make bookmark of any portion of video and view list of all bookmarks
60	The VMS Client Application must have feature for Instant Playback and Quick Search of event-based recordings.
61	The VMS Client Application must have feature of Event based search: Event based Time line to quickly show coloured dots in Timeline and view recorded videos at the event time.
62	The VMS Client Application must have a feature of Playlist with files listed for each date. User can click on a date to play recordings.
63	E-map client should show icon blink and voice alert of the event. Should be able to take snapshots from Google Map if connected to internet. It should be possible to click on icon in a map to initiate PTZ camera preset, run PTZ pattern, view camera.
64	The VMS Application Two-way audio communication between camera and VMS. Option to send/broadcast Audio to multiple cameras
	Mobile Surveillance & Remote Viewing Parameters
65	The VMS must have Ability to view live video on iOS and Android phones through Mobile Applications.

66	The VMS Mobile App must have the Provision for PTZ Control on Mobile App and Remote Locations
67	VMS Mobile App support for multiple sites spread across WAN to be controlled and viewed from central location.
68	The Mobile App must also Support for Audio Streaming along with Video Streaming.
	Administration & Failover Parameters
69	The VMS must have the Capability of Automatic discovery of devices/IP Cameras using UPnP and/or ONVIF
70	The VMS Application shall have No software limit on number of cameras supported in single recording server (Any increase in the number of cameras should be possible by augmentation of hardware and license components)
71	The VMS Application must have the feature to Add all cameras with single click. Apply settings to multiple cameras of same model with single click.
72	Generate logs & reports in Graphical & Tabular form and export in pdf, excel or more format

73	The VMS Application must Support Failover with Automatic switching of user selected cameras to back-up server in case of failure.
74	Automatic Health check-up and activation of optimization modules once CPU reached more than 85%.
75	The VMS Application must have the Capability Add multiple recording servers under same management server. There shall no Limit on the No. of Recording Server that can be Added to a Single Management Server.
76	The VMS Application must support User role-based cameras and features access.
	It should have the Capability to Define users with passwords and access to only specific cameras
77	Complete server logs including login access, system settings change, archiving events, video or recording loss and all activity done by administrator or any other user in the system.

78	VMS control of cameras and monitoring on client workstations shall be done through the administrator interface.
79	System watchdog feature be available to alert in case of failure of cameras and servers.
	Camera Support Parameters
80	Should support multiple brand IP cameras, encoders, NVR's and DVRs. No restriction on camera hardware.
81	Should support ONVIF protocol including Profile-S, G, T & M.
	Alarm Centre Parameters
82	Option to view cameras only on alarm. Matrix grid size should change automatically if alarms are generated from multiple cameras simultaneously
83	Automatic or manual reset & close option of video panel
	Advance Features
84	The VMS Application must Support Failover for Management & Video Recording Servers. The System should support N: 1 or N: N failover for Recording Servers. Failover time should not be more than 30 seconds.
85	The VMS Application must have the Option to do failover of selected cameras in case of recording server failover.
86	The VMS Application must have the Option to add multiple recording servers under single Management Server.
87	The VMS licensing shall require MAC Id of Server/ Recorder only, not of camera devices.
88	The VMS Application must Supports up to minimum 50 clients simultaneously. Separate licensing required
89	The VMS Application must have Option to configure video analytics in same client as VMS
	External Storage Connectivity & it's Resiliency
90	The VMS must support for Connecting Multiple External Storage Devices in the form of Primary & Secondary Storage Drive.

91	It must also have the Option of Storage Drive Redundancy, wherein if the Primary Drive is Unavailable then the VMS Application/Recording Server must Automatically Start Recording in the Secondary Configured Drive.
92	In Case of Recording has been done in Secondary Storage Drive, during the Failure of Primary Drives then after the Primary is restored the Recording that took place in the Secondary Drive shall be Synchronized in the Primary Drive.
	VMS Web Client
93	The VMS Web Client shall have Dashboarding Capabilities, such that the Dashboard should Support for Drawings/Maps GIS Layer, OSM Layer, Autocad .dwg File, .JPEG file format, .PDF file format, Customized Video Grid for Live & Playback of Video & Events Table
94	The VMS Web Client shall show the Camera details with Key Performance Indicators like, Total Cameras connected, Total Cameras Disconnected, Status Visualization in the form of Pie Chart
95	The VMS Web Client shall have a Reporting functionality in the form Camera Uptime, Downtime.
96	The VMS Web Client shall also show the Recording server status Report, Storage Space Available status & Reports.
97	The VMS Web Client must support for H.265 Codec Live & Playback Streaming.
98	The VMS Web Client shall support comprehensive data filtering for most reports based on entity type, event type, event timestamp, custom fields, and more.
99	The VMS Web Client shall support the following actions on a report: print report, export report to a PDF/Microsoft Excel/CSV file, and automatically email a report based on a schedule and a list of one or more recipients.
100	The Video Management Software should support RTSPS or SRTP or RTSP over TLS Encrypted Live Streaming from cameras (If Supported by Cameras) to VMS as well as support streaming of RTSPS or SRTP or RTSP over TLS Encrypted Live Streaming from VMS servers to clients.
	Video Management Software Pre-Qualification Criteria

101	The Video Management Software (VMS) Application should be an Open Platform Application & should not be from the Same Camera OEM.
102	The Declaration of ONVIF S, G, T & M Profile shall be available on ONVIF Official Website www.onvif.org in the Conformant Devices.
	VMS OEM to Submit a Valid Certificate to Substantiate the Proof.
	The Compliance/Conformance to the ONVIF Profile S, G, T and M should be available with the VMS OEM on or before the Date of Bid Publishing.
103	The VMS OEM should have Certifications following certifications
	A.ISO 9001:2015 Quality Management Certifications in the name of the OEM
	B. 27001:2013 Information Security Management Systems Certifications
	E. ISO 27017:2015 – Information Security Control for Cloud Services

	The Above Certifications are the Minimum requirements to ensure Quality OEM Participation All of these Certificates to be Submitted by the OEM for Evaluation.
104	The VMS OEM should have Performed Benchmark Appraisal & Achieved CMMI V2.0 Maturity Level - 3.
	Appraisal Certificate of CMMI V2.0 Level - 3 to be Submitted as a Proof. The OEM should be in the Possession of the Appraisal Certificate on or before the Bid Publishing Date.
	The Appraisal shall be Validated Online & should be Available on Public Portal on CMMI Institutes Website in the Published Appraisal Results (https://cmminstitute.com/learning/appraisals/results).
105	The VMS, Software OEM shall have a direct Registered Office & shall also have a Research & Development Centre in India without any Collaboration, Joint Venture, Distributor, Parent Company & should be in Operational for the Last 10 Years as on the Last Date of Bid Submission.
	The VMS OEM Should be in the Business of Video Management Software from last 10 years, documentary evidence to be submitted.
	The IPR and source code of the offered VMS must not be owned by entities in

106	countries sharing a land border with India, and the OEM must provide a declaration, documentary evidence, and a Copyright Certificate of IPR & Source Code.
	For OEMs claiming "Make in India" status with over 50% local content, the IPR and source code must reside only in India, supported by appropriate documentary evidence.
107	The Offered Video Management Software (VMS) Application should be Indigenously Developed by the OEM & should not be White-labelled Product.
	The VMS OEM to Submit a Copyright Certificate, along with a Self-Declaration Stating the Proposed VMS Application is not White Labelled & is Indigenously Developed by the OEM themselves.
	Cyber Security Features
108	The Proposed Video Management Software (VMS) Server Application (Thick Client) as well the VMS Web Client Application should have undergone Audit as per OWASP Top 10 Desktop Application Security Risks, OWASP Top 10 Web Application Security Risks & OWASP Source Code Review Testing Guide from STQC. A Security Test Report/Certificate from STQC to be Submitted by the respective OEM to Substantiate the Proof of the Security testing.
	All the Applications Desktop as well as Web Client Application must have already undergone the Security testing/Auditing on or before the Bid Publishing Date.
	The Security testing Certificate from STQC must be Submitted as a Documentary Evidence/Proof.
109	The offered VMS must be cyber security certified with FIPS-140-2 encryption from Indian body for mitigating cyber security risk. The FIPS 140-2 Certification should be done on or before the Bid Publishing Date. A Valid Certificate for FIPS 140-2 for the VMS Application to be Submitted as a Proof.

14.15 Video Analytics Solution

Technical Specifications for AI based Video Analytics Software (VAS)	
#	Minimum Specifications
1	The Proposed Video Management Software (VMS) and AI Based Video Analytics (AI-VAS) should be from same OEM.
2	The Video Analytics shall offer a suite of analytics rules with Artificial Intelligence to provide automatic detection of a range of motion and non-motion behaviour of persons, objects and vehicles.
3	The provision of Video Analytics should be Strictly through Artificial Intelligence, Machine and Deep learning Technologies/solutions on video. 3D Calibrated Video Analytics with Old Image Comparison Technologies shall not be Accepted. There should be provision of 2 used cases (minimum) per camera.
4	Each of the video analytics use case shall be able to run on a unified Video Management Software Platform itself.
	Following video analytics and features should be supported based on licensing:
5	AI Based Camera Tampering Detection
	i. The AI Based Camera Tampering Detection Analytics must automatically detect the tampering of camera when a fixed camera's Field of View is Tampered/Changed, covering the lens, severely defocus, paint spray etc.
	ii. It must also Detect the Change or Orientation of Camera's Field of View, such that if the Camera's Orientation or Field of View is changed & no longer Observing the scene intended.
	AI Based Crowd detection
	i. The AI Based Crowd Detection Module must detect crowd formations and triggers alarms when a specified number of people (capacity) or a specified percentage of people (occupancy) thresholds is reached in the selected area.

6	ii. Should have the Functionality to create multiple regions or Zones in a Field of view of Camera & should allow the user to Specify Crowd Thresholds Individually for each region. If within any region the Crowd Density Estimation exceeds the Threshold, then the system should raise an Alert.
	iii. The System must have Configuration Options for User Defined Drawing/Setting of the Zone within the Field of view of the Cameras with Configurable Border Width & it's Colour.
	iv. The System must have Configuration Options for Drawing Multi point Crowd Monitoring Zone where the Crowd Estimation & Counting is Desired. This Crowd Monitoring Zone Border's width & it's Depiction Colour must also Configurable.

	v. The System must have Configuration Options for Inputting the User Defined Maximum Upper & Lower Limit Threshold
	vi. The System must have Configuration Option for Selecting the Alarm Interval in Seconds
	vii. It must be possible to configure Within a Single Filed of View/Camera, Multiple Monitoring Zones for Crowd Estimation & Counting can be Configured with each of them having different Crowd threshold Limits, The Different zone should be Distinguished with different Monitoring Zones Border Colours.
7	AI Based Object counting or people/vehicle counting analytics.
	i. Should Count the people in area to avoid overcrowding.
	ii. It should give real time indication of number of visitors inside any store or building.
	iii. Shall Allow Users to Draw Lines & Count People Entering & Exiting in Real Time & should show the Total IN & Total OUT Count in the OSD.
	Perimeter Trip wire/Crossing Virtual line

8	i. Should capture zoomed image of the object causing the Perimeter Breach and raises appropriate alarm.
	ii. Should also stores the time duration between the pre and post event of the Perimeter Breach.
	iii. Should have the Option Drawing Single/Multiple Lines along with Defining Logic for the Multiple Lines.
9	AI Based Classification of objects like person, vehicle or animals
	i. The AI Based Video Analytics Application Platform must have built in AI Algorithm for object classification, the Application must have inbuilt Object Detection for the Following Objects/Person/Animals:
	a. Vehicle Detection with Classification of Type of Vehicle: Bicycle, Motorcycle, Car, Truck/Bus, Light Commercial Vehicle (LCV)
	b. Human Detection
	c. Animals Detection with Classification: Dog, Cow, Horse etc.
10	AI Based Abandoned Baggage Detection
	i. The AI Based Abandoned Baggage /Objects must be capable of detecting left objects that have remained stationary for a period. It should Detect and generates an alert highlighting Suspicious objects which are left into the scene for a Period of time that is considered suspicious by the user.
	ii. Should be able to Detect Multiple object that are left Stationary in a Scene, the System shall be to detect multiple objects each with its own timer as per the predefined detection time. Alarms of each Individual Objects Abandoned shall be alerted Individually.
	iii. The Operator must have the ability to configure the detection time to suit the environment, from seconds to minutes or hours. The detection time is the elapsed time

	between when the object is first detected as an abandoned object and the time when an alarm is required to be raised.
	iv. The system shall be able to immediately review the event (with a click of a single jump- to-event button).

	Video Analytics Software basic Functional Requirements:
11	Proposed intelligent AI Based Video Analytics Software (VAS) shall have the capability to provide various alarms & triggers and should notify the Authorities if any incidence/violation happens.
12	The System shall be a real-time video analytics engine that utilizes advanced image processing algorithms & Artificial Intelligence to turn video into Actionable Intelligence.
13	The system shall provide configurable detection zones and lines to detect events of interest, Detection zones define an area of interest and Detection lines define a Virtual Line instead of a region.
14	The system shall facilitate creating multiple zones and lines in a single scene to trigger various alerts
15	The system shall allow the configuration of applicable rules and manage them
16	The system shall also enable editing the Zones and lines to the desired shape or size.
17	The triggers generated by the applied rules shall provide visual indicators to identify the event. Such as a Green coloured Bounding Box changing the Bounding Box colour to Red on event
18	The system shall enable detecting rules in the defined areas (zones/ lines)
19	The system shall provide a functionality for configuring timelines for various events such as abandoned object, Stopped Vehicle Detection, Wrong Way Driving Detection etc.

20	The system shall allow classification of different objects like Vehicles and people/Person.
21	The Proposed VAS should allow to add, edit, delete or disable and enable Policies.
22	System shall have a sophisticated rule-based engine with powerful analytics capabilities that provides automatic event notification.
23	The city-wide surveillance system needs to have the capability to deploy intelligent video analytics software on any of selected cameras. This software should have the capability to provide various alarms & triggers.
	Video Analytics Software Advanced Functional Requirements:
24	The AI Based Video Analytics Platform must Support for Analytics use-cases to be Deployed & can be applied in 4CIF, VGA, Full HD-1080P resolution & Streams Supporting H265, H.264 compression Standards and 25fps.
25	The VA shall support Applying & performing of video analytics from any camera supported by the VMS.
26	The Video Analytics Platform shall be able to Perform on Both offline Pre-Recorded Video and Real time Live Video Streams.
27	The Video Management Platform must have the Option to Email (Through E-Mail), SMS (through a SMS gateway) and Push Notification Alarm of any Event to mobile phones. Push method should be without SMS
28	The AI Video Analytics Platform must support for Offline analytics to be Applied in avi, mp4, ts, mpeg, h265, h264 and asf file formats
29	The AI Based Video Analytics Platform Must Support for Offline analytics to run in batch mode to take every file from specified folders and run analytics one by one on each file automatically.
30	The AI Based Video Analytics Platform Must Support Pre-buffer and Post buffer recordings up to 10 minutes for video analytic events.

31	The AI Based Video Analytics Platform have Option for Defining the Minimum and maximum object size-based filtering & must also Support for Filtering based on Object type.
32	The AI Based Video Analytics Platform Must Support for Defining schedule of video analytics to run weekly, daily, day/night or according to user specified date and time
33	The AI Based Video Analytics Platform Must have the feature to define minimum 20 shapes, lines or zone in single camera for video analytics.
34	The AI Based Video Analytics Platform Must have the option to run analytics in silent mode.
35	The Video Analytics Application must have the Capability to View snapshots of each event and click on event to play recording of that time period on the VMS Client Interface/GUI.
36	The Video Analytics must have Ability to virtually map devices to one another in the VMS. For example, Fixed cameras and PTZ cameras so that event from fixed cameras can be used to notify PTZ cameras to Zoom, Pan or tilt or go-to preset positions and take snapshots of events. PTZ Tracking should happen to track the intruding object
37	Reporting: Report of all events possible though bar and line charts.
38	The Video Analytics must have the Ability such that alerts can be searched and categorized based on this information. i.e. Timestamp (date & time), Alert Name, Alert Type, Camera Name, Camera ID.
39	Each of the video analytics use-case shall be structured as an independent module that can be deployed on any camera using a simple user interface utility, providing a complete visibility of the use cases and which cameras they are running on.
40	The Video Analytics system shall be compatible with the latest technological advancements in the domain of computer vision and AI. Hence, it shall be able to quickly adapt to newer libraries and AI advancements. All the analytics and use-

	cases shall be based on advanced AI technology, and shall not depend on traditional algorithms.
41	Event Notifications: The result of each of the use case shall be in the form of events that contain the screenshot with other metadata describing the event, such as detected objects, timestamp, camera/video that generated the event and all other metadata representing the event from different use cases. The Metadata must include the Bounding Boxes/Overlay on the Object Detected.
42	Resource Management View: The User interface shall provide a list of all the resources available in the system such as computing servers and cameras. The status of each of the devices, whether they are online/offline shall also be available at all times.
43	The algorithms powering the video intelligence system shall possess capability to operate parallel and distributed manner across a cluster of machines.

Technical Specifications for AI based Video Analytics Software (VAS)	
#	Minimum Specifications
44	The System shall be a real-time video analytics engine that utilizes advanced image processing algorithms to turn video into actionable intelligence. The AI based Video Analytics system shall consist of video- processing & analytics engine that works seamlessly both on saved videos or camera streams in real-time and provide events to the user based on the use-case basis. The system shall be compatible with all ONVIF compliant IP cameras with H.264/H.265 video decoding.
45	The AI Based Video Analytics Platform Must have the possibility to generate email or a text message to the designated recipients in case critical alerts are generated. The application shall escalate the alert to the designated users through email or a text message in case the alert is not acknowledged by the operator in a specified period of time.
46	The AI Based Video Analytics (VA) system should be native to the VMS.
47	It should be possible to configure video analytics on any of the cameras from the Video Management System desktop client Application. No Separate GUI or Application should be required to Configure the Video Analytics Use-Cases.
48	The VMS and VA must have tight integration so that there is no need to add cameras to VMS and VA servers separately.
49	Video Management System and Video Analytics System should be from the same OEM.
50	With the Video Analytics Platform running on the same VMS Platform, the VA Events must take Snapshots & View snapshots of each event and click on event to play recording of that time period.
51	VA should allow the VA applications to configure and run as per hourly/daily/weekly schedule. Users should be able to create various schedules to deploy the VA applications

	as required.
52	The Video Analytics should flag the video in the Video Management System. It should be possible for the operator to jump to the alert flag in the archived video for detailed investigation of the event.
	Video Analytics Software OEM Pre-Qualification Criteria
53	The Video Analytics should an Open Platform Application & should be Brand Agnostic & should support various third Party ONVIF IP Cameras, this is Compulsorily required so that the Same VAS Applications can be scaled up in future by just Adding third Party IP Cameras & Additional Software Licenses.
54	The Video Management Software (VMS) Application & Video Analytics Software (VAS) Software Application should be from the Same OEM to Achieve Seamless Integration Possibilities & Interoperability with each other.
55	The Video Analytics Software (VAS) Software Application OEM shall have a direct Registered Office & shall also have a Dedicated Support, Research & Development (R&D) Centre in India without any Collaboration, Joint Venture, Distributor, Parent Company & should be in Operational for the Last 10 Years as on the Last Date of Bid Submission.
56	The Video Analytics Software (VAS) Software Application OEM should have the Following Certificates:
	A. ISO 9001:2015 - Quality Management Certifications
	B. 27001:2013 - Information Security Management Systems,
	C. ISO 27017:2015 – Information Security Control for Cloud Services
	D. CMMI Level-3 Appraisal
	The Above Certifications are the Minimum requirements to ensure Quality OEM Participation All of these Certificates to be Submitted by the OEM for Evaluation.

57	The Offered AI Based Video Analytics (AI-VAS) Applica OEM should have Performed Benchmark Appraisal & Achieved CMMI V2.0 Maturity Level - 3. Appraisal Certificate of CMMI V2.0 Level - 3 to be Submitted as a Proof. The OEM should be in the Possession of the Appraisal Certificate on or before the Bid Publishing Date.
	The Appraisal shall be Validated Online & should be Available on Public Portal on CMMI Institutes Website in the Published Appraisal Results (https://cmmiinstitute.com/learning/appraisals/results). Any False Declarations shall lead to Bid Rejection & Blacklisting.
58	The Offered Video Analytics (VA) Server Application (Thick Client) as well the VA Web Client Application should have undergone Audit as per OWASP Top 10 Desktop Application Security Risks, OWASP Top 10 Web Application Security Risks & OWASP Source Code Review Testing Guide from STQC. A Security Test Report from STQC to be Submitted by the respective OEM to Substantiate the Proof of the Security testing.
	The Applications must have already undergone the Security testing/Auditing on or before the Bid Publishing Date. The Security testing must be Submitted as a Documentary Evidence/Proof.
	The IPR and source code of the offered Video Analytics (AI-VAS) Application must not be owned by entities in countries sharing a land border with India, and the OEM must provide a declaration, documentary evidence, and a Copyright Certificate of IPR & Source Code.
59	For OEMs claiming "Make in India" status with over 50% local content, the IPR and source code must reside only in India, supported by appropriate documentary evidence.
	The AI Video Analytics Software (AI-VAS) offered must be cyber security certified with FIPS-140-2 encryption from Indian body for mitigating cyber security risk. A Valid Certificate for FIPS 140-2 for the AI-VAS Application to be submitted as a Proof. The FIPS 140-2 Certification should be done on or before the Bid Publishing

	Date.
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14.16 Facial Recognition System

Technical Specifications for Face Recognition Software (FRS)	
#	Minimum Specifications
1	The Proposed AI based FRS shall be based on as Artificial Intelligence (AI) & Deep Learning Platform. The FRS system shall make use of the latest technologies such as AI & Deep learning with a series of the latest multiple CPU or GPUs from respective OEMs
2	Face Recognition System (FRS) should identify or verify a person from various kinds of photo inputs from digital image file to video source. It should enable security professionals to shortlist, target, and identify intruders, loiterers, and potential miscreants
3	The system should offer logical algorithms and user friendly, simple graphical user interface making it easy to perform the facial matching. Face detection and recognition based on real time video processing.
4	The FRS system shall be enterprise grade highly scalable providing most accurate results for the most demanding real time and post event offline mode).
	Face Recognizer software should provide the following capabilities:
	i. Face Recognition System shall work on real time and offline mode.
	ii. Detect and log faces.
	iii. Recognize faces (with pre-registration)
	iv. The system shall work on partial occlusion of face, glasses, scarfs, changes of facial expression etc.
	v. Search for similar faces from a single camera or across multiple cameras
	vi. Detect face images from a single camera or across multiple cameras and

5	real time trigger alerts if a blacklist/wanted match is found
	vii. Match suspected criminal face from pre-recorded video feeds obtained from CCTVs deployed in various critical identified locations, or with the video feeds received from private or other public organization's video feeds.
	viii. Allows users to track people presence across multiple cameras or locations to identify potential issues or threats
	ix. Creates an automated log of people in the camera or scene which can be used for forensic investigations
6	The facial recognition system should be able to recognize subjects appearing simultaneously in multiple live video streams retrieved from IP surveillance cameras.
7	The Facial recognition system should seamlessly be integrated to the video management system
8	The system should be able to detect multiple faces from live single video feed.
9	The system shall be able to work on full HD or 4K Cameras.
10	The FR software system should support to integrate with 3rd party camera (ONVIF Compliant)
11	The system shall be able to work on windows / Linux operating system.
12	The system shall be able to be implemented on both Server or Workstation.
13	The system shall support database system like MY SQL or PostgreSQL or equivalent
14	Shall be able to do automatic face detection & recognition from the CCTV Camera feed OR from user-uploaded videos/images. Provision to upload suspect's photo & search the face
15	FRS system shall have Enrolment, training, Multiple enrolments per person, Video enrolment for person which captures 5-10 pictures per enrolment. It should have Recognition and Enrolment from both Video and Image.
16	The system shall be support any of the file formats like JPEG, PNG, BMP, TIFF etc. format for enrolment.

17	The system shall be able to check if new enrolled face is already enrolled in the data base before registering the new enrolled face in the system.
18	FRS system should support Min VGA resolution to 8MP, Image resolution 0.3MP- 8MP.
19	FRS system should have Detection speed latency Recognition in less than 1-2 seconds in video mode.
20	The user interface of the facial recognition system should have a report generation tool. It should be able to generate real time report such as Audit log report, MIS report, Daily Detection Report, Statistics Report.
21	Dashboarding capabilities to show Health status of server, cameras, storage
22	FRS system should have web-based interface
23	Deep learning based facial Recognition 1:1, 1:N & N:N Face matching.
24	The system should have the ability to handle initial real-time watch list of Face. Shall Support multiple facial blacklists or whitelists.
25	Facial recognition software to give gender detection, people counting alerts etc.
26	The system shall be able to filter data based on color, gender, name etc.
27	System should be capable of work with various camera platforms and popular leading chip sets
28	The facial recognition system should be able to work on the server/ desktop OS as per the requirement.
29	The FRS Application must have ONVIF Discovery Tool within the Application for detecting ONVIF Cameras. Such that the FRS system shall support the auto- discovery of any ONVIF compliant camera.
30	The UI of the FRS system should support the live Video Streaming of all the connected Facial Recognition cameras for Live monitoring in real-time. Real-time Updating of Snapshots taken by Facial Recognition Cameras shall not be Acceptable.

Technical Specifications for Face Recognition Software (FRS)	
#	Minimum Specifications
31	The Backend Facial Recognition Engine should be from the same OEM of the of the Offered/proposed Facial Recognition Software & should not be from any 3 rd Party OEM.
32	To ensure the support to an open eco-system, the FRS system shall be a truly open & independent solution module and not embedded in any NVR or any IP Cameras.
33	The Face Recognition Software (FRS) Application OEM should have the Following Certificates:
	A. ISO 9001:2015 - Quality Management Certifications
	B. 27001:2013 - Information Security Management Systems,
	C. ISO 27017:2015 – Information Security Control for Cloud Services
	D. CMMI Level-3 Appraisal
	The Above Certifications are the Minimum requirements to ensure Quality OEM Participation All of these Certificates to be Submitted by the OEM for Evaluation.
34	The Proposed Facial Recognition Software Application should have undergone Audit as per OWASP Top 10 Web Application Security Risks. A Security Test Report/Certificate from STQC to be Submitted by the respective OEM to Substantiate the Proof of the Security testing
35	The Offered Face Recognition Software (FRS) Application OEM should have Performed Benchmark Appraisal & Achieved CMMI V2.0 Maturity Level - 3. Appraisal Certificate of CMMI V2.0 Level - 3 to be Submitted as a Proof. The OEM should be in the Possession of the Appraisal Certificate on or before the Bid Publishing Date.
	The Appraisal shall be Validated Online & should be Available on Public Portal on CMMI Institutes Website in the Published Appraisal Results (https://cmmiinstitute.com/learning/appraisals/results). Any False

	Declarations shall lead to Bid Rejection & Blacklisting.
36	The Proposed Video Management Software (VMS), AI Based Video Analytics Software (VAS), Intelligent Traffic Management Software (ITMS) and Face Recognition Software (FRS) must be from Same OEM.

14.17 Intelligent Traffic Management System (ITMS) ANPR/RLVD etc.

Technical Specifications for Intelligent Traffic Management Software (ITMS)	
S. No	Minimum Specification
1.	Automatic Number Plate Recognition (ANPR)
	i. The ANPR Application shall automatically detect the license plate in the captured video feed in real-time.
	ii. ANPR Application shall be designed to work for 24x7 unattended operations
	iii. ANPR Application shall perform OCR (optical character recognition) of the license Plate characters (English alpha-numeric characters in standard fonts).
	iv. ANPR Application shall store JPEG image of vehicle and license plate and enter the license plate number into DBMS like My Sq/Postgre etc. database along with date and time stamp.
	v. ANPR Application should support for Search for Vehicle based on the Following Criteria:
	o full or partial number of the license plate,
	o colour of the vehicle,
	o Speed of the vehicle
	o classification of vehicle,
	o Junction Name
	o Event Type (e.g. ANPR, Red Light Violation, Speed Violation, etc.)
	vi. ANPR Application should support for searching for similar plates across Single or multiple cameras.
	vii. ANPR Application should able to detect single row, double row, multi row, square and rectangular plates as well
	viii. ANPR Application should Compare against Watch List database to detect any

	matches
	ix. ANPR Application should support for Real-time alerts on Plate matches
	x. ANPR Application should Detect, Recognize and Search License Plates.
	xi. Vehicle monitoring is a large part of outdoor security & surveillance and integrated traffic systems.
	xii. It should Enable security professionals to shortlist, target, and identify “wanted”, “Suspicious”, “Stolen” unauthorized, plates.
	xiii. Allows users to track vehicles across multiple cameras or locations to identify potential threats.
	xiv. Should generate an alarm in case of any identified vehicle plate
	xv. Enables automated matching against a watch list with real time alerting
	xvi. The system Graphical User Interface should support English Language & the Graphical User interface (GUI) should provide following information:
	o Image of the Complete vehicle
	o Image of the Cropped Number Plate
	o Text conversion of number plate after using OCR (Optical Character Recognition) technology
	o Date and Time of offending vehicle
	o Event/images/chart of ANPR
	o Records and logs all License Plates at a scene, for forensic investigations.
	xvii. The Min. Video resolution Supported should: Min. 1080p & the Max. Video Resolution Supported should be Up to 4K Resolution.
	xviii. Min. Framerate: 25-30 FPS & Max. Upto 120FPS or the Max. Frame Rate Supported by the Cameras.
	xix. Image quality: LP image contrast should be high at different times of day, especially at night time. The image needs to have minimal noise at low light situations.
	xx. System should able to give vehicle image with license plate image

xxi. Store events with plate images
xxii. The system shall store the vehicle license number into a relational SQL database (MySQL)/Postgre along with date timestamp and Camera details. The necessary license/ subscription/support services of the database software should be bundled with the ANPR software.
xxiii. The ANPR Application must be.
o Open architecture and easy to integrate of alerts via http/XML
o Integrates with VMS or third-party VMS at central level.
o Can be integrated with e-Challan system
o Option to include or exclude zones
o Real-time alerts on Vehicle violation detection
o Detailed Reports of violations
xxiv. The ANPR Application should have ONVIF Discovery Tool within the Application for detecting ONVIF Cameras. The Proposed ANPR/ITMS Application shall be based on an Open Platform & should support various 3rd Party ONVIF Cameras.
xxv. Should work with real-time IP cameras, live videos.
xxvi. The ANPR Application shall be OS Agnostic & should Compulsorily be Compatible on Windows Operating System & Linux Operating Systems both.
xxvii. The ANPR Application shall have more than 90% Accuracy during daytime and 85% during night-time for all different types and classes of vehicles.
xxviii. The ANPR Application should Detects for both Standardized (High Security Registration Plates) and Non-Standardized plates.
xxix. The ANPR Application should have an Intuitive Graphical User Interface (GUI) & user-friendly menu driven Interface for the Configuration & Viewing the ANPR Application. For Ease of Operation & Maintenance, the Configuration should strictly be possible through the GUI & not through the Command Line Interface (CLI). Any Configuration through CLI shall not be Acceptable.

	xxx. The ANPR Application should have Multiple Grid options like 1x1, 2x2, 2x1, 3x3, 4x4, 1+2, 1+5, 1+7 with various Grid options for Live Video Streaming Capabilities in real-time. Real-Time Updating of Image Snapshot on any Transaction or Violation shall not be Acceptable. Live Streaming Support within the ANPR Application is a must & should be Demonstrated.
	xxxi. The ANPR Application should be a Web Based Application, so that it can Accessed on a Standard Web Browser from any System within the LAN. The Configuration of System should also be possible through the Web Browser itself. xxxii. The System shall have Health Check Dashboard to Monitor the Complete Server/LPU Health Status. Alarm shall be generated if CPU, RAM Exceeds the Operating Threshold & should be notified to the Operator in the form of Toggle Notification. xxxiii. The System shall Advanced Vehicle Tracking Section to track a Particular vehicle of Interest across Multiple ITMS/ANPR Cameras in the System. xxxiv. The ANPR Application must have the Capability to Play the Recorded Video Clip of the Speed Violation Event within the Client GUI Application itself. xxxv. The ANPR Application must have the Capability to Export Pre & Post Recording of the Speed Violation Event in Standard Video Formats like .avi, .asf, .mp4 & .ts
	No Helmet Detection i. No Helmet Detection Algorithm must Recognize people on moving Two-Wheeler/Motorcycle vehicles, detect head and recognize the presence of helmet. ii. The No Helmet Detection Camera shall detect for Rider's Head with or without a Helmet on a Two-Wheeler Vehicle. iii. If No Helmet is detected on the Rider's Head then a Metadata Overlay

	(Bounding Box) on the Rider shall be marked with Text No Helmet.
	iv. No Helmet Detection in Real-time, with Evidence Monitoring of Infraction/Violation of No Helmet Riding in Real-time
	v. No Helmet Detection systems must work by Evidence Capturing Mechanism of Commuters travelling on a Two-Wheeler without a Helmet in tandem with the ANPR System.
2.	vi. No Helmet Detection Application must have options for Smart Searching & Exporting the Vehicles data for No Helmet Violations only.
	vii. No Helmet Detection Application must give Real-time alerts on No Helmet Detection.
	viii. No Helmet Detection Application must have advanced searching capabilities with options for filtering by violation type, Number Plate Search, with option for search with AND/OR function to be applied to two different parameters for finding the exact Violation/Infraction.
	ix. No Helmet Detection Application must Automatically Pop-up of Hot-listed Vehicles upon Detection of Hot-Listed Number/License Plates.
	x. No Helmet Detection Application must have option for creating various User Defined Categories like VIP Vehicles, Stolen Vehicles, Suspicious Vehicles. For each Category a Number/License Plate Number can be Assigned & Accordingly that Category of Vehicle can be searched in the Database.
	xi. No Helmet Detection Application must have support for Actionable Intelligence that includes automatic E-Mailing/SMS to respective concerned Authorities.
	xii. No Helmet Detection Application shall be Compatible on Windows Operating System & Linux Operating Systems both.

Technical Specifications for Intelligent Traffic Management Software (ITMS)	
S. No	Minimum Specification
	xiii. No Helmet Detection Application should support Integration with RTO/VAHAN Database for gathering Infracting Vehicle's details & the Vehicle's owner details. xiv. No Helmet Detection Application should have a Built-in E-Challan generation option in a Customised/User Centric Format. xv. The No-Helmet Detection Application should have an Intuitive Graphical User Interface (GUI) & user-friendly menu driven Interface for the Configuration & Viewing the No-Helmet Detection Application. For Ease of Operation & Maintenance, the Configuration should strictly be possible through the GUI & not through the Command Line Interface (CLI). Any Configuration through CLI shall not be Acceptable. xvi. The No-Helmet Detection Application should have Multiple Grid options like 1x1, 2x2, 2x1, 3x3, 4x4, 1+2, 1+5, 1+7 with various Grid options for Live Video Streaming Capabilities in real-time. xvii. The No-Helmet Detection Application should be a Web Based Application, so that it can Accessed on a Standard Web Browser from any System within the LAN. xviii. The No-Helmet Application should have a Built-in E-Challan generation option in a Customized/User Centric Format.
	Triple Riding Detection on Two-Wheeler Triple Riding Detection system should work by Evidence Capturing Mechanism of Commuters travelling on a Two-Wheeler with 3 Persons on a Single Vehicle (Triple Riding) in tandem with the ANPR System. i. The Triple Riding Detection Camera shall detect for the No. of Person Riding on a Bike/Two-Wheeler Vehicle.

	ii. If more than 2 Persons are found to be Riding on a Bike/Two-Wheeler vehicle then the Triple Riding Detection System Shall Automatically Identify it as Triple Riding Detected & a Metadata Overlay (Bounding Box) on the Rider shall be marked with Text Triple Riding.
	iii. Triple Riding Detection in Real-time Traffic Scenario, with Evidence Monitoring of Infraction/Violation of Triple Riding in Real-time.
3.	iv. Triple Riding Detection Application must have advanced searching capabilities with options for filtering by violation type, Number Plate Search, with option for search with AND/OR function to be applied to two different parameters for finding the exact Violation/Infraction.
	v. Triple Riding Detection Application must Automatically Pop-up of Hot-listed Vehicles upon Detection of Hot-Listed Number/License Plates.
	vi. Triple Riding Detection Application must have option for creating various User Defined Categories like VIP Vehicles, Stolen Vehicles, and Suspicious Vehicles. For each Category a Number/License Plate Number can be Assigned & Accordingly that Category of Vehicle can be searched in the Database.
	vii. Triple Riding Detection Application must have support for Actionable Intelligence that includes automatic E-Mailing/SMS to respective concerned Authorities.
	viii. Triple Riding Detection Application shall be Compatible on Windows Operating System & Linux Operating Systems both.
	ix. Triple Riding Detection Application should support Integration with RTO/VAHAN Database for gathering Infractioning Vehicle's details & the Vehicle's owner details.
	x. Triple Riding Detection Application should have a Built-in E-Challan generation option in a Customised/User Centric Format.

	xi. The Triple Riding Application should have an Intuitive Graphical User Interface (GUI) & user-friendly menu driven Interface for the Configuration & Viewing the Triple Riding Application. For Ease of Operation & Maintenance, the Configuration should strictly be possible through the GUI & not through the Command Line Interface (CLI). Any Configuration through CLI shall not be Acceptable. xii. The Triple Riding Application should have an Intuitive Graphical User Interface (GUI) & user friendly for the Configuration & Viewing the Triple Riding Application. xiii. The Triple Riding Application should have Multiple Grid options like 1x1, 2x2, 2x1, 3x3, 4x4, 1+2, 1+5, 1+7 with various Grid options for Live Video Streaming Capabilities in real-time. xiv. The Triple Riding Application should be a Web Based Application, so that it can Accessed on a Standard Web Browser from any System within the LAN. xv. The Triple Riding Application should have a Built-in E-Challan generation option in a Customized/User Centric Format.
	Wrong Way Driving Detection Wrong Way Driving Detection System Should Identify the direction of expected flow of vehicles in a road or junction. The system dynamically detects vehicles moving in the wrong direction and captures with evidence. i. The Wrong Way Driving Detection System shall detect for the Direction of the Expected Flow of Vehicles in a Road or Junction. ii. If the Vehicle is found to be Moving or Travelling in the Wrong Direction then the Wrong Way Driving Detection System Shall Automatically Identify it as Wrong Way Driving Detected & a Metadata Overlay (Bounding Box) on that Particular Vehicle shall be marked with Text Wrong Wat Driving. iii. The Wrong Way Driving Detection must work/function in Real-time Traffic Scenario, with Evidence Monitoring of Infraction/Violation of Wrong Way Driving

4.	Detection in Real-time.
	iv. Wrong Way Driving Detection Application must have advanced searching capabilities with options for filtering by violation type, Number Plate Search, with option for search with AND/OR function to be applied to two different parameters for finding the exact Violation/Infraction.
	v. Wrong Way Driving Detection Application must Automatically Pop-up of Hot-listed Vehicles upon Detection of Hot-Listed Number/License Plates.
	vi. Wrong Way Driving Detection Application must have support for Actionable Intelligence that includes automatic E-Mailing/SMS to respective concerned Authorities.
	vii. Wrong Way Driving Detection Application shall be Compatible on Windows Operating System & Linux Operating Systems both.
	viii. Wrong Way Driving Detection Application should support Integration with RTO/VAHAN Database for gathering Infractioning Vehicle's details & the Vehicle's owner details.
	ix. Wrong Way Driving Detection Application should have a Built-in E-Challan generation option in a Customised/User Centric Format.
	x. The Wrong Way Driving Application should have an Intuitive Graphical User Interface (GUI) & user-friendly menu driven Interface for the Configuration & Viewing the Wrong Way Application. For Ease of Operation & Maintenance, the Configuration should strictly be possible through the GUI & not through the Command Line Interface (CLI). Any Configuration through CLI shall not be Acceptable.
	xi. The Wrong Way Driving Application should have an Intuitive Graphical User Interface (GUI) & user friendly for the Configuration & Viewing the Triple Riding Application.
	xii. The Wrong Way Driving Application should have Multiple Grid options like 1x1, 2x2,2x1,3x3,4x4,1+2,1+5,1+7 with various Grid options for Live Video

	Streaming Capabilities in real-time. Real-Time Updating of Image Snapshot shall not be Acceptable. xiii. The Wrong Way Driving Application should be a Web Based Application, so that it can Accessed on a Standard Web Browser from any System within the LAN. The Configuration of System should also be possible through the Web Browser itself. xiv. The Wrong Way Driving Application should have a Built-in E-Challan generation option in a Customized/User Centric Format.
5.	Red Light Violation Detection (RLVD) I. Red Light Violation Detection (RLVD) system is a system for capturing details of vehicles that have crossed the stop line at the junction while the traffic light is red. System shall be able to automatically detect red light through evidence camera units. The information so captured shall be used to issue challans to the violators. II. RLVD system is a combined solution with ANPR system. RLVD camera covers the complete road of the junction giving an overview of the junction from a wide field of view. ANPR camera will capture the license plate of the violating vehicle using OCR and the violation event tagged with ANPR image, OCR data, shall be Stored in a Relational Database like My sql/Postgre. III. RLVD solution shall have an overview camera to capture the zoomed-out picture of the entire area when there is a red-light violation. IV. The RLVD System should not support any use of Hardware sensors for Traffic Light Colour Monitoring, the Traffic Lights shall be Monitored by the Overview Camera & in the Overview Camera of RLVD Application it must have a display of the Traffic Light Status in the Live Feed to check for the status of Traffic Light. V. The RLVD Application must store Video & Images of Multiple Violating Vehicles in Different Lanes with a Unique ID, Location/Direction, Device ID, Lane ID or Lane No. And Evidence Image & ANPR Image along with Date & Time Stamp in the

encrypted
form in relational Database.

VI. The RLVD Application must have options for Smart Searching & Exporting the Vehicles data for Red Light Violations only.

VII. The RLVD Application must give Real-time alerts on Red Light Violations.

Technical Specifications for Intelligent Traffic Management Software (ITMS)	
S. No	Minimum Specification
	VIII. The RLVD Application must have advanced searching capabilities with options for filtering by violation type, Number Plate Search, with option for search with AND/OR function to be applied to two different parameters for finding the exact Violation/Infraction.
	IX. The RLVD Application must Automatically Pop-up of Hot-listed Vehicles upon Detection of Hot-Listed Number/License Plates.
	X. The RLVD Application must have option for creating various User Defined Categories like VIP Vehicles, Stolen Vehicles, and Suspicious Vehicles. For each Category, a Number/License Plate Number can be Assigned & Accordingly that Category of Vehicle can be searched in the Database.
	XI. The RLVD Application must have support for Actionable Intelligence that includes automatic E-Mailing/SMS to respective concerned Authorities.
	XII. The RLVD Application shall be OS Agnostic & should Compulsorily be Compatible on Windows Operating System & Linux Operating Systems both.
	XIII. The RLVD Application should support Integration with RTO/VAHAN Database for gathering Infractioning Vehicle's details & the Vehicle's owner details.
	XIV. The RLVD Application should have an Intuitive Graphical User Interface (GUI) & user-friendly menu driven Interface for the Configuration & Viewing the RLVD Application. For Ease of Operation & Maintenance, the Configuration should strictly be possible through the GUI & not through the Command Line Interface (CLI). Any Configuration through CLI shall not be Acceptable.
	XV. The RLVD Application should have Multiple Grid options like 1x1, 2x2, 2x1, 3x3, 4x4, 1+2, 1+5, 1+7 with various Grid options for Live Video Streaming Capabilities in real-time. Real-Time Updating of Image Snapshot on any Transaction

or Violation shall not be Acceptable. Live Streaming Support within the ANPR Application is a must & should be Demonstrated.

XVI. The RLVD Application should be a Web Based Application, so that it can Accessed on a Standard Web Browser from any System within the LAN. The Configuration of System should also be possible through the Web Browser itself.

XVII. The RLVD Application should have a Built-in E-Challan generation option in a Customized/User Centric Format.

XVIII. RLVD system, in case of an offence detected, shall capture details such as site name, location details, lane number, date & time, registration number of car and type of offence on the image itself.

XIX. The system shall also be able to generate number of reports for analysis such as the traffic light with maximum offenders, peak time of traffic offence and other reports in discussion and as per the customization requirement for this project.

XX. The system shall be designed to work for 24x7 unattended operations.

XXI. The System shall have Health Check Dashboard to Monitor the Complete Server/LPU Health Status. Alarm shall be generated if CPU, RAM Exceeds the Operating Threshold & should be notified to the Operator in the form of Toggle Notification.

XXII. The System shall Advanced Vehicle Tracking Section to track a Particular vehicle of Interest across Multiple ITMS/RLVD Cameras in the System.

Technical Specifications for Intelligent Traffic Management Software (ITMS)	
S. No	Minimum Specification
	XXIII. The RLVD Application must have the Capability to Play the Recorded Video Clip of the Red Light Violation Event within the Client GUI Application itself.
	XXIV. The RLVD Application must have the Capability to Export Pre & Post Recording of the Red Light Violation Event in Standard Video Formats like .avi, .asf, .mp4 & .ts
6.	The ITMS Application should have been Audited from Cert-In Empanelled Auditors for Security Audit Certificate as per OWASP Guidelines to Mitigate Cyber Security Attacks.
7.	The ITMS Application OEM should have Performed Benchmark Appraisal & Achieved CMMI V2.0 Maturity Level - 3. Appraisal Certificate of CMMI V2.0 Level - 3 to be Submitted as a Proof. The OEM should be in the Possession of the Appraisal Certificate on or before the Bid Publishing Date.
8.	The Appraisal shall be Validated Online & should be Available on Public Portal on CMMI Institutes Website in the Published Appraisal Results (https://cmmiinstitute.com/learning/appraisals/results).
9.	The Proposed Video Management Software (VMS), AI based Video Analytics Software (VAS) and Intelligent Traffic Management Software (ITMS) must be from Same OEM.

14.18 Adaptive Traffic Control System (ATCS) Solution

Minimum Technical & Functional Specifications for ATCS Solution	
#	Minimum Specifications
1. FRS for Adaptive Traffic Controlling System	
1	Traffic Signal Controller
2	Vehicle Detectors
3	Communication Network
4	Software Application
1.1 Traffic Signal Controller	
#	Minimum Specifications
	OEM Criteria
1	The proposed ATCS Controller should have installed at More than 100 junctions in a single project in India. OEM needs to submit client certificate.
2	The proposed ATCS controller should have deployed at least at 3 different cities in any municipal corporations/smart cities in India. OEM needs to submit client certificate.
3	OEM shall be Class-I Local Supplier under PMI policy under Make-In- India (MII) initiatives. OEM to submit self-declaration on their letterhead.
4	ATCS software application and ATCS controller should be from the same OEM. OEM to submit self-declaration on their letterhead.
5	ATC controller OEM should have India based hardware customization lab to customize hardware as per authority requirement with at least 10 hardware engineers. OEM to submit undertaking for the same along with PF documentary evidence.
	OEM should have valid certificate at organization level for below points,
	· ISO 20000-1:2018 – IT Service Management System (ITSMS) Certificate
	· ISO 14001:2015 – Environmental Management System (EMS) Certification
	· ISO 45001:2018 – Occupational Health and Safety Management System (OHSMS) Certification

6	· ISO 27001:2013 – Information Security Management System (ISMS) Certification
	· ISO 9001:2015 – Quality Management System (QMS) Certification
	OEM to submit valid certification.
	Functional Requirement

Minimum Technical & Functional Specifications for ATCS Solution	
#	Minimum Specifications
1	The Traffic Signal Controller equipment is a 32 bit or 64-bit microcontroller with solid state traffic signal lamp switching module with the ability to program any combination of traffic signal stages, phases and junction groups. The controller will ideally have a conflict monitoring facility to ensure that conflicting, dangerous are pre-flagged at the programming stage and these are disallowed even during manual override phase.
2	The Traffic Signal Controller will be adaptive so that it can be controlled through the central traffic control center as an individual junction or as part of group of traffic junctions along a corridor or a region. The signal controller design must be flexible for the junction could be easily configured to be part of any corridor or group definition and could be changed through central command controller easily
3	Site specific configuration data shall be stored in a non-volatile memory device (FLASH memory) easily programmable at the site through keypad or laptop. A minimum of 512KB flash memory and 128KB RAM shall be provided. Volatile memory shall not be used for storing the junction specific plans or signal timings.
4	All timings generated within a traffic signal controller shall be digitally derived from a crystal clock which shall be accurate to plus or minus 100 milliseconds.
5	The controller shall provide a real time clock (RTC) with battery backup The RTC shall have minimum of 5 years battery backup with maximum time tolerance of +/- 2 sec per day.
6	The controller shall have the facility to update the RTC time from ATCS server, and through manual entry.
7	The traffic signal system including controller shall have provision for audio output tones and should be disabled friendly.
8	The controller shall be capable of communicating with the ATCS server through Ethernet on a managed leased line network or any other appropriate stable communication network.
Police Panel	

The controller shall provide the following facilities in a separate panel with provision for lock and key arrangements for use by the Traffic Police.

#	Minimum Specifications
1	Four Hurry Call switches: The Hurry Call mode will provide the means to force the controller to a defined stage, without violating safety clearances. A preemption input may be used to demand the Hurry Call mode to give right of way to emergency vehicles. It should be possible to configure the Hurry Call switches to any stage as per site requirements.
2	One Forced Flash Switch: Activation of this switch should force the signal to Flashing Amber / Flashing Red.

Minimum Technical & Functional Specifications for ATCS Solution	
#	Minimum Specifications
3	One Auto / Manual Switch: Activation of this switch should enable manual operation of the controller. Deactivation of the manual switch shall continue from the current stage without interruption.
4	One Manual Advance Pushbutton Switch: In manual operation mode, the stages appear in the sequence specified in the signal plan timetable. Activating the pushbutton switch shall terminate the currently running stage and start the next.
5	One Junction OFF Switch: Activating this switch should put OFF all signal lamps. On deactivation of the switch the traffic signal controller shall resume its normal operation.
Mode of Operations	
#	Minimum Specifications
1	Fixed Time: In fixed time (pre-timed) mode the traffic signal controller shall execute stage timings according to the site-specific timetable maintained in the traffic signal controller FLASH memory. Inputs from vehicle detectors shall be ignored in this mode and no preemption shall be made on any stage. Cycle time remains constant in every cycle execution for a given time period.
2	Vehicle Actuation with All Stages Preemption: In the vehicle actuation with all stages preemption mode, the traffic signal controller shall execute stage timings as per demand from vehicle detectors within the constraints of Minimum Green, Maximum Green running period for the stage and Cycle time stored in the traffic signal controller FLASH memory. Preemption shall be possible for all demand actuated stages. Cycle time may vary in every cycle execution.
3	Semi-Actuation: In the semi-actuation mode, the traffic signal controller shall execute stage timings in the vehicle actuated stages as per demand from vehicle detectors within the constraints of Minimum Green, Maximum Green running period for the stage and Cycle time stored in the traffic signal controller FLASH memory. All other stages shall execute the Maximum green time configured for the stage. Preemption

	shall be possible for all demand actuated stages. Cycle time may vary in every cycle execution.
4	Stage Skipping: The traffic signal controller shall not execute the stage enabled for skipping when there is no vehicle demand registered for the stage till clearance amber time of the previous stage.
5	Transit Signal Priority (TSP) for BRT buses: The traffic signal controller shall provide transit signal priority for buses in dedicated lane to ensure minimum stop delay at the intersection, without violating safety clearances.
6	Vehicle Actuation with Fixed Cycle length: In vehicle actuation with fixed cycle length mode, the traffic signal controller shall execute stage timings as per demand from vehicle detectors within the constraints of Minimum Green, Maximum Green running period for the stage and

Minimum Technical & Functional Specifications for ATCS Solution	
#	Minimum Specifications
	Cycle time shall be maintained constant during a given timeslot. Preemption for all demand actuated stages except for Priority Stage shall be possible.
7	Full ATCS (FATCS): In FATCS mode, the traffic signal controller shall execute stage timings as per demand within the constraints of Minimum Green, Maximum Green running period for the stage and Cycle time specified by the Central Computer during every cycle switching. Preemption for all demand actuated stages except Priority Stage shall be possible in this mode. The traffic signal controller shall identify a communication failure with the central computer within a specified time period. In such an event the signal plan timings shall be executed from the local timetable stored in the traffic signal controller FLASH memory. Fallback mode of the traffic signal controller shall be vehicle actuated. On restoration of the communication with central computer the traffic signal controller shall automatically resort to FATCS mode.
	The traffic signal controller shall accept commands for remote selection / de-selection of the following from the Central Computer at ICC.
	Hurry Call
	Flashing Amber / Flashing Red Junction Off
	If not reverted to the normal operation within the time period listed below, the traffic signal controllers shall timeout the commands and operate normally
	Hurry Call – 5 Minutes
	Flashing Amber / Flashing Red – 30 Minutes Junction Off – 30 Minutes
	The traffic signal controller shall report the following to the Central Computer through the communication network every cycle or on an event as appropriate.
	Green time exercised for each approach (stage preemption timing) against the Green running period set for the approach by the Central Computer
	Mode of Operation Lamp failure, if any
	Output short circuit, if any

	Detector failure, if any
Traffic Signal Controller Operating Parameters	
The controller shall have facility to configure 32 Phases either for vehicular movement, filter green, indicative green, pedestrian movement or a combination thereof.	
#	Minimum Specifications

Minimum Technical & Functional Specifications for ATCS Solution	
#	Minimum Specifications
1	It shall be possible to operate the filter green (turning right signal) along with a vehicular phase. The filter green signal shall flash for a time period equal to the clearance amber period at timeout when operated with a vehicular phase.
2	The pedestrian phase signal shall be configured for flashing red or flashing green aspect during pedestrian clearance.
3	It shall be possible to configure any phase to the given lamp numbers at the site.
4	Stages – The controller shall have facility to configure 32 Stages
5	Cycle Plans – The controller shall have facility to configure 24 Cycle Plans and the Amber Flashing / Red Flashing plan. It shall be possible to define different stage switching sequences in different cycle plans. The controller shall have the capability for a minimum of 32 cycle- switching per day in fixed mode of operation.
6	Day Plans – The controller shall have facility to configure each day of the week with different day plans. It shall also be possible to set any of the day plans to any day of the week. The controller shall have the capability to configure 20 day plans.
7	Special Day Plans – The controller shall have facility to configure a minimum of 20 days as special days in a calendar year.
8	Starting Amber – During power up the controller shall initially execute the Flashing Amber / Flashing Red plan for a time period of 3 Seconds to 10 Seconds. The default value of this Starting Amber is 5 Seconds. Facility shall be available to configure the time period of Starting Amber within the given limits at the site.
9	Inter-green – Normally the inter-green period formed by the clearance amber and red extension period will be common for all stages. However, the controller shall have a facility to program individual inter-green period from 3 Seconds to 10 Seconds.
10	Minimum Green – The controller shall allow programming the Minimum Green period from 5 Seconds to 10 Seconds without violating the safety clearances. It should not be possible to preempt the Minimum Green once the stage start commencing execution.

11	All Red – Immediately after the Starting Amber all the approaches should be given red signal for a few seconds before allowing any right of way, as a safety measure. The controller shall have programmability of 3 Seconds to 10 Seconds for All Red signal.
12	Signal lamps monitoring – The controller shall have inbuilt circuitry to monitor the lamp status
13	Green – Green Conflict Monitoring – The controller shall have a facility to list all conflicting phases at an intersection. The controller should not allow programming of these conflicting phases in a Stage. A hardware failure leading to a conflict condition (due to faulty devices or short circuit in the output) shall force the signal into Flashing Amber / Flashing Red.

Minimum Technical & Functional Specifications for ATCS Solution	
#	Minimum Specifications
14	Cable less Synchronization – It shall be possible to synchronize the traffic signal controllers installed in a corridor in the following modes of operation, without physically linking them and without communication network. GPS enabled RTC shall be the reference for the cable less synchronization.
15	Fixed Time mode with fixed offsets
16	Vehicle Actuated mode with fixed offsets
Input and Output facilities	
#	Minimum Specifications
1	Lamp Switching: The controller shall have maximum 64 individual output for signal lamp switching, configurable from 16 to 32 lamps. The signal lamps shall be operating on appropriate DC/AC voltage of applicable rating
2	Detector Interface: A minimum of 16 vehicle detector inputs shall be available in the controller.
3	Communication Interface: The traffic signal controller shall support Ethernet interface to communicate with the ATCS server
4	Power Saving: The traffic signal controller shall have a facility to regulate the intensity of signal lamps during different ambient light conditions thereby saving energy.
5	Real-time Clock (RTC): The GPS receiver for updating time, date and day of the week information of the traffic signal controller should be an integral part of the traffic signal controller.
6	The traffic signal controller shall update the date, time and day of the week automatically from GPS during power ON and at scheduled intervals.
7	Manual entry for date, time and day of week shall be provisioned for setting the traffic signal controller RTC (Real Time Clock).
8	It shall be possible to set the RTC from the Central Server when networked
9	Keypad (optional): The traffic signal controller shall have a custom-made keypad or should have provision for plan upload and download using PC/laptop/Central Server

10	Operator Display (optional): The traffic signal controller shall optionally have a LED backlit Liquid Crystal Display (LCD) as the operator interface.
1.2 Camera based Vehicle Detector	
#	Minimum Specifications

Minimum Technical & Functional Specifications for ATCS Solution	
#	Minimum Specifications
	The detector equipment is a separate logic unit, which may be integrated into the controller, or alternatively mounted in its own housing. The outputs of the detectors indicate the presence of vehicles and are used to influence the operation of the traffic signal controller and shall generate counts, demands and extensions for right-of-way. Means shall be provided so that a detector may be connected to demand and / or extend a phase movement as specified.
1	The contractor shall clearly specify the placement of the detector (upstream, downstream, stop-line, exit etc.) for independent straight and right turn signals.
2	The detector shall be able to count vehicles in non-lane based mixed traffic flow conditions. The accuracy of counts shall be bigger than 90% over all light and weather conditions. The contractor shall clearly specify how this is accomplished.
3	The contractor shall give an estimate of the total number of vehicle presence detection zones and vehicle detectors required and the type of detection system recommended.
4	A detector that does not change its status at least once during a stage execution shall be notified to the Central Computer (in ATCS mode) at the termination of the associated stage.
1.3 Countdown Timer	
#	Minimum Specifications
	Countdown Timers shall be installed at each traffic junction under ATCS System Project.
1	Count Down Timer to be configured in Vehicular Mode.
2	The Vehicular countdown timer should be dual color:
	§ Red for Stop
	§ Green color for Go
3	There should be alternate Red and Balance phase time for STOP or STP in Flashing
4	Alternate Green and Balance Phase Time for Go in Flashing
5	The proposed Countdown Timer and ATC Controller should be from same OEM.

6	The proposed Count Down Timer should have installed at 100 junctions/arms in a single project in India. OEM needs to submit client certificate.
1.4 Communication Network	

Minimum Technical & Functional Specifications for ATCS Solution	
#	Minimum Specifications
1	Function of the Communication network is for remote monitoring of the intersection and its management. Real time data (like RTC time, stage timing, mode, events, etc.) from the traffic signal controller is required to be sent to the Central Computer in ICCC. Central Computer running the ATCS application shall calculate and send optimum signal timings to all intersections in the corridor. The contractor shall clearly specify the bandwidth requirements and the type of network recommended for the ATCS. The contractor shall specify the networking hardware requirements at the ICCC and remote intersections for establishing the communication network..
1.1.5 ATCS Software Application	
Objective of the ATCS is to minimize the stops and delays in a road network to decrease the travel time with the help of state-of-the-art technology. The adaptive traffic control system shall operate in real time with the capacity to calculate the optimal cycle times, effective green time ratios, and change intervals for all system traffic signal controllers connected to it. These calculations will be based up on assessments carried out by the ATCS application software running on a Central Computer based on the data and information gathered by vehicle detectors at strategic locations at the intersections controlled by the system. The ATCS application software shall do the following:	
#	Minimum Specifications
	OEM Criteria
1	OEM shall have CMMI Level 3 or above certificates in Software Development. OEM needs to submit copy of the valid certificate on a name of bidding entity. The certificate must be valid on https://cmminstitute.com website.
2	The proposed OEM should be in class-1 local supplier under PMI policy under Make-In- India (MII) initiatives as per Government of India's guidelines. OEM to submit self-declaration on their letterhead.

3	The proposed software application should have deployed across 3 different cities in India. OEM to submit self-declaration on their letterhead.
4	ATCS software application and ATCS controller should be from the same OEM.
5	Functional Requirement
6	Identify the critical junction of a corridor or a region based on maximum traffic demand and saturation.
7	The critical junction cycle time shall be used as the group cycle time i.e., cycle time common to all intersection in that corridor or region.

Minimum Technical & Functional Specifications for ATCS Solution	
#	Minimum Specifications
8	Stage optimization to the best level of service shall be carried out based on the traffic demand.
9	Cycle optimization shall be carried out by increasing or decreasing the common corridor cycle time based on the traffic demand within the constraints of Minimum and Maximum designed value of cycle time.
10	Offset correction shall be carried out to minimize number of stops and delays along the corridor for the priority route. Offset deviation measured using distance and speed between successive intersections
	shall be corrected within 5 cycles at a tolerance of +/- 5 seconds maximum.
11	The system shall have provision to configure priority for upstream signals as default. The ATCS software shall continuously check the traffic demand for upstream and downstream traffic and automatically assign the priority route to the higher demand direction.
12	Develop appropriate stage timing plans for each approach of every intersection under the ATCS, based on real time demand
13	Propose timing plans to every intersection under the ATCS in every Cycle
14	Verify the effectiveness of the proposed timing plans in every cycle
15	Identify Priority routes
16	Synchronize traffic in the Priority routes
17	Manage and maintain communication with traffic signal controllers under ATCS
18	Maintain database for time plan execution and system performance
19	Maintain error logs and system logs
20	Generate Reports on request
21	Graphically present signal plan execution and traffic flow at the intersection on desktop
22	Graphically present time-space diagram for selected corridors on desktop
23	Graphically present network status on desktop
24	Make available the network status and report viewing on Web

25	The ATCS shall generate standard and custom reports for planning and analysis
26	Shall have the ability to smartly manage the traffic pattern across the signals over the next few minutes, hours and just in the current real time.

Minimum Technical & Functional Specifications for ATCS Solution	
#	Minimum Specifications
29	Shall collect continuously information about current observed traffic conditions from a variety of data sources and of different kind (traffic states, signal states, vehicle trajectories, incidents, road works, ...)
36	Shall distribute both collected and calculated traffic information via a variety of communication protocols and channels, ensuring high interoperability degree and thus acting as a “traffic data and information hub”
37	Shall create a traffic data warehouse for all historic traffic information gathered from the hardware installed on the road network.
38	Shall operate in real time that is continuously updating the estimates on the state of the network and the travel times on the basis of data collected continuously over time.
39	Shall operate the traffic lights with the adaptive traffic controls, based on the current traffic demand and the current incidents, thus optimizing the green waves continuously throughout the network
(A) Reports	
#	Minimum Specifications
The system shall generate Corridor based and Intersection based reports. The application software shall generate the following reports but not limited to the below. All the reports shall be possible for selected dates.	
1	Intersection based reports
2	Stage Timing report – The report shall give details of time at which every stage change has taken place. The report shall show the stage sequence, stage timings and stage saturation of all stages of all cycles for a day. The saturation is defined as the ratio between the available stage timings to the actual stage timing executed by the traffic signal controller for the stage (stage preemption time).
3	Cycle Timing report – The report shall give details of time at which every cycle has taken place. The report shall show the cycle sequence and cycle timings for all the cycles in a day.

4	Stage switching report – The report shall give details of time at which a stage switching has taken place. The report shall show the stage sequence, stage timings and stage saturation for a day.
5	Cycle Time switching report – The report shall give details of time at which a cycle switching has taken place. The report shall show the cycle sequence and cycle timings for the cycle in a day.
6	Mode switching report – The report shall give details of the mode switching taken place on a day.

Minimum Technical & Functional Specifications for ATCS Solution	
#	Minimum Specifications
7	Event Report - The report shall show events generated by the controller with date and time of event.
8	Power on & down: The report shall show time when the master is switched on, and last working time of the master controller.
9	Intensity Change – The report shall show the brightness of the signal lamp is changed according to the light intensity either manually through keypad or automatically by LDR with time stamp.
10	Plan Change – The report shall show the time of change of plan either through keypad or remotely through a PC or Server.
11	RTC Failure – The report shall show the time when RTC battery level goes below the threshold value.
12	Time Update – The report shall show the time when the Master controller updated its time either manually through keypad, automatically by GPS or through remote server.
13	Mode Change – The report shall show the time when Master controller's operating mode is changed either manually through keypad or a remote server. The typical modes are FIXED, FULL VA SPLIT, FULL VA CYCLE, FLASH, LAMP OFF and HURRY CALL.
14	Lamp Status Report – The report shall show lamp failure report with date and time of failure, colour of the lamp and associated phase
15	Loop Failure Report – The report shall show the date and time of detector failure with detector number and associated phase.
16	Conflict – The report shall show the conflict between lamps (RED, AMBER, GREEN) in the same phase or conflict between lamps with other phase.
17	Corridor Performance Report – The report shall show the saturation of all the intersections in a corridor for every cycle executed for the corridor and the average corridor saturation for a day

18	Corridor Cycle Time Report – The report shall show the Corridor cycle time, Intersection cycle time, Mode of operation and degree of saturation of all the intersections in a corridor for every cycle for a day
(A) Graphical User Interface	
#	Minimum Specifications
The application software shall have the following Graphical User Interface (GUI) for user friendliness	

Minimum Technical & Functional Specifications for ATCS Solution	
#	Minimum Specifications
1	User login – Operator authentication shall be verified at this screen with login name and password
2	Network Status Display – This online display shall indicate with appropriate colour coding on site map whether an intersection under the ATCS is online or off. On double clicking the intersection a link shall be activated for the traffic flow display for the intersection.
3	Traffic Flow Display – This online display shall indicate the current traffic flow with animated arrows, mode of operation, stage number being executed and elapsed stage time.
4	Saturation Snapshot – This display shall show the current saturation levels of all intersections in a corridor.
5	Reports Printing / Viewing – This link shall allow selection, viewing and printing of different reports available under ATCS
6	Time-Space Diagram – The time-space diagram shall display the current stages being executed at every intersection in a corridor with immediate previous history.
7	Junctions shall be plotted proportional to their distance on Y-axis and time elapsed for the stage in seconds on X-axis.
8	Junction names shall be identified with each plot.
9	Facility shall be available to plot the time-space diagram from history.
10	Currently running stage and completed stages shall be identified with different colours.
11	Stages identified for synchronization shall be shown in a different colour.
12	Speed lines shall be plotted for stages identified for synchronization to the nearest intersection in both directions.
13	It should be possible to freeze and resume online plotting of Time-Space diagram.
14	The system shall have other graphical interfaces for configuring the ATCS, as appropriate.

Technical Requirement Specifications for ATCS Solution	
#	Minimum Specifications
Traffic Controller	
	Appropriate controller technology may be chosen to provide the operational levels and accuracy as required for the successful function of the ATCS system as per the SLAs defined. The proposed traffic controller shall be disabled friendly and shall also provide audio tones output.

Minimum Technical & Functional Specifications for ATCS Solution	
#	Minimum Specifications
Traffic Sensor	
	Appropriate camera-based traffic sensors may be chosen to provide the operational levels and accuracy as required for successful function of the ATCS system as per the SLAs defined.
Traffic Light Aspects	
#	Minimum Specifications
	Key Features:
a.	lowest power consumption for all colors
b.	Meets or exceeds intensity, colour and uniformity specifications
c.	Temperature compensated power supplies for longer LED life
d.	Uniform appearance light diffusing
e.	Should be Intertek/ETL/EN compliant
f.	LED shall be single source narrow beam type with clear lens & Luminance uniformity
g.	Phantom Class 5 or equivalent. IP Rating: IP65
	LED aspects:
a.	Red, Amber, Green-Full (300 mm diameter): Hi Flux OR Discrete Hi Bright LED OR better
b.	Green-arrow (300 mm diameter): Hi flux OR Discrete Hi Bright LED OR better
c.	Animated Pedestrian-Red and Green Animated c/w countdown (300 mm) Hi Brite with diffusions or clear lens
d.	The proposed Traffic Light Aspects and ATC Controller should be from the same OEM.
Countdown Timer	
#	Minimum Specifications
1	CPU: Micro Controller
2	Mechanical Specifications
A	Structural Material:Polycarbonate strengthened against UV rays or Rust-free Metal Alloy cabinet.

B	Body Color:Light Grey/Black
C	Dimensions: 360mm x 370mm x 220mm or better
3	Display Specification

Minimum Technical & Functional Specifications for ATCS Solution	
#	Minimum Specifications
A	Display Type: Dual Coloured (Red & Green)
B	No. of Digit: 3 or configurable.
4	LED Specifications
A	LED Diameter:5mm LED / SMD LED
B	Viewing Angle: As per LED Type
C	LED Wavelength: 630-640nm (Red), 489nm-505nm (Blue-Green)
D	LED Dice Material: AlInGap (Red), InGaN (Blue-Green)
5	Technical Features
A	Power Consumption: 20 - 30 Watt Per Lamp
B	Input Power: 12/24V DC or 230V AC ~ 50Hz
C	Operating Temperature: 0 to + 55 °C
D	Humidity: 0% to 95% Relative Humidity
E	Water & Dust Ingress: IP 65

14.19 Public Addressing System with Emergency response

Minimum Technical & Functional Specification of Public Address System & Emergency Call Box		
#	Parameter	Minimum Specification
1	Desktop Call Station, full IP based handset and microphone	
2	Master Station should be a powerful desktop video phone featuring 5" or 7" colour touch screen, real-time HD video telephony, built-in Wi-Fi, Bluetooth. Should be POE powered. It should be able to display HD video and clear sound. The master station shall be compatible with Intelligent Unified platform The master station shall Support high- definition audio and video calls based on SIP protocol, with excellent hardware echo suppression and noise reduction effects; support standard SIP2.0 protocol,	

	compatible with mainstream switch, IMS and IPPBX systems on the market, as well as various SIP protocol mainstream audio and video terminals . The call station shall have the feature of call recording. It shall be built as per latest cyber security norms.	
	Specifications:	
3	Graphic Display	7" (1024x600) capacitive (5 points) touch screen TFT LCD
4	Camera	Tilt able megapixel CMOS camera with privacy shutter, 720P@30fps
5	Auxiliary Ports	RJ9 headset jack (allowing EHS with Plantronics headsets),
6		USB port, SD, HDMI-out (1.4 up to 720p30fps). USB Type C x1, Rj11x1 or 3.5mm stereo headset socket.
7	Feature keys	2 function touch keys VOLUME +/-, 3 dedicated Android touch keys HOME, MENU, and BACK
8	Video Codec	H.263, H.264 BP/MP/HP
9	Video resolution	Up to 720p
10	Video frame rate	Up to 30 fps
11	Operating temperature range	0°C to +40°C
12	Storage temperature range	-10°C to +60°C
13	Relative humidity	10% - 90% non-condensing
14	Power options	Power over Ethernet (PoE & PoE+) or power adapter.
15	Power over Ethernet	802.3af Class 3, 802.3at Class 4
16	Power adapter	Input: 100-240VAC 50-60Hz; Output 12VDC

		1.5A
17	Network Interface	1 x RJ45 (Ethernet) 10/100/1000 Mbps with integrated PoE
18	Bluetooth	Integrated, Bluetooth 4.0 + EDR
19	Wi-Fi	Integrated, dual-band 2.4 & 5GHz with 802.11 a/b/g/n
20	Security	User and administrator level passwords, MD5 and MD5-sess based authentication, 256-bit AES encrypted configuration file, TLS, SRTP, HTTPS, 802.1x media access control
21	Protocols/Standards	SIP RFC3261, TCP/IP/UDP, RTP/RTCP, HTTP/HTTPS, ARP, ICMP, DNS (A record, SRV, NAPTR), DHCP, PPPoE, SSH, TFTP, NTP, STUN, SIMPLE, LLDP MED, LDAP, TR-069, 802.1x, TLS, SRTP, IPv6, OpenVPN®.
22	Audio technology	G.711μ/a, G.722 (wide-band), G.726-32, iLBC, Opus, G.729A/B in-band and out of-band DTMF (In audio, RFC2833, SIP INFO), VAD, CNG, AEC, PLC, AJB, AGC, ANS
23	Language support	English.
24	Compliance	FCC: Part 15 (CFR 47) Class B;
25		CE: EN55022 Class B, ROHS
26	IP Horn Type PA Speaker	

27	The IP horn loudspeaker shall be individually addressable and ideal for applications that only require a limited number of speakers. It should be PoE capable and provides 25 watts of output power. It should be possible to do software upgrades remotely, configuration can be done via built in web server. The Horn design should give better directivity over that of a cabinet speaker, and ideal for more target audio messages, or installation in challenging acoustic environments where increased directivity is key to intelligible audio. The station shall be ONVIF compatible. It shall be built as per latest cyber-security norms. The IP speaker shall be IP-66 rated.	
28	Internal speaker amplifier	25 W class D
29	Max. sound pressure level at 1 meter	116 dB
30	Amplifier description	25W Class-D Amplifier
31		
32	Dispersion (-6dB) 1kHz / 4kHz	120° / 60°
33	Directivity factor, Q	1, 8
34	Codecs	G.722, G.722.2, G.711μ/a, G.729A/B, G.723.1, OPUS
35	Microphone	Built in Micro phone
36	Frequency range, G.722 Codec	280 Hz – 12kHz
37	Mounting	Bracket Should be included (Stainless Steel material)
38	Material / Colour	ASA (plastic) Colour RAL White
39	Electronics cover material	ASA (plastic)
40	Gasket material	Silicon rubber
41	IP Rating	The speaker should be IP67 and /or NEMA-4X rated
42	Operating temperature range	-40° to 65°C
43	Storage temperature range	-40° to 65°C

44	Relative humidity	< 95% not condensing
45	Certifications	CE and FCC Part 15, ROHS, IP66
46	Ethernet connector	1 x RJ 45
47	Power options	PoE
48	PoE (power over Ethernet)	IEEE 802.3af standard, Max25W
49	Power consumption	Idle 1.8W, max 25W (depending on volume)
50	Protocols	IPv4 (with DiffServ), SIP, TCP, UDP, Unicast, Multicast, HTTPS, TFTP, RTP, DHCP, SNMPv2c, ONVIF, NTP
51	LAN protocols	Power over Ethernet (IEEE 802.3 a-f) Network Access Control (IEEE 802.1x)
52	Management and operation	HTTP/HTTPS (Web configuration) DHCP and static IP, Remote automatic software upgrade. Centralized monitoring
53	Advanced supervision functions	E.g. network test, tone test, status reports
54	SIP support	RFC 3261 (SIP base standard), RFC 3515 (SIP refer), RFC 2976 (SIP info)
55	DTMF support	RFC 2833, 2976 (SIP info)
56	Emergency Audio call station	
57	Voice Emergency Station should be a rugged device IP67/IK10, designed for harsh environments. The intercom station should be fully digital and should offer crystal clear audio with high output through a 10 W internal amplifier offering up to 95dB SPL. Active Noise Reduction and Acoustic Echo Cancelling allows for hands-free two-way communication with superior audio quality. Intercom status indicators display the status of the system. It should have 2 buttons to call two locations independently. / The station shall be compatible with Intelligent Unified platform The station shall be CE, FCC, RoHS, IK10, IP67, and ISO9001 compliant. It will be built as per latest cyber-	

	security norms.	
58	Audio quality - percentage articulation loss of consonants (Alcons) - at 70 dB	< 5%
59	Audio quality - total harmonic distortion + noise, without noise reduction (THD+N) - at 70 dB	< 2%
60	SPL rated power at 1m in open duplex	96 dB
61	SPL rated power at 1m in half duplex	107 dB
62	SPL rated power at 1m in program distribution and announcement	107 dB
63	Noise cancelling - suppression of musical noise	YES
64	Noise cancelling - suppression of static noise	YES
65	Noise cancelling-suppression of rapidly changing noise	YES
66	Codecs	G.711, G.722, G.729
67	Frequency range, G.722 Codec	200 Hz – 7000 Hz
68	Audio technology	Modes: Full open duplex, switched open duplex
		Adaptive jitter buffer
		Audio Mixing – Conversation and Group Call
		Automatic gain control (microphone)
		10 W class D

69	Internal speaker amplifier	Digital MEMS/omnidirectional microphone
70	Microphone technology	Undistorted and clear audio
71	Automatic Volume Control (AVC)	Prevents audio feedback even at high volumes (95dB)
72	Acoustic Echo Cancellation (AEC)	Matches 10W amp for distortion-free broadcast level sound
73	10W Speaker	1 x RJ 45 or more
74	Ethernet connector	Tool less, spring loaded, vibration proof terminals
75	All other connectors	Minimum 5 (configurable)
76	General inputs and outputs	12mA as LED drivers
77	Outputs	Max: 250VAC/220VDC, 2A, 60W
78	Change-over relay (NO+NC+COM)	PoE and or external power supply
79	Power options	IEEE 802.3af standard, Class 0 (0.44W to 12.95 W)
80	PoE (power over Ethernet)	24 VDC (16 – 48 V)
81	External power supply	Idle 1.8W, max 12W (depending on volume)
82	Power consumption	600 Ohm
83	Audio Line out / Induction loop signal	LED
84	Button backlight	Icons/colors for hearing impaired
85	Call indication	LCD Display
86	Display technology	600m V/Lux-sec
87	Display contrast/Sensitivity	160 deg
88	Viewing angle	120 cd/m2
89	Display brightness	50000 hours/5 years
90	Display lifetime	180 x 120 x 73 mm / 7.1" x 4.7" x 2.9"

91	Dimensions (H x W x D)	0.8 kg / 1.8 lbs
92	Weight	PMMA colour printed on back side or Cold rolled steel with outdoor colour powder
93	Faceplate material	Aluminium alloy - A413.0, AlSi12Fe, painted
94	Base / frame material	Polycarbonate (translucent)
95	Electronics cover material	Silicone rubber
96	Gasket material	SECC Steel
97	Fastening bracket material	Polycarbonate (transparent) or Stainless steel
98	Button material	1.25 mm
99	Button travel length	350 gf
100	Button activation force	300000
101	Button push-cycles before failure	Open flow anechoic design eliminates "standing waves"
102	Anechoic Design	3D cast aluminium speaker grille
103	Loudspeaker poke protection, large diameter object	Stainless steel mesh, acoustically transparent
104	Loudspeaker poke protection, small diameter objects	IPv4 (with DiffServ), SIP, TCP, UDP, HTTPS, TFTP, RTP, SRTP, DHCP, SNMP, ONVIF, NTP
105	Protocols	Power over Ethernet (IEEE 802.3 a-f) Network
		Access Control (IEEE 802.1x) STP (IEEE 802.1d)
106	LAN protocols	HTTP/HTTPS (Web configuration) DHCP and static IP. Remote automatic software upgrade.
		Centralized monitoring.
107	Management and operation	E.g. network test, tone test, status reports
108	Advanced supervision functions	RFC 3261 (SIP base standard) RFC 3515 (SIP refer) RFC 2976 (SIP info), SIP using TLS, RFC 5630 SIPS URI scheme

109	SIP support	RFC 2833, 2976 (SIP info)
110	DTMF support	IP67 tested according to EN 60529 (applies when mounted in TA-1 back box)
111	IP rating	IK10, tested according to EN 62262
112	IK rating	-40° to 70° C
113	Operating temperature range	-40° to 70° C
114	Storage temperature range	< 95% not condensing
115	Relative humidity	Salty mist, tested according to EN60945
116	Corrosion	Tested according to EN60945
117	Vibration	YES
118	Compliances	CE, FCC, RoHS

14.20 GIS Software

Minimum Technical Specification GIS Software		
#	Parameters	Minimum Specifications
The envisioned GIS solution should be Open Source with following minimum specification:		
1	OGC Standards	Should support WMS, WFS, WCS, WMTS for web map publishing
2	Performance	Should have optimized rendering engine for fast web map delivery
3	Supported OS	Should support Windows, Linux, macOS etc.
4	Authentication & Security	Supports basic authentication and integration with external security services.
5	Customization	Extendable through Python scripting and server-side configuration
6	Supported formats	Vector (SHP, GeoJSON, KML, GPKG, etc.), Raster (GeoTIFF, PNG, JPEG, ECW, etc.)
7	Print Layouts	Exposes print layouts as web-based print services

8	Data Support	Supports raster (GeoTIFF, NetCDF, JPEG2000) and vector (Shapefile, GeoJSON, PostGIS, etc.) data
9	Editing Tools	Allows direct editing of vector data, attribute tables, and geoprocessing operations.
10	Spatial Databases	Seamless integration with PostgreSQL/PostGIS, Spatialite, MySQL, and Oracle Spatial.
11	Web Server	Apache/Nginx
12	Web Server OS	Ubuntu 20.04+/ Debian 11/ Windows or equivalent.
13	Plugins:	Extend functionality using Python-based plugins
14	Cartography & Styling	Advanced symbology, labelling, and print layouts
15	Python Scripting:	PyQGIS framework allows automation and customization
16	Interoperability file formats	Reads and writes following file formats: Vector: .shp, .shx, .dbf,.gpkg,.geojson,.kml, .kmz,PostgreSQL database,.SQLite,.gml,.dxf,.csv,.gpx,.tab, .mif, .mid,.fgb Raster: .tif, .tiff,.jp2,.png,.jpg,.asc,.nc,.img 3D & LiDAR: .las, .laz,.ply,.obj

14.21 Enterprise Management Systems (EMS) Solution

Minimum Technical Specification for EMS Solution	
#	Minimum Specification

1	Complete end to end fault & Performance monitoring from a single OEM 1. Fault & Performance Monitoring (Network, Server, Cloud, VMs, CCTV, Wi-Fi, all IP network) 2. Network configuration & Change management 3. Traffic analysis 4. Assets Management 5. Log management 6. Reporting & Dashboarding with integration 7. Helpdesk ITSM Tool 8. IPAM (IP Address management)
2	General
3	The proposed EMS OEM must have at least 1 deployment (in state/central Government/ PSU/BFSI) in India with 10,000 core network devices such as router, switch, firewall being monitored and their configuration is also managed in this deployment in last five years. Reference PO copy and completion/ signoff document need to be submitted.
4	The solution should be capable of running in Linux platform with time series database (not RDBMS) as backend and should be 64-bit application to fully utilize the server resources on which it is installed.
5	The organization should have ISO 270001, ISO 27034, SOC3 and CMMI Level 3 certification for their internal processes and certificate must be provided.
6	Proposed Tool should be certified for ITIL V4 for 9 or more practices from Peoplecert.
7	The proposed solution should be OWASP & SANS certified from Cert-In empanelled vendor

8	Tool should support Multi-Tenant & Multi-Tier architecture (with GUI Layer, DB Layer, Backend Execution Layer, Queuing should be running on separate system independently with different code)(where in every module and system being used can be assigned to a specific set of users or a group of users.), System should have developed using modern Event Driven programming with Function as Service concept, Completely Pub-Sub mechanism , Should have Push API's using Web Socket to push data to 3rd Party Application for Dashboard and Reports (to optimize bandwidth usage), Should use Document DB with inbuilt 3 node clustered deployment for high availability. Use multiple type of DB based on Usage for ex. Document oriented DB for Ticketing, Time series DB for Statistical/monitoring Data, In memory DB for Faster data access etc.
9	Tool should provide option for the users to choose personalized GUI Color theme (Multi-Color, Dark/Light Theme), It should have Multi-Language Support so every state user can use system with in their own language. Multiple Logo supports based on the user state, system should load their state default logo. System should support Key board sort custs to navigate through different modules and perform faster actions
10	The solution should have dual-stack IP support (support both IPv4 and IPv6) and should be completely vendor-agnostic in nature to be able to monitor a multi-vendor environment
11	The solution should be a unified system which can monitor networks, servers, apps and any IT or Non-IT Communicable device (ex.: RF device, VSAT etc.)
12	Search & Views: possible to search for events / alerts based on a set of attributes, support creating views to quickly extract the necessary info about events based on different predefined filters or search conditions
13	The system should be capable to retrieve and show fault, performance , inventory and SLA data in a single dynamic view with option to export the views into PDF, Word, Excel, HTML etc. formats depending on the need. System should have capability to add any additional information about the nodes via custom fields.

14	System should have Node Tags for device grouping and resource/interface tagging for element grouping. Apart from Node Tags additionally system should have options to do device grouping based on default fields and customer fields
15	System should have a bi-directional integrated NCCM tool with option to use NCCM features easily by enabling the license for it without having to do any additional installations. The integration should allow assets and topology to sync from the NMS module to the NCCM features for helping in Root-Cause-Analysis of faults
16	Network Monitoring
17	System should have option for multiple options for discovery including IP address based discovery, IP address range discovery, CSV based discovery for bulk discovery and it should allow options to add custom fields to support customer specific data to upload during discovery
18	The system should fetch topology via SNMP for ARP tables from routers , MAC tables from layer 2 switches, cisco Discovery Protocol, Link Layer Discovery Protocol, Foundry Discovery Protocol or SynOptics Network Management Protocol. The discovery should be automated and continuous.
19	Discovery has to work intelligently by identifying the device in the network by the given IP range and categorize into network devices and servers with vendor and model details.
20	Automatically learn devices that supports SNMP, HTTP, Ping, SMTP, POP3, WMI,JMX, SOAP, REST API,PDC, SSH and Telnet along with any required protocol to communicate to the devices.
21	System should support global threshold and it should have option to define individual resource/interface statistics level threshold
22	Threshold & Alerts: define and store static & dynamic resource utilisation thresholds, define and maintain availability thresholds for individual components, services or applications, individual service actions / automated operations (performing a transaction, running an automated procedure etc.), support comparison of actual availability , actual performance with agreed levels and alerting on breaches
23	Configurable parameters like frequency, data duration, resolution duration, sigma

	based polarity value, reset points should be available
24	All thresholds should have set point , reset point, polarity , set point message and reset point message for ease of use.
25	Detect & highlight faults (abnormal situations) in near real-time occurring anywhere within the monitored IT Infrastructure
26	Provides Filtering, De-duplication, Holding, Suppression and Correlation capability to let user focus on the critical event that affects the business and business processes
27	Provides multi-level (preferably six-level) Severity definition, will handle events automatically and inform the designated person as per operational requirement
28	System should support separate Rule Engine based alarms apart from the generic threshold. a. Should have capability to configure Device Group based, Node Based, Resources/Interface based, Aggregation link based. b. On Selection of Nodes/Resources/Aggregation links it have flexibility to filter based on fields available in node information c. Rules should have option to apply configuration on top of performance value or based on configured threshold alarms d. Rules should have option configure the breach based on min, max and average values e. Should have option to configure rules n repeat counters f. Should have options to select custom alarm and clear alarm messages for individual configured rules g. Should have option to send severity levels like error, warning and information h. Notifications support based on configured rules
29	Provides alarm suppression with hold time and aid in prevention of flooding
30	Sends alert via E-mail, SMS, Execute Batch file, SNMP Trap, XML notification, Pop-up window and Audio alert
31	Capacity Reservations: tool should allow management of resource allocations and reservations (for services, applications or other needs), identify resource shortages and provide information for further analysis or procurement

32	Event Record & Classification: possible to generate event for all the monitoring devices, tool be used to define thresholds to generate events, collect from 3rd party using REST API , on regular interval Polling API and collect events from 3rd party system, classify them , assign different levels of severity to events, attribute events to specialised practices such as performance and capacity management, availability management, information security management, allow the automatic recording of event messages reported by external tools, filter & differentiate between different types of events
33	Configurations: create rules that automatically assign deadlines to events based on their impact on services or on end-users, create rules that perform automated assignment of events to the corresponding teams, create rules that control automated notification of interested stakeholders about events , automatically handling duplicate events, provide event correlation capabilities to combine a set of different events into one major event
34	Monitors all traffic from all the interfaces of the network device. Provides traffic Utilization based on individual interface level, nodes level or based on the group by location, branch, departments etc.... as an Avg, Min and Max bandwidth, utilization, throughput or any custom monitoring parameters.
35	Provision to change the polling interval to any frequency depending on the priority till the individual component / resource level like each interface might have the different polling interval in the same device based of the criticality and importance of service customer
36	System should have capability to configure business , non-business hours or custom time polling. These configuration should be available for every device as well as every component in the device.
37	Provision to disable and enable the polling of specific type of devices
38	System should have capability to configure the maintenance period for any device. When device is in maintenance period there is no polling done and the SLA clock on the device is stopped.

39	SLA calculation / Isolation report should be made with the consideration of both the Primary and Secondary link together instead of individual link based. The downtime calculation will be measured when both the links are down for internal reporting and link based for ISP reporting. System should provide the flexible configuration in UI itself based on user needs
40	Provide a notification mechanism that allows administrator to define what notification channel to be used in different time of days, and able to trigger multiple notifications to alert multiple person and actions
41	Provide standard reports that display current status of nodes and interfaces. Reports could be viewed on daily graph (5 minute average), weekly graph (1 hour average minute average), monthly graph (1 hour average) and yearly graph (1 day average)
42	Reports & Dashboard: Pre defined Availability, Performance , Capacity Dashboards & Report, Should have option to drag and drop dashboard configuration option Should have option to add multiple type of widgets along with (Tabular, Summary, Multiple Graph options), Filter (predefined & Dynamic), Sort, Search, Group by, multi threshold, Export option to PDF , XLS etc., Generate automatically and send over Email or to a predefined folder, possible to define custom KPIs , A KPI definition must include the period-bound target value and the threshold value (to distinguish between the Green, Amber and Red zones).
43	Automatically generate daily reports that provide a summary of the IT Infrastructure as well as custom Reports and that are automatically sent by email at a pre-defined schedule to any recipient or save into any specific folder or drive.
44	Supports instant diagnosis of the node status through Ping, Telnet and SNMPwalk
45	Support Real-Time report generation for checking continuous reachability of target device
46	System should provide many different types of topology representation. To perform the following : 1. Display physical connections of the different devices being monitored in the system 2. Display flat maps of the entire network or networks in a single view 3. Display customer maps based on user configurations

	4. Display maps based on geo locations
47	Automatically learn IP Networks and their segments, LANs, hosts, switches, routers, firewalls etc. and to establish the connections and to correlate
48	Provides provision to draw & map user specific network diagram
49	The tool should have Integrated Web based feature to build Network Diagram, No separate client window to configure network Diagram. The builder should be similar to MS Visio with all pre-loaded shapes and icons.
50	It should be a Drag & Drop based Network Diagram builder, Dynamically Upload Images, Customizable objects to support multiple vendors, capability to export maps in an XML format and upload to any other system.
51	Panel View a. Panel view should look similar to the actual device front panel b. System should automatically detect the device model display the right panel without any additional configuration c. Panel should show all the monitored interface with status d. Fan status with live fan icon and LED status for power
52	Tool should have complete inventory information of the assets discovered along with an option to fetch the target network device EoL / EoS information if required
53	Tool should allow QoS monitoring of WAN links across multiple technologies like Cisco IPSLA, Juniper RPM, Huawei NQA etc. across multiple protocols like HTTP, TCP, FTP, DNS etc.
54	QoS paramters should include link response time, link-level latency, link-level packet loss, link-level jitter, Round-Trip-Time etc.
55	Should monitor Class-Based Quality of Service (CBQoS) to find out if traffic prioritization policies are effective and if business-critical applications have network traffic priority. Should also support CBQoS Nested policies
56	Tool should have option to collect and store system logs from target devices including

	firewalls, routers, switches, WLC, servers, applications & databases
57	Tool should have multiple filtering options for incoming system logs based on target device, log_ID, severity, level, message, OS type, application / database etc.
58	Tool should have option to export specific syslog messages to users via email / SMS
59	System should support VM, Hypervisor and Cluster monitoring from different vendors like VMWare, Citrix, Nutanix, Linux etc.
60	System licensing should be based only on Physical Hosts and not charge separately for individual guest VMs running on VM Hosts
61	Cover geographically distributed networks through multi-level scalable distributed deployment architecture
62	Ability to add new pollers at no extra cost.
63	Network Configuration, Orchestration & Automation
64	Tool must support CLI-based network device configuration snapshot management including backup of configuration files, traffic logs, messages etc. , pushing configuration files to target network devices, with option to perform remote firmware upgrades.
65	The configuration changes to be done on target network devices must follow an approval-based system wherein changes can be performed only after required approvals are passed. Tool must have in-built approval mechanism along with option to integrate with Change Management module of other ITSM tools for the approval process.
66	Tool must provide option for target CLI-based network device vulnerability detection based on their model number and firmware version. It should also provide options to remedy the vulnerabilities with help of pre-configured scripts for certain vulnerability types.
67	Tool must provide option to perform standard compliance checks like PCI-DSS, NIST, DISA etc. across all target CLI-based network devices

68	Tool must provide an option for taking remote access via Telnet / SSH to target CLI-based Network Devices with an option to record all sessions to capture all commands being executed on the remote devices. The tool must allow session relay wherein a higher-privileged user can view the ongoing CLI session of a lower-privileged user in real-time from the tool GUI. The sessions should be saved for historical analysis with flexible filter options like searching for sessions in which a particular command has been executed.
69	Network Traffic Analysis
70	The proposed monitoring solution should be able to monitor network traffic by capturing flow data from network devices, including Cisco Netflow v5 or v9, Juniper J- Flow, IPFIX, sFlow, NetStream data and also sampled Netflow data. Solution must be able to store ALL flows without any rollups or loss for retention period - for security and audit purposes.
71	Should identify which users, applications, protocols, countries, AS numbers, top routers, and top interfaces are consuming the most bandwidth
72	System should have capability to alternatively capture traffic data via packet capture.
73	Should be able to associate traffic coming from different sources to application names
74	Should be able to receive flows from non-SNMP-enabled devices, like VMware vSwitch
75	Should monitor Type of Service (ToS), Differentiated Services Codepoint (DSCP), and Per-Hop Behaviour (PHB), BGP AS and NEXT HOP
76	Should provide flow analysis with 1-minute granularity and The solution should be able to monitor up to 5 million flows per second, and should employ advanced optimization methods
77	Solution should support advanced SSL/TLS analysis like detecting false certificates, expired, self signed
78	Solution should also feature signature based detection techniques and allow drilldown to packets from alerts
79	Solution should provide DDoS reports in real time within 1 minute after detection of attack with details of IP, Ports, ASN numbers, Router Interfaces, Customers facing the attacks

80	Solution should feature threat monitoring by comparing enterprise traffic against known IOC
81	IPAM
82	IPAM solution should have complete IP discovery , IP management with historical tracking
83	IPAM should have IP Grouping, Sub grouping and role and privileged based access.
84	Support both IPv4 and V6 along with IP Classes
85	AIOPS
86	AI/ML-driven root cause analysis by correlating multiple sources of data (logs, configurations, etc.) to identify the underlying cause of an incident, accelerating the resolution process.
87	Anomaly Detection and Alerting: AI/ML-powered systems continuously monitor IT infrastructure metrics, network traffic, or system logs to detect anomalies or deviations from normal behaviour. Alerts are generated for potential issues.
88	Capacity Planning and Optimization: Inbuilt AI/ML algorithms analyse historical usage data and predict future resource demands, enabling better capacity planning and optimization of IT resources to meet demand spikes or prevent resource shortages. tool should help to identify resource shortages and provide information for further analysis, suggestion to upgrade/downgrade specific infra or procurement?
89	Inbuilt AI/ML algorithms can predict potential failures or performance issues in IT infrastructure, by analyzing historical data patterns. This allows proactive maintenance to prevent system failures or downtime.
90	Inbuilt ML/AI support for: Incidents: AI enabled Auto classification, Categorization of Incident. Finding and classifying similar incident, duplicate Incidents, based on customer requirement similar or duplicate incidents should merge automatically. AI service management (AISM) should Harness intelligent and automated incident routing & workload management, AI enabled Email merging/ AI enabled Email Automator. AI Bot to update knowledge bases with new solutions insights gained from past incidents

91	AI-enabled sentiment analysis to help agents predict end users mood and tone at the time of raising tickets and further conversation depending on their word choice and previous CSAT survey results.
92	Service Management
93	Low Code /No Code Platform for Integration: Tool should provide REST APIs to integrate with IT Infrastructure Management, Configuration Management, Network Management, CRM, SIEM tools to automate Events to Ticket. The proposed tool must provide Dynamic REST/WEB API integration without writing any code, Just by configuration on GUI with various inbuilt Authentication method. Should be able to do 2 Way Integration with 3rd party and should be able to exchange the data at any stage of the lifecycle of the Event, Incident, Problem, Change, Request, Task, Release etc.
94	Low Code /No Code Platform for Robotic Process Automation: Tool should provide Drag and Drop based Workflow Process Design and No code Input Forms design using Drag and Drop method for different processes, services and workflow No code automation platform to support Rule execution (value based, Time based rule executions)
95	Team/Individual Pressure/Load Score, Efficiency Score, Expertise Score should be present on Dashboard
96	Tool must provide intelligent Email-to-Incident feature in which tool admin has the option to allow certain domains for automatic conversion of emails to tickets. Tool should merge all subsequent email communication for a particular email-to-incident ticket into the same ticket in the form of a message thread. Tool should be intelligent enough to understand email conversation chains for merging emails to a particular incident. Merging logic should be not only based on TicketID but also on email sender, cc responses to that email chain
97	Tool should be able to provide real-time Email, SMS Notification alerts to notify respective users about any changes in ticket state and status. Tool should provide Email Communication Interface to allow technicians to send replies to customers / end users

	from the tool GUI and Record all the Email Communication in Chronological Order
98	The integrated ITSM module should have its own Android & IOS app
99	The proposed tool must provide GUI interface for users, requesters, customers, support staff, 3rd party vendors, Area Managers, Field Engineers , Site Engineers, Supervisors, Managers, (Helpdesk available 24x7 at customer site) etc. with options to restrict amount of information that can be accessed by each role
100	The proposed tool should have the capability to be able to define and access the Business and Technical catalogue separately
101	The tool should allow the administrator to create categories and multiple sub- categories (under each category) in hierarchical order for services being offered to the end users.
102	Tool should have option to define the workflow for each service created in the Service Catalog for each process (Incident, Problem , Change, Request)
103	The tool should provide a self service portal where End-users / requesters can log in and raise incidents
104	End user should also be able to browse the service catalogue and should be able to raise request by providing the input to particular service request, Address etc.
105	The proposed tool must provide an option for users to track their incidents status, check knowledge articles and chat with technicians on particular incidents
106	Users must have an option to Log, Classify, Categorize & Prioritize Requests
107	The proposed tool must provide an option to design the request management input parameter template for each service in service catalogue
108	The proposed tool must provide an option to design dynamic workflows, lifecycle, Tasks, Notification action for each service which can be requested
109	The proposed tool must record Problem Record Date and Time, Problem Source, Contact Detail, Symptoms and Status
110	Tool should allow Problem records to be classified according to priority and category
111	Tool should allow a problem record to be escalated based on pre-established rules with

	option to manually overridden conditions
112	Tool should allow users to create, edit & delete Change Request through web interface, Each CR should have Unique and any authorized user should be able to raise RFC
113	The proposed tool must allow Change records Categorization, classification according to Change Class(Permanent, temporary, Recurring) ,Change Type (Normal , Standard, Expedited,Letent, Emergency), Change Category , service category , Impacted Service,, Impact, Urgency , Priority
114	The Change records in the proposed tool must contain State & Status information along with Dynamic Workflow definition with color coding for each status
115	There should be records for Benefits, Effects, and Required resources & Cost required to perform change
116	The proposed tool must have a powerful knowledge management functionality
117	Knowledgebase Management should be integrated with the NMS/EMS system
118	The proposed tool must provide Role based, Team Based & User Based access control on KB articles/FAQ/Information/KE/Solutions etc.
119	In FAQ/Solutions type of knowledge , system should allow to add multiple questions/multiple solutions with single knowledge article
120	Tool should have option to promote knowledge to analysts (ServiceDesk) and end users (ServicePortal)

14.22 Building Management System Solution

Minimum Specification for Integrated Building Management System (IBMS)	
#	Minimum Specification
1	The IBMS shall perform the following important functions • Building Management & Control • Serve as operator Man – Machine interface • Data Collection & Historization • Alarm Event & Management • Trending Reports & MIS Generation • Maintenance & Complaint Management • Integration of several sub systems and related protocols
2	The following minimum systems (but not limited to) has to be integrated - Precision AC Units - Temperature monitoring and controls at all specified positions/locations. - UPS Monitoring. - Fire Alarm System Integration. - VESDA (Very Early Smoke Detection Alarm) System Integration. - Access Control & Surveillance System Integration. - Gas Suppression System integration - DG Set on MODBUS Protocol with RS 485 Communication Port - Energy Meter on MODBUS Protocol with RS 485 Communication Port
3	The proposed system shall be based on Distributed Networkable Intelligent system. The system shall be microprocessor based Direct Digital Controllers (DDC) shall interface with relays, sensors, actuators and safety & utility systems
4	System architectural design shall eliminate dependence upon any single device for alarm reporting and control execution. Each DDC Controller shall operate independently by performing its own specified control, alarm management, operator I/O and data collection. The failure of any single component or network connection

	shall not interrupt the execution of control strategies at other operational devices.
5	Peer-to-peer data sharing across DDCs. DDC Controllers shall also be able to send alarm reports to multiple operator workstations without dependence upon a central processing device.
6	The BMS system shall utilize industry standard protocols like BACnet, LON, KNX, OPC, DALI, M- Bus, etc or equivalent and thereby support various third party systems using standard hardware and software to link various functional nodes into a single integrated system.
7	Data Logging & Trend Analysis:- • Real-time and historical data logging • Trend visualization with graphing support • Logging accessible via GUI and exportable in standard formats (CSV, PDF, etc.)
8	Controllers shall utilize a minimum 32-bit or higher microprocessor to ensure high-performance operation. Controllers must support multi-tasking, multi-user operations, and be capable of executing real-time control logic. Controllers must be compact with onboard I/O and support modular expansion for additional input/output requirements. Controllers shall include an onboard Ethernet interface and support connectivity to other controllers through a high-speed communication bus or network. They should be available with

Minimum Specification for Integrated Building Management System (IBMS)	
#	Minimum Specification
	interfaces to 3rd party equipment using standard protocols like BACnet, Modbus, M-Bus, KNX etc. or equivalent. The DDC controller shall have an Integral Display which should display all parameters and allow overriding of outputs.
9	Controllers must support secure remote configuration and monitoring without requiring shutdown or disconnection of any part of the system. The configuration tool must be web based and be easily deployable. It should contain all modules necessary for configuring the controller.
10	Reports and Logs. The system shall include a reporting and logging module that enables users to: • Generate, modify, and customize reports based on system data • Define report content, format, frequency, and time range • Archive data securely for historical reference • Store reports/logs in formats compatible with standard applications (e.g., Excel, PDF, CSV etc.) • Access real-time and historical logs • Print reports to any connected printer
11	Web Browser Access: The DDC system shall provide total integration of the facility infrastructure systems with user access to all system data, either locally over a secure Intranet within the building or by remote access by a standard Web Browser over the Internet.
12	All DDC controllers shall be capable of handling voltage, mili-ampere, resistance or open and closed contacts inputs in any mix, if required.
13	The communication between controllers shall be via a dedicated communication

	network as per LonWorks/ BACNet/ Modbus/ equivalent recommended standards.
14	Standard and Reference
	ISO 16484 Building Automation and Control Systems (BACS)
	ISO 18025/EN 45001- Conformity Declaration
	ISO 9001 Quality Management Systems (QMS)
	IEEE 802 series- Local area network
15	The Integrated IBMS Software shall coordinate and integrate with all Extra Low Voltage Building Systems to ensure that data exchange between the various ELV building systems meet the project requirements.
16	The IBMS Software shall have the common GUI, database and data storage, application program and operating systems.
17	The IBMS Software shall provide both client and server functions; the IBMS Software shall request information from the various ELV buildings communicating on the Common LAN/Equivalent network.
18	The IBMS Software shall have responsibility for providing an interoperable system that enables the sharing of information between the ELV building systems.
19	The software shall be capable to accept at least BACNET/IP, MODBUS/IP, LONWORKS/IP, M- Bus/IP and SNMP or equivalent without any additional software driver or any additional hardware.

14.23 Centralized Anti-virus Solution

Minimum Specification for Centralized Anti-virus Solution	
#	Minimum Specifications
1	Anti-virus solution with Centralized management
2	Antivirus Software: Antivirus required with 5 years validity. The Solution should have following features and capabilities:
3	Anti-Spyware
4	Anti-Malware
5	Silent Firewall
6	Intrusion Detection
7	HIPS, Anti-Spam
8	Anti-Phishing
9	Web Security
10	Parental Control
11	Ransomware protection with inbuilt data backup and restore tool, Vulnerability Scan
12	Data Theft Protection
13	Safe Mode Protection
14	Tune Up - PC optimization dashboard to get rid of junk files and duplicate data, free up memory space, clean the registry and carry out other tasks that help speed up the computer
15	Compatibility with Windows OS - Server / Desktop (Windows Server OS 2019, 2022, Window Pro 10 / 11 (64 bit)
16	Certifications: ICSA 2022 /AV-TEST/AV- Comparatives/ OPSWAT or equivalent

14.24 Core & WAN/Internet Router

#	Minimum Requirement Description
1	Router series should be CE3.0 certified. Should be listed in TTP portal
2	Router OS of same series/family should be NDPP/EAL2 certified
3	Router should have 9000 Gbps throughput from day one
4	The router shall support for 400G, 100GE, 40GE, 10GE and 1GE optical interfaces.
5	Router should have 8 x 10G port from day one should be upgradable to 25G
6	Router should have 16x 40/100G ports from day one.
7	Router should have 2x400G ports from day one
8	All the above interfaces should be distributed at least in two cards. Router should have at least two slot vacant for future use.
9	Router shall support 128K Mac addresses
11	Router shall support minimum 2Million IPv4 FIB routes/ minimum 1 Million IPv6 FIB Routes
12	Router shall support 32000 queues
13	Router should support 1000 L3 VPN
14	Router should support 1000 L2 VPN
15	Router should support multicast VPN
17	Router should support 80K multicast routes and 100 multicast VPN
18	Router shall support aggregation of links. Minimum 8 link should be supported as part of single aggregation
19	Router shall support IPSLA or equivalent and Y.1731 for performance monitoring.
20	Router shall support MPLS-TE with FRR for sub 50 msec protection.
21	Router must support Traffic Engineering for node and link protection.
22	Router shall support IPV4 and IPV6, IGMP V2/V3, MLD,IGMP and PIM,6PE and 6VPE mode for IPV6 transport over IPV4, ECMP,LDP,BGP Prefix independent control (EDGE and Core) for IPV4 and IPV6,BGP,IS- IS,OSPFv2and V3,RSVP,VRRP Traffic Engineering,TI-LFA

	Segment Routing, Segment Routing TE and 8 label stack and SR-LDP interworking, SRv6, IP FRR,LDP FRR(Local and Remote)
23	Router should support EVPN
24	The router must support 1588V2,Sync-E, Class-C timing.
25	Router should support high-availability for all BFD,BGP ,OSPF and IS-IS and no packet loss during controller switch over.
26	Router should support RFC 3107 of Carrying Label Information in BGP-4

#	Minimum Requirement Description
27	The Router should support Point to Point, Point to Multipoint LSP for Unicast and Multicast traffic.
28	Router shall support 3 level of HQOS on all kind of interface in both ingress and egress direction. Similar QOS shall be supported for all type of interface including Bundled interfaces.
29	Shall support Ingress classification, marking and policing on physical interfaces and logical interfaces using source/destination IP subnet, protocol types (IP/TCP/UDP), source/destination ports, IP Precedence, MPLS EXP, DSCP,802.1p.
30	Shall support Strict Priority Queuing or Low Latency Queuing to support real time application like Voice and Video with Minimum delay and Jitter
31	Congestion Management: WRED, Priority queuing, Class based weighted fair queuing
32	Support Access Control List to filter traffic Source & Destination IP Subnet, Source & Destination, Ports and Vlan.
33	Should Support per-user Authentication, Authorization and Accounting through RADIUS or TACACS. Should Support SNMPV1/V2/V3, NETCONF and YANG Data models
34	Router should support '0°C to 65°C operating temperature and up to 90% relative Humidity from day-1
35	Router should support 100 GRE tunnel
36	Router should have at least Two hot-swappable AC power supplies provide N+1/1+1 redundancy
37	Router should have N+1 FAN redundancy
38	Router should have 1+1 controller / routing card redundancy and N+1/1+1 Fabric/Switch card redundancy

Network OEM shall have below eligibility criteria:

1. The OEM of the Network Equipment should have direct incorporated Company in MCA India for minimum 5 years. Registered offices by way of Joint ventures, Franchise, distribution partners will

not be considered. Please attach MCA Registration copy

2. The Network Field OEM should have minimum implementation of 2000 Managed PoE/Non-PoE Switches for any State/City or Central Government Department in India. Valid certificates like purchased order/contract agreements should be provided.
3. OEM should have Following ISO Certifications
 - a) A.ISO 9001:2015 Quality Management Certifications in the name of the OEM
 - b) 27001:2013 Information Security Management Systems Certifications
 - c) ISO 14001:2015 – Environmental Management System

14.25 Core Switch

#	Feature Set
1	General Requirement
1.1	The core switches should have hardware level redundancy (1+1) in terms of control plane.
1.2	The switch should have redundant CPUs from day 1. Switch dual supervisor configuration must allow nonstop forwarding (NSF) with a stateful switchover (SSO) when a supervisor-level failure occurs.
1.3	The Core switch must support active-active configuration.
1.4	The Switch should support non-blocking architecture and all proposed ports must provide wire speed line rate performance.
1.5	The Switch should have redundant Supervisor, power supplies and fans. There should not be any single point of failure in the fabric hardware.
1.6	The Switch should support in-line hot insertion and removal of different parts like modules, power supplies, fan trays etc. This should not require rebooting of the switch or create disruption in the working/functionality of the switch
1.7	The Switch should support the complete STACK of IPV4 and IPV6 services.
1.9	All relevant licenses for all the features and scale should be quoted along with switch and all these licenses and features should be supported from Day 1.
2	Hardware and Interface Requirement
2.1	Device should have 96 X100 G ports from day 1 and should be scalable up to 144x100 G ports without using any Breakout Cable .
3	Performance Requirement
3.1	Switch should support Graceful Restart for routing protocols like OSPF, BGP etc.
3.2	Switch should support minimum 1000 VRF/VNI instances with route leaking functionality
3.3	The switch should support minimum 500k IPV4 Longest Prefix Match routes.
3.4	The Core Switch should support a minimum of 19.2 Tbps throughput

4	Network Virtualization Features
4.1	Switch should support VXLAN to achieve Network Virtualisation.
4.2	Switch Hardware should have capability to support VXLAN and EVPN symmetric IRB for supporting Core – Leaf architecture to optimize the east – west traffic flow inside the Data Center
5	Layer2 Features
5.1	Switch should support minimum 128k of MAC addresses
5.2	Switch should support layer 2 extension over VXLAN across all Data Centres to enable VM mobility & availability
5.3	Switch Hardware should have capability to support BGP EVPN Route Type 1 , Type 2,

#	Feature Set
	Type 3, Type 4 , Type 5.
6	Layer3 Features
6.1	Switch should support static and dynamic routing
6.2	Switch should support segment routing / VRF route leaking functionality from day 1
6.3	Switch should provide multicast traffic reachable using PIM-SM, PIM SSM and Multicast Source Discovery Protocol (MSDP)
6.4	Switch should support Multicast routing
7	Quality of Service
7.1	Switch should support 802.1P classification and marking of packet using CoS (Class of Service) and DSCP (Differentiated Services Code Point)
7.2	Switch should support different type of QoS features for real time traffic differential treatment using Weighted Random Early Detection and Strict Priority Queuing
7.3	Switch should support to trust the QoS marking and priority settings of the end points as per the defined policy.
8	Security
8.1	Switch should support control plane Protection from unnecessary or DoS traffic by control plane protection policy
8.2	Switch should support external database for AAA using TACACS+ / RADIUS
9	Manageability
9.1	Switch should support for sending logs to multiple centralised syslog servers for log monitoring and audit trail.
9.2	Switch should provide remote login for administration using SSHv2
9.3	Switch should support monitoring using different type of Industry standard NMS tools using SNMP v3.

9.4	Switch should provide different privilege for login into the system for monitoring and management
9.5	All relevant licenses for all the features and scale should be quoted along with switch and all these licenses and features should be supported from Day 1 from Single OEM.

14.26 48 Ports Distribution/TOR Switch

S. No.	Parameters/ Features	Minimum Specification
1	General	Switch shall be 1U to 3U and rack mountable in standard 19" rack.
2	Port Density & Redundancy	48 x SFP+ (1/10) Ports.
		4 x QSFP28 (40/100) Port
3	SFP	As per solution requirement from same OEM
4	RAM & Flash	8GB RAM & 8GB Flash
5	MAC address support	Should support at least 64K MAC address
6	Number of VLANs Supported	4000

S. No.	Parameters/ Features	Minimum Specification
7	Jumbo frame size	9000 bytes
8	Packet Buffer	36MB
9	Switching Capacity	Non-blocking Switching capacity 3.2Tbps or better & wire-speed Forwarding capacity 1 Bpps or better. The switch should support 25G connectivity also on the downlink ports, keeping future scalability in mind.
10	Features	Switch must support Port mirroring capability.
		SDN support thru restful API
		The switch must support Web-based Management (GUI), SSH v2
		The switch must support Broadcast & Multicast Rate limiting per port.
		The switch must support IPv4/IPv6 management.
		VRF, Internet Control Message Protocol version 6 (ICMPv6), PIM-SM, PIM-SSM, 4K multicast routes, stateful switchover or equivalent, Non-Stop forwarding or equivalent.
11	Quality of Service	Static routing, RIP V1&V2, RIPng, OSPF v2&v3, BGP v4, GRE, VRRP, DHCPv6 server, ARP
		Support for Egress rate limiting, DHCP for IP-based QoS, Differentiated services architecture, IEEE 802.1p Class of Service with strict and weighted round Robin scheduling.

12	Protocol Support	IGMP Snooping V1, V2, V3, MLD, PIM-SM/PIM-SSM/PIM-DM/PIM-Bidirectional, DVMRP/PIM DM, OSPF, RIP, BGP, IS-IS, IEEE 802.1s, IEEE 802.3ad/802.1AX Link Aggregation Control Protocol (LACP), Ipv4/Ipv6, DHCP Option 82, BPDU, STP Root Guard, VXLAN, IEEE 802.1ae MACSEC-256 on the hardware.
13	Management	SNMP V1,V2,V3, Web GUI/CLI, USB or equivalent memory card, IP v6 management feature on open standards, IEEE802.1ag

S. No.	Parameters/ Features	Minimum Specification
14	Security	Should support Access Control Lists (ACLs), DHCP snooping, IEEE802.1x based port authentication, RADIUS/ TACACS+, SSL, SSH, port mirroring, NTP, AES/TLS, MD5
15	Resiliency	IEEE 802.1D, IEEE 802.1w, IEEE 802.3ad/802.1AX Link Aggregation Control Protocol (LACP)
16	Power Supply	System should be supplied with Redundant Hot Swappable Internal platinum-rated Dual Power Supply - AC/DC ready from day one. Power Supplies should be Energy efficient (EEE)
17	Operating Temperature	0 to 40 deg
18	Safety Certifications	UL 60950 or IEC 60950 or CSA 60950 or EN 60950
		EN 55022/55024 or CISPR22/CISPR24 or CE
		Certified for EAL 2/NDPP/Common Criteria or above
		CAN/CSA-C22.2 No. 60950-1 or
		IEC 62368-1, IPv6 Logo Certified
19	Warranty	5-Years from OEM with Toll free number for support in India, with Advanced Hardware replacement warranty and ongoing software upgrades for all major and minor releases.

14.27 24 Ports Layer 2 Switch

#	Parameters/ Features	Minimum Specification
1	Port Density & Redundancy	24 x Gigabit Ethernet PoE Ports with PoE budget of 370Watts.

		4 x SFP+ (1G/10G) Ports populated with required optics
2	SFP	As required
3	Stacking Option	Support stacking of 8 switches or more in one stack, Stacking Module should be provided from Day-1.
4	Switching Capacity	Non-blocking 128 Gbps or better, excluding stacking bandwidth
5	Stacking Capacity	should support Min. 80 Gbps or better Stacking through dedicated stacking ports over and above the asked downlink and uplink ports.
6	Forwarding Bandwidth	Wire speed 95 MPPS or better

#	Parameters/ Features	Minimum Specification
7	Quality of Service	Support for Egress rate limiting, Eight egress queues per port, Voice VLAN, WRR (weighted round Robin)
8	Routing	16000 MAC, 2K VLAN IDs, 9K Jumbo Frame, 1000 Multicast group, IGMPV1/V2/V3, DHCP Option 82
9	Protocol Support	IGMP Snooping V1, V2, V3
		802.3ad/802.1AX Link Aggregation Control Protocol (LACP), Ipv4/Ipv6, IEEE802.1q, IEEE802.1d, IEEE802.1s, IEEE802.1w, sFlow or equivalent, IEEE 802.3az, IEEE 802.1ae MACSEC-128
10	Management	SNMP V1, V2, V3, Web GUI, CLI, SSHv2, USB, IPv6 management feature on open standards
11	Security	Should support Access Control Lists (ACLs), DHCP snooping, Guest VLAN, IEEE802.1x based port authentication, RADIUS/TACACS+, SSL, SSH, port mirroring, NTP, BPDU, STP Root Guard, Dynamic ARP
12	Switching Memory	Switch shall have minimum 2 GB RAM, 2 GB Flash memory and 6MB packet buffer memory.
13	Power Supply	Should support dual hot swappable internal power supply. External power supply shall not be acceptable. The power supply and the fans should be Field-replaceable
14	Operating Temperature	0°C to +40°C
15	Safety Certifications	IEC 60950/EN 60950/ IEC 60825-1/2 LaserIEEE802.3EMI, EMC, CE, RoHS standards EN 55022/24ITU-T NDPP/EAL2/EAL3 / Common Criteria or equivalent certified, IPv6 Logo Certified
16	Warranty	5 Years from OEM with Toll free number for support in India with Advanced Hardware replacement warranty and ongoing software upgrades for all major and minor releases.

14.28 Internet Firewall

Internet Firewall	
Feature	Technical Specification
Interface and Connectivity Requirement	8 X 1G Copper/RJ45 Day 1
	8 X 10G SFP/SFP+ Day 1
	4 X 40G QSFP+ module for future scalability
Hardware Architecture	The appliance based security platform should provide Next-Gen Firewall functionality like IPS, Application Control, URL filtering and Anti-malware functionality in a single appliance from day one.

Internet Firewall	
Feature	Technical Specification
	The appliance hardware should be a multicore CPU architecture and should not be proprietary ASIC based in nature & should be open architecture based on multi-core cpu's to protect & scale against dynamic latest security threats. The appliance hardware should have a hardened operating system from the OEM and should support support minimum of 128 GB of RAM to make sure all the security capabilities are provided without degradation form day one
	Proposed firewall should not consume more than 1RU of rack space to make sure sustainability goals of the organization.
	The firewall should have integrated redundnant hot swappable fan tray and dual redundant power supply to remove any single point of failure in the solution
Performance & Scalability	The NGFW throughput of the firewall should be a minimum 20 Gbps with application identification and firewalling enabled with real world/enterpirse/ production traffic.
	The IPS throughput should be 20 Gbps
	The firewall should provide 10 Gbps of IPSEC VPN throughput
	NGFW Firewall should support at least 4,000,000 Layer 7/app-id Concurrent sessions
	NGFW Firewall should support Layer 7/app-id connections per second – Min 150,000 or at least 500,000 connections per second L3/L4
	High Availability Configurations shall support Active/ Passive or Active/Active-Clustering
	Firewall should support creating security policies with sorce/destinatoin zones , network subents/ranges, geolocation objects, ports/protocols, applications, user/group attributes, URL/URL categories and action on traffic . The actions on the traffic should be to allow, alert, block, block and continue , reset. The firewall

Next Gen Firewall Features	should provide time based polices with optoins for reccurrecing schedule or one time schedule.
	The firewall should supports NAT's like source NAT , destination NAT , U-Turn NAT. Firewall should support Nat66, Nat 64 & Nat46 functionality.
	Solution should provides capabilities like dynamic real-time metrics based , policy-based, application path selection across multiple WAN connections and supports service chaining for additional services such as WAN optimization and firewalls.
	The solution should provide the following routing capabilities: OSPF, EIGRP, BGP, RIP, Multicast, Static, Route Tracking(SLA) PBR, ISIS, BFD, ECMP, VRF, Application based Routing

Internet Firewall	
Feature	Technical Specification
	The solution should be able to provide contextual information about the hosts and the network subnets present such that the admins are able to capture all the required information and build the security profiles based on the details shown on the solution . The details captured should consist of the following: IOC's , MAC addresses, IP address , Applications , Ports and protocols, vulnerabilities etc.
	Should support capability to integrate with other security solutions to receive contextual information like security group tags/names.
	Should support more than 6000+ (excluding custom application signatures) distinct application signature as application detection mechanism to optimize security effectiveness and should be able to create 40 or more application categories for operational efficiency
	Should be capable of dynamically tuning IDS/IPS sensors (e.g., selecting rules, configuring policies, updating policies, etc.) with minimal human intervention.
	Should support more than 25,000 (excluding custom signatures) IPS signatures or more. Solution should be able to passively detect endpoints and infrastructure for threat correlation and Indicators of Compromise (IoC) intelligence. The signatures should also have categorization based on MITRE TTP's.
	The firewall solution should have the following capabilities to make sure the current solution is future ready for technologies like WAN routing , SASE etc. The firewall should have application aware routing with HTTP and ICMP ping , ZTNA based clientless access to applications.
	Should be capable of automatically providing the appropriate inspections and protections for traffic sent over non-standard communications ports.

	The solution should be able to identify, decrypt and evaluate both inbound and outbound SSL traffic on-box. The NGFW shall support the ability to have a SSL inspection policy differentiate between personal SSL connections i.e. banking, shopping, health and non-personal traffic.
	The solution should have ML/AI capability to detect client apps and process . Moreover it should be able identify malicious encrypted traffic even when it is destined for a trustworthy service. This is required to help administrators control specific applications and improve network security
	The solution must provide IP reputation feed that comprised of several regularly updated collections of poor repuration of IP addresses determined by the proposed security vendor. Solution must support IP reputation intelligence feeds from third party and custom lists of IP addresses including a global blacklist. The solutoin should have the capability to detect MD5, SHA256 and SHA512 traffic hashs to detect any malicious traffic pattern
	Should must support DNS threat intelligence feeds to protect against threats
	The Appliance OEM must have its own threat intelligence analysis center and should use the global footprint of security deployments for more

Internet Firewall	
Feature	Technical Specification
	comprehensive network protection.
	The detection engine should support capability of detecting and preventing a wide variety of threats (e.g., network probes/reconnaissance, VoIP attacks, buffer overflows, P2P attacks, etc.).
	Should be able to identify attacks based on Geo-location and define policy to block on the basis of Geo-location
	The detection engine must incorporate multiple approaches for detecting threats, including at a minimum exploit-based signatures, vulnerability-based rules, protocol anomaly detection, and behavioral anomaly detection techniques.
	Should support Open based Application ID / Custom Application ID for access to community resources and ability to easily customize security to address new and specific threats and applications quickly
URL Filtering Features	Should must support URL threat intelligence feeds to protect against threats
	Should support Reputation- and category-based URL filtering offering comprehensive alerting and control over suspect web traffic and enforces policies on more than 250 million of URLs in more than 75+ categories.
	Should support safe search for YouTube EDU enforcement
Anti-APT / Malware Features	Should support the capability of providing network-based detection of malware by checking the disposition of unknown files using SHA-256 file-hash or signature as they transit the network and capability to do dynamic analysis.
	Solution shall have capability to analyze and block TCP/UDP protocol to identify attacks and malware communications. At minimum, the following protocols are supported for real-time inspection, blocking and control of download files: HTTP, SMTP, POP3, IMAP, NetBIOS-SSN and FTP
	Proposed solution shall have required subscription like Threat Intelligence for proper functioning

Management	The management platform must be accessible via a web-based interface and ideally with no need for additional client software and must provide centralized logging and reporting functionality
	The management platform must be a dedicated OEM appliance and VM running on server will not be accepted
	The management appliance should have 2 x 10G port and integrated redundant power supply from day one
	The management platform must be capable of integrating third party vulnerability information into threat policy adjustment routines and automated tuning workflows
	The management platform must be capable of role-based administration, enabling different sets of views and configuration capabilities for different administrators subsequent to their authentication.

Internet Firewall	
Feature	Technical Specification
	Should support troubleshooting techniques like Packet tracer and capture
	The management platform must provide multiple report output types or formats, such as PDF, HTML, and CSV. The management platform support running on-demand and scheduled reports
	The management platform must support multiple mechanisms for issuing alerts (e.g., SNMP, e-mail, SYSLOG).
	The centralized management platform must not have any limit in terms of handling logs per day
	The management platform must provide built-in robust reporting capabilities, including a selection of pre-defined reports and the ability for complete customization and generation of new reports.
	The management platform must risk reports like advanced malware, attacks and network
	The management platform must include an integration mechanism, preferably in the form of open APIs and/or standard interfaces, to enable events and log data to be shared with external network and security management applications, such as Security Information and Event Managers (SIEMs), and log management tools.
	Proposed solution should support 24x7x365 OEM TAC support and advance Next Business Day Hardware replacement

14.29 Internet Firewall

Intranet Firewall	
Feature	Technical Specification
Interface and	8 X 1G Copper/RJ45 Day 1
	8 X 10G SFP/SFP+ Day 1

Connectivity Requirement	8 X 10G SFP+ module for future scalability
Hardware Architecture	The appliance based security platform should provide Next-Gen Firewall functionality like IPS, Application Control, URL filtering and Anti- malware functionality in a single appliance from day one.
	The appliance hardware should be a multicore CPU architecture and should not be proprietary ASIC based in nature & should be open architecture based on multi-core cpu's to protect & scale against dynamic latest security threats.The appliance hardware should have a hardened operating system from the OEM and should support support minimum of 64 GB of RAM to make sure all the security capabilities are provided without degradation form day one
	Proposed firewall should not consume more than 1RU of rack space to make sure sustainability goals of the organization.
	The firewall should have integrated redundnant hot swappable fan tray and dual redundant power supply to remove any single point of failure in the solution
Performance & Scalability	The NGFW throughput of the firewall should be a minimum 15 Gbps with application identification and firewalling enabled with real world/enterpirse/ production traffic.
	The IPS throughput should be 15 Gbps
	The firewall should provide 7 Gbps of IPSEC VPN throughput
	NGFW Firewall should support at least 2,000,000 Layer 7/app-id Concurrent sessions
	NGFW Firewall should support at least Layer 7/app-id connections per second – 120,000 or 280,000 connections per second L3/L4
	High Availability Configurations shall support Active/

	Passive or Active/Active-Clustering
Next Gen Firewall Features	Firewall should support creating security policies with source/destination zones , network subnets/ranges, geolocation objects, ports/protocols, applications, user/group attributes, URL/URL categories and action on traffic . The actions on the traffic should be to allow, alert, block, block and continue , reset. The firewall should provide time based policies with options for recurring schedule or one time schedule.
	The firewall should support NAT's like source NAT , destination NAT , U- Turn NAT. Firewall should support Nat66, Nat 64 & Nat46 functionality.
	Solution should provide capabilities like dynamic real-time metrics based , policy-based, application path selection across multiple WAN connections and supports service chaining for additional services such as WAN optimization and firewalls.
	The solution should provide the following routing capabilities: OSPF, EIGRP, BGP, RIP, Multicast, Static, Route Tracking(SLA) PBR, ISIS, BFD, ECMP, VRF, Application based Routing
	The solution should be able to provide contextual information about the hosts and the network subnets present such that the admins are able to capture all the required information and build the security profiles based on the details shown on the solution . The details captured should consist of the following: IOC's , MAC addresses, IP address , Applications , Ports and protocols, vulnerabilities etc.
	Should support capability to integrate with other security solutions to receive contextual information like security group tags/names.

Should support more than 6000+ (excluding custom application signatures) distinct application signature as application detection mechanism to optimize security effectiveness and should be able to create 40 or more application categories for operational efficiency

Should be capable of dynamically tuning IDS/IPS sensors (e.g., selecting rules, configuring policies, updating policies, etc.) with minimal human intervention.

Intranet Firewall

Feature	Technical Specification
	Should support more than 25,000 (excluding custom signatures) IPS signatures or more. Solution should be able to passively detect endpoints and infrastructure for threat correlation and Indicators of Compromise (IoC) intelligence. The signatures should also have categorization based on MITRE TTP's.
	The firewall solution should have the following capabilities to make sure the current solution is future ready for technologies like WAN routing , SASE etc. The firewall should have application aware routing with HTTP and ICMP ping , ZTNA based clientless access to applications.
	Should be capable of automatically providing the appropriate inspections and protections for traffic sent over non-standard communications ports.
	The solution should be able to identify, decrypt and evaluate both inbound and outbound SSL traffic on-box. The NGFW shall support the ability to have a SSL inspection policy differentiate between personal SSL connections i.e. banking, shopping, health and non-personal traffic.
	The solution should have ML/AI capability to detect client apps and process . Moreover it should be able to identify malicious encrypted traffic even when it is destined for a trustworthy service. This is required to help administrators control specific applications and improve network security
	Should must support DNS threat intelligence feeds to protect against threats

	The Appliance OEM must have its own threat intelligence analysis center and should use the global footprint of security deployments for more comprehensive network protection.
	The detection engine should support capability of detecting and preventing a wide variety of threats (e.g., network probes/reconnaissance, VoIP attacks, buffer overflows, P2P attacks, etc.).
	Should be able to identify attacks based on Geo-location and define policy to block on the basis of Geo-location
	The detection engine must incorporate multiple approaches for detecting threats, including at a minimum exploit-based signatures, vulnerability-based rules, protocol anomaly detection, and behavioral anomaly detection techniques.
	Should support Open based Application ID / Custom Application ID for access to community resources and ability to easily customize security to address new and specific threats and applications quickly
	Proposed solution shall have required subscription like Threat Intelligence for proper functioning
Management	The management platform must be accessible via a web-based interface and ideally with no need for additional client software and must provide centralized logging and reporting functionality
	The management platform must be a dedicated OEM appliance and VM running on server will not be accepted

Intranet Firewall

Feature	Technical Specification
	The management appliance should have 2 x 10G port and integrated redundant power supply from day one
	The management platform must be capable of integrating third party vulnerability information into threat policy adjustment routines and automated tuning workflows
	The management platform must be capable of role-based administration, enabling different sets of views and configuration capabilities for different administrators subsequent to their authentication.
	Should support troubleshooting techniques like Packet tracer and capture
	The management platform must provide multiple report output types or formats, such as PDF, HTML, and CSV. The management platform support running on-demand and scheduled reports
	The management platform must support multiple mechanisms for issuing alerts (e.g., SNMP, e-mail, SYSLOG).
	The centralized management platform must not have any limit in terms of handling logs per day
	The management platform must provide built-in robust reporting capabilities, including a selection of pre-defined reports and the ability for complete customization and generation of new reports.
	The management platform must risk reports like advanced malware, attacks and network
	The management platform must include an integration mechanism, preferably in the form of open APIs and/or standard interfaces, to enable events and log data to be shared with external network and security management applications, such as Security

	Information and Event Managers (SIEMs), and log management tools.
	Proposed solution should support 24x7x365 OEM TAC support and advance Next Business Day Hardware replacement

14.30 8 Port Industrial Grade Switch with SFP

S.No	Parameters	Minimum Requirement
1	Ethernet Interfaces	The switch should provide 8 x 10/100/1000 Mbps ports for downlink out of which minimum 4 Port should be PoE / PoE+ and 2 should be SFP GE Ports (Should be loaded with minimum 2 x 1G)
		Single mode Industrial Grade Fiber Modules supports up to 10 Km Should be proposed with ruggedized transceivers as per SI solution. Switch and transceivers should be of the same OEM.
2	Performance	Switch should have wire rate switching fabric of minimum 16 Gbps or more.
3	ERPS	Should support Improved resiliency with the support of ERPS or equivalent
4	Multicast	Switch should support IGMP v1/v2/v3 as well as IGMP snooping and minimum 1000 IGMP Multicast Groups IGMP filtering, IGMP querier, MLD snooping v1, v2

5	Layer 2 Features	NTP, UDLD, LLDP, Unicast MAC filter, LACP, Private VLAN, Voice VLAN, VLAN double tagging (QinQ), STP, RSTP, MSTP, SNMP, DHCP, Server/Relay/Client, DHCP Option 82, Boot P, ARP, TFTP, RMON, HTTP, HTTPS, Syslog, LLDP, 802.1x, CIP Ethernet, Port mirroring and static Routing from day one.
6	IEEE 802.1P standard	Switch should support classification and scheduling as per IEEE 802.1P on all ports and four egress queues per port. Switch should also support mechanism of applying Automatic QoS or equivalent mechanism.
7	Queuing	Switch should support strict priority queuing or equivalent to guarantee that the highest-priority packets are serviced ahead of all other traffic.
8	Security	Switch should support ACLs, TACACS+, RADIUS, ARP spoofing, DHCP snooping, Dynamic ARP Inspection (DAI), IP source guard and BDU Guard or equivalent, and IEEE 802.11ae, MAB (MAC Authentication Bypass), 802.1x and Secure BOOT
9	Management	Switch should have a console port, support for SNMP Version 1, 2 and 3, TELNET, SSHv2 and central controller. Support for 4 groups of embedded RMON, UDLD, DHCP Server/Client, Dying Gasp, multicast, broadcast, port mirroring and remote port mirroring for centralised traffic capture of network device, DHCP enabled/disabled.
10	IPv6	The switch should support following IPv6 Features: 128-Bit Wide Unicast Addresses, DNS for IPv6, ICMPv6, Neighbor Discovery, IPv6 Stateless Auto-configuration

		and Duplicate Address Detection, SNMP and Syslog Over IPv6, HTTP over IPv6 and IPv6 MLD snooping
11	Standards	RoHS Compliant, IEEE 1588v2 hardware ready - Precision Time Protocol, IEEE 802.3af, 802.3at, NTP
12	General Requirements	IP30 /IP40• ISO-9001:2015, ISO-14001:2015, ISO-20000-1:2018, ISO-27001:2013, ISO-45001:2018, ISO/IEC 15408 and CMMiLevel3/CMMi Level 5 certificates, UL/CSA 60950-1/EN60950-1/IEC 60950- 1, DIN rail mount
13	Redundancy Protocols	ITU-T G.8032 ERPS Ring or Equivalent, STP, RSTP, MSTP
14	Certifications / Compliances	EMC - FCC Part 15, Subpart B, Class A
		EMC - EN 55032, EN 61000-4-3, CE/NDPP/EAL/TEC certified.
		IEC 61000-4-3
		IEC 61000-4-4
		IEC 61000-4-5
		IEC 61000-4-6
Industrial Grade SFP Transceiver, 1Gbps, 1310nm, Single-mode, 10km- Specifications		
#	Parameters	Minimum Technical Specifications
1	Distance	10kb
2	Media Type	Single-Mode
3	Data Rate	1000(mbps)
4	Wavelength	1310 (nm)/1550nm
5	Light Source	FP
6	Tx Power (dBm)	-9.5 ~ -3 @ 9/125 μm
7	Rx Sensitivity (dBm)	- 20 Max

8	Link budget (dBm)	10.5
9	Saturation (dBm)	-3
10	Operating Temp.	-40°C~80°C
11	Safety & Certification	UL/TUV, IEC 60825-1, CFR1040

AC-DC Industrial DIN Rail Power Supply Output 48VDC at 2.5Amp Metal Case-Specifications

#	Parameter	Minimum Technical Specifications
1	Input Voltage	180~240VAC
2	Input Frequency	50~60Hz
3	Output DC Voltage	48VDC±10%
4	Rated Current	2.5Amp
5	Current Range	0 ~ 5Amp
6	Rated Power	120-150W
7	Voltage Range	48~53VDC
8	Over-Voltage Protection	55~60VDC
9	Operation Temperature	-20 ~ +75°C
10	Relative Humidity	20 ~ 95% RH non-condensing
11	Mounting Style	DIN Rail
12	Warranty	5 Years

14.31 SAN Switch

Minimum Specifications for SAN Switch	
#	Minimum Specifications
1	The SAN switch should be configured with 24 X 32Gbps FC ports with required SFP and licensing and the switch should be scalable to 48 ports
2	Each switch should deliver 32 Gbit/Sec or above non-Blocking architecture with 1:1 performance for up to 48 ports in an energy-efficient fashion
3	Should protect existing device investments with auto sensing 8, 16, and 32 Gbit/sec capabilities.
4	The switch should be rack mountable
5	Should provide enterprise-class availability features such as redundant and hot-pluggable components like power supply and FAN
6	The switch shall provide Aggregate bandwidth of 1536 Gbps end to end.
7	Switch shall have support for web-based management and should also support CLI
8	Necessary FC Cables as per the solution shall be configured along with the switches

14.32 Storage Solution

Minimum Specification for Storage		
#	Parameter	Minimum Specifications
1	Storage Quality Certification	The Storage OEM should be established in the Gartner or any other equivalent global research firm for the last five years.
2	Storage Controller	1. The Storage system offered must be a true unified and scale-out system offering NAS (file) , SAN (block) and object workloads. The Storage supplied should be an appliance with a Single Microcode offering all protocols and should not be based on server based General Purpose Filesystems or Operating systems such as Linux,

		Windows etc.
		2. Storage system must be offered in a No-Single-Point of Failure offering upto six 9s of availability with minimum 2 Nodes/Controllers and Scale-Out to minimum 12 Nodes/Controllers.

Minimum Specification for Storage		
#	Parameter	Minimum Specifications
3	Cache/Memory Support	1. The system should be offered with minimum 128 GB Distributed/Global/Federated DRAM cache across dual controllers. The cache should be scalable to 768 GB in a scale-out architecture with minimum 12 Controllers. System should offer capability to protect the write cache in case of a controller failure. Also, a failure of controller should not lead to write-through mode for cache. 2. The system should be configured with minimum 1TB of SSD/Flash/NVMe in addition to the above and same should be scalable to 6TB.
4	Drive Support	The system must support intermixing of SSD, SAS, and NL-SAS drives, each of 12Gbps interface speed to meet the capacity and performance requirements for the applications. The system must support a minimum of 144 disks for scalability purpose.
5	Disk Drive Protection	The proposed system should offer minimum dual drive failure protection, however for high density drives it should also support triple drive failure protection for better resiliency and performance.
6	Capacity	The system should be configured with 750TB capacity using NL-SAS 7.2K RPM Drives with Dual Drive / Triple drive or equivalent or better protection.

7	Protocols	The storage should be configured natively with FC, iSCSI, NFS (NFSv3, NFSv4, NFSv4.1 supporting RFC5661), CIFS/SMB protocols for use with different applications. In addition to the above, Object (S3 compatible) protocol should also be supported either natively or through any additional appliance.
8	Front-End and Backend connectivity	The proposed storage system should have minimum 4x12Gb SAS ports and 4x10GbE and 4 X 32/16Gbps FC front end ports available across dual controllers.
9	Investment Protection	1. The storage offered should be a true scale-out system that allows intermixing of controllers across generations within the same system and scalable to a minimum of 12 controllers for maximum investment protection. 2. The system should offer capability of replicating to the same operating system in the cloud for replication or migration purposes. It should also allow seamless data movement to public cloud environments without the need for any backup-recovery software or third party software. 3. The proposed system should offer capability to tier the data to either On-Prem or Cloud Object Storage. System should be configured with any software capability or license for On-Prem tiering to Object Storage from day-one.
10	Storage General Features	1. Ability to expand LUNS/Volumes on the storage online and instantly.

Minimum Specification for Storage		
#	Parameter	Minimum Specifications
		2. Quality of Service feature configured for both min and max limit at individual volume/LUN. The QoS should offer capability to maintain IOPs per GB allowing to increase the IOPs as LUN/Volume size is increased. Any additional license should be configured for the same if required.
		3. Capability of moving the hot data to high-performance drives and cold data to low performance drives in real time. The system should provide capability to tier data to high density drives on premise and off premise to an object storage or equivalent platform preserving data efficiencies .
		4. Redundant hot swappable components like controllers, disks, power supplies, fans etc and allow re-usage of Disk Shelves with higher models of the same product line.
		5. The proposed system should offer up to 20PBs capacity scalable within a single namespace.
		6. The proposed system should offer centralized, application-consistent data protection supported for various applications.
		7. The proposed storage should enable and integrate with server virtualization technologies such as VMware vSphere. The proposed storage must support VASA 3.0 and above, VMware VVOL feature and feasibility to create more than 1000 VVOLs. The proposed array should be able to present both VVOL storage pool and traditional LUN's.

		8. The storage system should be capable of providing multi-pathing software with failover and load balancing functionality . 9. The proposed storage should provide both in-line and post process efficiency features such as Compression, De-Duplication and Compaction. 10. The proposed storage should be able to provide secure multi tenancy for air gap security and isolation from other workloads 11. The proposed system should provide the features such as capacity usage, trends, activity evaluation and perform corrective actions on the directories and files. 12. The proposed storage should provide capability to do what/if analysis on cost savings on the filesystems based on the cost assigned to the tier. 13. The Storage array should be offered with Synchronous, Asynchronous replication feature & Zero Data Loss protection between the DC, DR and Near DR
11	Data Protection	a. The proposed system/solution should offer incremental replication capabilities in both fan-out and cascading topologies. The WAN replication should be secured by end-to-end encryption and bandwidth optimization supported natively. All the necessary licenses should be quoted from day 1.

Minimum Specification for Storage		
#	Parameter	Minimum Specifications
		b. The proposed system should offer solution for zero RPO and near zero RTO for high data availability and fast data replication for business-critical applications in both virtual and physical environments such that the services should continue operating even when there is a complete site failure.
		c. The offered system should ensure a unified architecture flexibility for replication both on-prem & to the cloud natively with out the use of any third party hardware or software solutions. The replication should support end-to-end encryption and bandwidth optimization.
		d. The system offered should provide the ability to recover files, databases, and complete volumes instantaneously from the snapshot copies.
		e. The proposed storage should offer minimum 1000 point-in-time snapshots per volume/LUN in such a way that the snapshots should not consume extra space at the time of creation. The license for entire usable capacity to be included.
		f. The proposed storage should support software for fast, space-efficient, application-consistent, disk-based backups and clone management that can protect applications with improved RPO/RTO.
		g. The proposed storage should provide Fast Restores, Instant VM Recoveries and Data Fabric Integration along with RBAC.

		h. The proposed system should be offered with the necessary licenses/software that simplify backup, restore and clone management by allowing mountable snapshots and clones without disruption to production. i. The Proposed Storage system should have native GUI to monitor & perform operations on data protection jobs j. Proposed storage should offer capabilities to create backup copies across sites and also allow replication of data across backup targets. Any license required should be configured.
12	Security and Encryption	k. The proposed storage array must support data at rest encryption for file shares including both CIFS and NFS, managed by On-board Key Manager or External Key Manager offering industry standard certification/compliance by using a cryptographic security module supporting FIPS 140-2 level encryption. For multi-tenant configuration, individual tenant's keys should be managed by the offered storage. The proposed storage array must support data-at-rest encryption in compliance with FIPS 140-2 certification managed by On-board Key Manager or External Key Manager using a cryptographic security module. The proposed storage should maintain individual keys for every tenant in multi-tenant configuration. Storage shall provide the capability to sanitize disk to ensure that data can be made un-readable while replacing the Disk Drives in the array.

Minimum Specification for Storage		
#	Parameter	Minimum Specifications
		The storage system should support IPsec data encryption in flight for all IP traffic including the NFS, iSCSI, and SMB/CIFS protocols to combat replay and man-in-the-middle (MITM) attacks.
		The storage should be configured to comply with SEC Rule 17a-4 for filesystems. Also, the offered storage should ensure that no one including administrator should be able to delete the data post WORM enabled.
		The storage system should support the functionality to enable administrators in limiting or restricting users' administrative access granted for their defined role.
		The offered system should be a TPM based model to offer better security and protection . The same security module should be offered by all the products of the family such that upgradation to a same or higher family model should be a non-disruptive process.
		The storage system must offer File system analytics to analyse Data discovery, Capacity usage ,File and directory counts, File activity trends, Active and inactive data identification and other analytics solutions which can leverage the REST API to collect the analytics information from the storage system and provide extended use cases such as capacity trending and storage reporting.

		The storage system should offer high-performance compliance solution in accordance to various industry standards to meet regulations such as Securities and Exchange Commission (SEC) 17a- 4, HIPAA, Financial Industry Regulatory Authority (FINRA), Commodity Futures Trading Commission (CFTC), and General Data Protection Regulation(GDPR).
		The Storage system should support (UEFI) secure boot to ensure that only signed and verified images are used to boot the system. Storage array should provide security feature while booting by ensuring that Key Manager manages keys to lock/unlock drives and associated volumes.
		The storage system should offer capability towards visibility, detection and remediation of ransomware attacks. The storage system should provide a file blocking methodology that allows organizations to filter or block traffic based on file extensions and file metadata
		Storage system must use TLS for secure communication and administration functions such as secure log forwarding.
		Storage management software should support MFA to ensure secure access of Management Software. The Storage array should support SHA-2 level security for manging user credentials.
		Proposed storage should support block level data de-duplication , compression for all kinds of data (structured & unstructured), compaction and Thin provisioning .

Minimum Specification for Storage		
#	Parameter	Minimum Specifications
13	Data Reduction Technology / Storage Efficiency	The Storage Management Software should offer operational simplicity and rich data management functionalities for Unified Storage. It should provide a single dashboard to monitor health, availability, capacity usage, performance, and data protection status of various platforms along with resource planning.
14	Management	The management tool should offer ansible playbook generation for selective workloads , provide latest software upgrades, cloud backup to protect volumes and timely system analysis and recommendations to solve any performance issues. The management tool should display system alerts and notifications for proactive management on the dashboard for users to quickly access them and it should provide information about support cases raised on the cluster. The management tool should offer global search bar for all storage objects and also action based searching. The Storage management interface (GUI) should be virtualisation aware and provide end to-end virtual-to-physical mapping of the physical infrastructure using a single console. The offered system should be able to deliver actionable predictive analytics and proactive support through a cloud-based portal and mobile app. It should support automating maintenance task along with upgrades automation and watchlist. It should automate the task

		of updating the firmware via ansible playbooks.
		It should support config drift to identify deviations in configurations and configuration drift corrections to help proactively address configuration gaps and anomalies. It should support capacity forecasting with drift chat integration to enable timely support.
		The offered system should offer capability to find and fix security vulnerabilities and automate risk remediation.
		The offered system should support single plane of automation that contain automation capacities with full REST APIs. It should support REST APIs for events, systems and retrieving performance and license details.
		The offered system should support configurable security dashboard. It should have cluster security to monitor and alert when security settings are added, changed, or deleted. It should be able to import externally generated SSL Certificates.
		It should support storage virtual machine disaster recovery monitoring that provides a unified protection view and enable administrators to see SVM-DR relationships on the data centre level.
		It should support Intelligent placement and provisioning of storage workloads, Service Level Oriented NAS Workload Provisioning and Service Level Oriented LUN Workload Provisioning.
		The management tool should be a SaaS based solution that provides

		real time insights into complex cloud-native architectures, real-time
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Minimum Specification for Storage		
#	Parameter	Minimum Specifications
		data visualization of the topology, availability and utilization of the entire infrastructure, including both cloud and on-premises multivendor resources.
		The offered system should support ransomware and insider threat detection to protect data with early detection and actionable intelligence on ransomware and other malware incursions. It should detect malicious activity and protect the data by automatically taking a snapshot.
		The storage provider should be ansible automation certified partner and should be able to deliver Red Hat Certified Support Modules which should enable a lower cost of ownership and ease of setup by reducing the time to deploy and manage the storage. The Ansible Playbooks combined modules should deliver full stack presentations of storage to the host. It should seamlessly unite workflow orchestration with configuration management, provisioning and application deployment in one easy-to-use and deploy platform.
15	Automation	The offered storage system support APIs to manage and monitor storage infrastructure. It should support various API categories such as Intelligent provisioning, Data centre management and monitoring, Configuration and admin, Datacentre-level Aggregation etc. The offered system should support automation to achieve the key storage outcomes such as cluster setup, Cluster upgrade, Provisioning, Protection and Monitoring and provide

		easy provisioning for volume, svm and LUN. The storage system should provide centralized monitoring across hybrid infrastructures through the agentless discovery of multi-vendor, multi-protocol, and multi-cloud (public and private) IT resources on-premises and in geographically dispersed sites.
16	Rack Mountable	The storage should be supplied with rack mount kit. All the necessary patch cords (Ethernet and Fiber) shall be provided and installed by the vendor.
17	Warranty & AMC	The Hardware and software quoted should have 5 years support along with upgrade and updates.

14.33 Backup Solution

Minimum Specification for Backup Software		
#	Parameters	Minimum Specifications
1	Backup Software	The proposed software shall provide a single console for managing backups across physical, virtual, cloud environments.
		The backup software shall offer either 40TB minimum capacity-based perpetual/subscription licenses or host-based.
		It must provide backup and granular recovery capabilities for Files, Virtual Machines (VMs), Databases, and NDMP data (including File share NFS & CIFS/SMB), and robust support for specialized enterprise workloads across physical servers and virtual machines.
		The proposed backup software must support a backup architecture that utilizes both SAN-based and LAN-based methods for protecting physical servers and virtual instances.
		The solution shall provide real-time monitoring, detailed reporting, and proactive alerts to ensure efficient backup operations.

		The backup storage shall be sized as per the below retention policies to backup object storage: a) Daily incremental copies – 7 days. b) Weekly full backup copies – 1 month. c) Monthly full backup copies – 3 months. Annual growth of 5% YoY with daily change rate of 1.5%. The sizing must be done for 5 years. The backup storage/appliance should be quoted with adequate capacity considering any additional compute, software, backup storage capacity. Any other component required as per sizing needs to be provided by the OEM & bidder at the time of bid. The bidder must also submit the backup capacity sizing certificate/report on the OEM's letter head with seal and sign from authorized signatory.
		The backup software must support a broad range of disk and tape libraries, with full capability for multi-streaming and multiplexing in tape backups. It must allow direct backup of both virtual and physical servers, including databases such as Oracle, to tape without requiring intermediate disk staging.
2	Application-Aware Backup and Restore	The proposed backup solution shall offer application-aware backups and granular recovery for critical enterprise applications and databases, including Oracle and Oracle RAC , SAP HANA, PostgreSQL, PostgreSQL Cluster, Microsoft Exchange, and NoSQL databases like MongoDB, Cassandra, and Hadoop. The backup software must support various file systems, including but not limited to NTFS (with volumes exceeding 64TB), FAT/FAT32, NFS, CIFS, EXT2, XFS, ZFS, and other

		commonly used file systems. The solution should ensure seamless backup and
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Minimum Specification for Backup Software		
#	Parameters	Minimum Specifications
		recovery operations across these file systems, regardless of volume size or storage architecture.
		Integration is required to provide detailed and flexible backup and recovery for Oracle databases including ASM, supporting point-in-time and granular restores.
3	Virtual Environments and Cloud Support	The proposed backup software shall offer agentless backup for leading virtualization platforms, including VMware, Microsoft Hyper-V, and Nutanix AHV. It must support full, incremental, and synthetic full backups using Changed Block Tracking (CBT), reducing backup times and minimizing system impact.
		The backup software should allow cross-hypervisor restores, enabling virtual machines to be restored to different virtualization platforms.
4	Security and Ransomware	The solution must include malware detection tools, either native or open-source (e.g., YARA), with automated latest signature or rule updates by the OEM every 24 hours. These tools must not require manual updates or rule creation, ensuring fully automated scanning and malware detection.
		The backup solution must include integrated antivirus/malware detection and quarantine capabilities, ensuring backups are scanned and verified for threats. The solution must support clean restore without requiring a scan

	Protection and WORM Capabilities	during recovery. Alternatively, the solution may provide third-party antivirus/malware licenses for protection, and if required restores may be performed with disabled network adapters to prevent the spread of infection.
		The proposed backup software must provide immutable backups including WORM capabilities, ensuring that stored backup data cannot be modified or deleted by ransomware or unauthorized users.
		The backup software should provide AES-256 encryption for data both at rest and in transit, ensuring data confidentiality throughout the backup lifecycle.
5	Storage Vendor and Cloud Integration	The proposed solution must integrate seamlessly with major storage systems like NetApp, Dell EMC, Pure Storage, and HPE, providing flexibility across diverse environments without vendor lock-in.
		Support for automated cloud storage tiering is required to ensure cost-effective data retention by moving backups between high- performance and lower-cost storage tiers based on policies. The data protection software shouldn't allow SSE-C methodology to encrypt or decrypt the AWS S3 bucket.
		The software must natively support S3-compatible object storage, enabling scalable and efficient long-term retention in both public and private clouds.

Minimum Specification for Backup Software		
#	Parameters	Minimum Specifications
		The proposed solution's target storage must be designed with no single point of failure, ensuring that the entire capacity of the target backup disk storage remains accessible and unaffected by hardware failures.
6	Snapshot, NDMP, and NAS Support	The proposed solution must provide seamless integration with hardware snapshots for fast, application-consistent and fast/instant NAS File granular recovery across a variety of storage vendors.
		The backup solution must offer full NDMP support for NAS systems, including support for incremental and differential backups to ensure efficient data protection in large-scale environments.
7	Deduplication and Efficiency	The proposed solution must provide global deduplication across schedules, jobs, physical, virtual, and cloud environments, ensuring efficient storage usage and reduced data redundancy.
		The solution must support source-side deduplication to minimize network bandwidth usage during backup operations.
		The backup software must include incremental forever and synthetic full backups, ensuring optimized storage utilization and reduced backup windows.

8	Compliance and Legal Hold	The proposed solution must automate compliance enforcement for retention policies, including GDPR, HIPAA, and SOX, with strict adherence to policy-driven data retention.
		The solution must provide legal hold functionality to preserve critical data immutably for legal, audit, and regulatory purposes.
		The solution must support WORM (Write Once, Read Many) storage, ensuring backups are immutable and tamper-proof across all supported storage platforms.
		The backup solution must include a Compliance Lock to prevent unauthorized deletion or modification of backups in both cloud and on-premises environments.
		The solution must maintain detailed audit trails for all backup and recovery operations, enabling comprehensive reporting for regulatory audits.
9	Automation and Orchestration	The proposed solution must enable automated DR orchestration for seamless failover and failback across both on-premises and cloud environments, ensuring minimal disruption during recovery.
		The solution must provide API integration for automating backup, recovery, and maintenance operations
		The solution must support customizable workflows to automate repetitive tasks like backup scheduling, data replication, and recovery processes, enhancing operational efficiency.

Minimum Specification for Backup Software		
#	Parameters	Minimum Specifications
		The proposed backup solution must support Multi-Person Authorization ensuring multiple approvals for operations, including backup deletion, policy changes, and restores. It must apply across all repository types (disk, cloud, object, tape) with robust RBAC, ITSM integration, API support, and comprehensive audit logging to address enterprise-grade security and compliance needs.
10	Service and Support	The solution must offer 24/7 global support, backed by Service Level Agreements (SLAs) for timely issue resolution.
		The vendor must provide detailed training resources, on-demand documentation to ensure effective system management.
		The solution must include professional services for deployment, customization, and ongoing system optimization.
		The solution must deliver regular software updates, security patches, and feature enhancements to ensure system security and functionality.

14.34 Server Load Balancer

Minimum Technical Specifications for Server Load Balancer	
#	Minimum Requirement Description
1	Device to have capabilities to support ADC as independent Network Function and not an integrated solution to ensure required performance.
2	It shall support built-in failover decision/health check conditions. It shall also support failover and High Availability (HA) requirements. It shall have redundant power supplies. Shall support script-based functions support for content inspection, traffic matching and monitoring of HTTP, SOAP, XML, generic TCP, TCPS
3	Should provide comprehensive and reliable support for high availability with Active- active & active standby unit redundancy mode. Should support both device level and VA level High availability for using standard VRRP or Equivalent protocol
4	The appliance should be modular based high performance purpose built next generation multi-tenant hardware with Network function virtualization . The Appliance should support multiple network functions virtualization with dedicated hardware resources for each virtual instance.
5	Appliance should have at least 1x1Gb port for management and 8 X 10G SFP+ or higher ports to meet the design criteria"
6	The appliance should have multicore CPU, minimum 64 GB RAM, minimum 240 GB SSD or more and dual power supply
7	The device should support minimum 8 virtual instances from Day1.
8	The solution should support minimum 5 million L7 RPS and 2.5 million L4 Connections per second.
9	The solution should respectively support working modes and protocol detection based on IPv4 and IPv6 environments, and be able to support IPv4 and IPv6 dual-stack environments.
10	The solution should able to load balancer both TCP and UDP based applications with layer 2 to layer 7 load balancing including WebSocket and WebSocket Secure.

11	The solution should support for policy nesting at layer7 and layer4. it should able to combine layer4 and layer7 policies to address the complex application integration.
12	The solution using e-policy then should support algorithms including round robin, least connections, shortest response, persistence ip, hash ip, hash ip and port, consistent hash ip and snmp
13	The solution should provide Dua Stack IPv4 and IPv6 support .
14	The solution should provide application & server health checks for well-known protocols such as ARP, ICMP, TCP, DNS, RADIUS, HTTP/HTTPS, RTSP etc.

Minimum Technical Specifications for Server Load Balancer	
#	Minimum Requirement Description
15	It should support advance functions Authoritative name sever, DNS server with DNSEC, application load balancing from day one. It should be capable of handling complete Full DNS bind records including A, AAAA
16	The solution should provide comprehensive and reliable support for high availability /clustering through VRRP or equivalent on Per VIP based Active-active & active standby unit redundancy mode.
17	Operating temperature: 0 to 40 degrees
18	Humidity: 10% to 85% non-condensing

14.35 42U Rack (Network/Server/Storage)

Minimum Technical Specification for 42U Racks (Network/Server/Storage)		
#	Parameter	Minimum Specifications
1	Type	19" 42U racks mounted on the floor
2		Rack -42Ux600Wx1000D or 42Ux800Wx1000D
3		Floor Standing Server Rack - 42U with Top cover with FHU provision. Top & Bottom cover with cable entry gland plates. Heavy Duty Top and Bottom frame of MS. Two pairs of 19" mounting angles with 'U' marking. Depth support channels - 3 pairs with an overall weight carrying Capacity of Min 1000Kgs.
4		All racks should have mounting hardware 2 Packs, Blanking Panel.
5		Stationery Shelf (2 sets per Rack)
6		All racks must be lockable on all sides with unique key for each rack

7		Racks should have Rear Cable Management channels & also have provision for cable entry from the top and bottom
8	Wire managers	Two vertical and four horizontals
9	Power Distribution Units	Power Distribution Unit 2Nos. Each rack- Easy Rack PDU, Metered, 1 Phase, 7.4kW, 230V, 32A, 20 x C13 and 4 x C19 outlets, IEC60309 2P+E inlet,
10	Doors	Rack should have front door tough and transparent glass fitted on MS/CRCA sheet on sides with Lock and key.
11		Back doors should be perforated
12		Both the front and rear doors should be designed with quick-release hinges allowing for quick and easy detachment without the use of tools.

Minimum Technical Specification for 42U Racks (Network/Server/Storage)		
#	Parameter	Minimum Specifications
13	Fans and Fan Tray	Fan 90CFM 230V AC, 4" diameter (4 Nos. per Rack)
14		Fan Housing Unit 4 Fan Position (Top Mounted) (1 no. per Rack)
15		Monitored- Thermostat based - The Fans should switch on based on the Temperature within the rack. The temperature setting should be factory-settable.
16	Finish	Painting: 7 tank process with PP Powder Coating. Colour - RAL7035, Powder coating thickness between 70-to-120-micron finish
17	Side Panel	Detachable side panels (set of 2 per Rack)
18	Certifications	The OEM should have a manufacturing Unit along with the ISO 9001:2015, 14001:2015 & 45001:2015, UL Certifications

14.36 Application Server/Non-GPU Server

Application Rack Server		
#	Parameter	Minimum Specification
1	Form factor	Maximum 2U rack mount server with Bezel, Bezel Locking Kit, Chassis Intrusion Detection Kit, Sliding rails, AC power cords.
2	Processor	Minimum 2 X Latest 5th Generation 2.9GHz, 24-core minimum, 60MB or higher L3 cache, 3 UPI or higher. 64- bit x86 processor fully binary compatible to 64/32-bit applications and supporting hyper-threading. Number of cores on a single die/socket will be treated as a single processor.

3	Memory	512GB RDIMM, DDR5 DIMM in balanced configuration scalable up to 2TB. Advanced ECC to protect servers against single-bit errors as well as to protect against multi-bit memory errors within a single RAM chip as well as within a single memory module
4	Memory RAS	Advanced ECC, online spare, mirroring, and Fast Fault Tolerance (ADDDC)

Application Rack Server		
#	Parameter	Minimum Specification
5	Storage controller	Tri-mode RAID Controller supporting SAS/SATA/NVMe RAID controller with minimum 8GB or higher cache, & RAID 1/5/6/10/50/60 support. Offered controller must support mix-and-match up to 16 no's 12G SAS, 6G SATA, and 16G NVMe drives to the same controller..
		Offered Storage controller must support:
		a) Immutable Hardware root of trust
		b) Expand & Move Logical Drive
		c) Configurable stripe size up to 1 MB
		d) Instant Secure Erase
		e) Migrate RAID/Stripe Size
		f) Modifying Cache Write Policy
		g) SSD wear gauge.
		h) Re-enable Failed Logical Drive
6	Disk Drives	a) 2 x 480GB SATA SSD in RAID1 for Boot.
		b) 2.0 TB usable NVMe SSD in RAID6.
		c) 2.0 TB usable SAS-10K HDD in RAID6.
7	Graphics	Video modes up to 1920 x 1200@60Hz (32 bpp).
8	LAN port	4 x 1G (RJ-45), 2 x 10G (SR), 2 x 16/32G FC (SW)
9	OS & Hypervisor certification	Certified for latest version of Red Hat Enterprise Linux, SUSE Linux Enterprise Server, Ubuntu, Microsoft Windows Server, VMWare.
10	Power Supply	Minimum Hot Plug Redundant power supplies of maximum 2kW or better with minimum 94% or better

		efficiency.
11	Fans/Blower	Fully populated redundant (N+1) hot-swap fans system
12	Other Interfaces	Minimum 1 x 1Gbps Dedicated OOB system management port (RJ-45), 1 x video port, min 2 or higher USB 3.0 ports
13	Driver/ Software Utilities	All required device drivers for OS installation /System Configuration and Server Management. Offered server management software shall be with perpetual licensing.
14	System Compliances	ACPI 6.3, PCIe 5.0, SMBIOS 3.2, UEFI 2.7, IPMI 2.0, AES, 3DES, SNMP v3, TLS 1.2, SMASH CLP, RESTful API, ASHRAE A3/A4
		Continuous, proactive health monitoring as well as notification of actual or impending component failure alerts on key internal server components such as CPUs, memory, temperature, fans, RAID controllers, hard drives (including cache modules) and power supplies.

Application Rack Server		
#	Parameter	Minimum Specification
15	System BIOS	System should boot with & run the BIOS from the same server hardware OEM (manufacturer). All updates should happen only using quoted OEM's access controller & management software to enforce security. MII compliance.
16	Server Security & Management	Immutable Silicon-based Hardware Root of Trust
		FIPS 140-2, TPM 2.0, CNSA
		UEFI Secure Boot and Secure Start along with Runtime Firmware Validation
		One-button/click Secure erase of NAND/user data
		Server should have security dashboard: displaying the status of important security features, the Overall Security Status for the system, and the current configuration for the Security State and Server Configuration Lock features.
		Should help to proactively identify out-of-date BIOS, drivers, and Server Management agents and enable the remote update of system software/firmware components. Should have dashboard for firmware baselines while performing minimum required firmware checks and highlighting out-of-compliance devices for updates with the selected firmware baseline.
		Should provide a Server workload-performance advisor to enable/help in server tuning

		recommendations to improve server performance or equivalent
		Should support managing multiple servers as one via: Group Power Control, Group Power Capping, Group Firmware Update, Group Configuration, Group Virtual Media and Encrypted Virtual Media, and Group License Activation
17	System Management	System management software shall be from the same server hardware OEM. System management software shall be with perpetual license.
		System remote management should support browser based graphical remote console along with Virtual Power button, remote boot using any of USB/CD/DVD Drive. It should be capable of offering upgrade of software and patches from a remote client using Media/image/folder; It should support server power capping and historical reporting and should have support for multifactor authentication

Application Rack Server		
#	Parameter	Minimum Specification
		Server should support monitoring and recording changes in the server hardware and system configuration. It assists in diagnosing problems and delivering rapid resolution when system failures occur
18	Serviceability	System should support embedded remote support to transmit hardware events directly to OEM or an authorized partner for automated phone home support
		Should have monitoring & analytics feature for the offered server/chassis along with its sub-components to predict, prevent, and auto-resolve problems and by providing automating case creation and log file submission for the problems that can't be auto resolved.
19	Certifications & benchmark	Relevant product datasheets, certification, benchmark or reference documents verifiable from publicly available data sources must be submitted along with Bid.
20	Authorization	"Manufacturer Authorization Letter" specific to the tender, signed digitally or by OEM's Board authorized signatory must be submitted.
21	IDC Ranking	OEM should be ranked within top 3 as per IDC report for any one of the previous four quarter in India for server.

14.37 Analytics Application Server with GPU

Technical Specification for Analytics Application Server with GPU		
#	Parameter	Minimum Specification
1	Form factor	Maximum 2U rack mount server with Bezel, Bezel Locking Kit, Chassis Intrusion Detection Kit, Sliding rails, AC power cords. and accessory patch cords (5 or higher meters).
2	Processor	Minimum 2 X Latest 5 th Generation 2.4GHz or higher, 24-core minimum, 60 MB or higher L3 cache, 3 UPI or higher. 64-bit x86 processor fully binary compatible to 64/32-bit applications and supporting hyper-threading. Number of cores on a single die/socket will be treated as a single processor.
3	Memory	Minimum 512 GB RDIMM, DDR5 DIMM in balanced configuration scalable up to 2TB. Advanced ECC to protect servers against single-bit errors as well as to protect against multi-bit memory errors within a single RAM chip as well as within a single memory module
		. Offered server should have native capability of identifying and reporting the genuineness of the memory installed in the server.

Technical Specification for Analytics Application Server with GPU		
#	Parameter	Minimum Specification
4	Memory RAS	Advanced ECC, online spare, mirroring, and Fast Fault Tolerance (ADDDC)
5	Storage controller	Tri-mode RAID Controller supporting SAS/SATA/NVMe RAID controller with minimum 8GB or higher cache, & RAID 1/5/6/10/50/60 support. Offered controller must support mix-and-match up to 16 no's 12G SAS, 6G SATA, and 16G NVMe drives to the same controller. Hardware RAID controller, should support different Raid levels and have at least 8GB Cache.
		Offered Storage controller must support:
		a) Immutable Hardware root of trust
		b) Expand & Move Logical Drive
		c) Configurable stripe size up to 1 MB
		d) Instant Secure Erase
		e) Migrate RAID/Stripe Size
		f) Modifying Cache Write Policy
		g) SSD wear gauge.
		h) Re-enable Failed Logical Drive
6	Disk Drives	2 x 480GB SATA SSD in RAID1 for Boot.
		2.0 TB usable NVMe SSD in RAID6.
		4.0 TB usable SAS-10K HDD in RAID6.
7	Graphics	Video modes up to 1920 x 1200@60Hz (32 bpp).
		3 x NVIDIA L4(24GB) Accelerator from day1 scalable up to 8 similar GPUs.
8	LAN port	4 x 1G (RJ-45), 2 x 10G (SR), 2 x 16/32G FC (SW)

9	OS & Hypervisor certification	Certified for latest version of Red Hat Enterprise Linux, SUSE Linux Enterprise Server, Ubuntu, Microsoft Windows Server, VMWare.
10	Power Supply	Minimum Hot Plug Redundant power supplies of maximum 2kW or better with minimum 94% or better efficiency.
11	Fans/Blower	Fully populated redundant (N+1) hot-swap fans system
12	Other Interfaces	Minimum 1Gbps Dedicated OOB system management port (RJ-45), 1 x video port, min 2 or higher USB 3.0 ports
13	Driver/ Software Utilities	All required device drivers for OS installation /System Configuration and Server Management. Offered server management software shall be with perpetual licensing.
14	System Compliances	ACPI 6.3, PCIe 5.0, SMBIOS 3.2, UEFI 2.7, IPMI 2.0, AES, 3DES, SNMP v3, TLS 1.2, SMASH CLP, RESTful API, ASHRAE A3/A4
		Continuous, proactive health monitoring as well as notification of actual or impending component failure alerts on key internal server components such as CPUs, memory, temperature, fans, RAID controllers, hard drives (including cache modules) and power supplies.

Technical Specification for Analytics Application Server with GPU		
#	Parameter	Minimum Specification
15	System BIOS	System should boot with & run the BIOS from the same server hardware OEM (manufacturer). All updates should happen only using quoted OEM's access controller & management software to enforce security. MII compliance.
16	Server Security & Management	Immutable Silicon-based Hardware Root of Trust
		FIPS 140-2, TPM 2.0, CNSA
		UEFI Secure Boot and Secure Start along with Runtime Firmware Validation
		One-button/click Secure erase of NAND/user data
		Server should have security dashboard: displaying the status of important security features, the Overall Security Status for the system, and the current configuration for the Security State and Server Configuration Lock features.
		Should help to proactively identify out-of-date BIOS, drivers, and Server Management agents and enable the remote update of system software/firmware components. Should have dashboard for firmware baselines while performing minimum required firmware checks and highlighting out-of-compliance devices for updates with the selected firmware baseline.
		Should provide a Server workload-performance advisor to enable/help in server tuning recommendations to improve server performance or equivalent

		Should support managing multiple servers as one via: Group Power Control, Group Power Capping, Group Firmware Update, Group Configuration, Group Virtual Media and Encrypted Virtual Media, and Group License Activation
17	System Management	System management software shall be from the same server hardware OEM. System management software shall be with perpetual license. System remote management should support browser based graphical remote console along with Virtual Power button, remote boot using any of USB/CD/DVD Drive. It should be capable of offering upgrade of software and patches from a remote client using Media/image/folder; It should support server power capping and historical reporting and should have support for multifactor authentication Server should support monitoring and recording changes in the server hardware and system configuration. It assists in diagnosing problems and delivering rapid resolution when system failures occur
18	Serviceability	System should support embedded remote support to transmit hardware events directly to OEM or an authorized partner for automated phone home support Should have monitoring & analytics feature for the offered server/chassis along with its sub-components to predict, prevent, and auto-resolve problems and by providing automating case creation and log file submission for the problems that can't be auto resolved.

Technical Specification for Analytics Application Server with GPU		
#	Parameter	Minimum Specification
19	Certifications & benchmark	Relevant product datasheets, certification, benchmark or reference documents verifiable from publicly available data sources must be submitted along bid.
20	Authorization	"Manufacturer Authorization Letter" specific to the tender, signed digitally or by OEM's Board authorized signatory must be submitted.
21	IDC Ranking	OEM should be ranked within top 3 as per IDC report for any one of the previous four quarter in India for server.

14.38 Precision AC for Server Room

Minimum Specifications for Precision Air Conditioner (PAC)		
#	Parameter	Minimum Specifications
1	Cabinet Construction	• The frame and panels shall be constructed of heavy gauge corrosion resistant sheet steel and have modular construction and hinged doors. • The cabinet shall be powder coated and have a textured finish. • The cabinet Shall be provided with double skin side panels on all four sides with inner panel of minimum thickness of 0.8mm and outer panel of thickness of 1.0mm • Insulation in the side panels should be 19 mm thick glass wool and front & back panels should be insulated with 25 mm thick special acoustic mineral/Rock wool.

2	Refrigeration Circuit	• The refrigeration system shall be of the direct expansion type and each unit must incorporate Variable Capacity Hermetic Digital scroll compressors having independent evaporator coil circuit and outdoor unit. Compressors will be with necessary protection devices and valves complete. The system shall include a auto reset HP control and LP switch, filter drier and charging port. A thermal expansion valve, sight glass and filter drier shall be provided in each circuit. Additionally, the system must be provided with vibration absorbers on the suction & discharge side of compressor piping to minimize chances of any leaks due to compressor vibrations during start / stop cycle; this must be in addition to the anti -vibration mounts provided for the compressor. • Hot gas bypass is not required since the load in the server room / Data centre remains constant and the units are designed for 100% capacity load.
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Minimum Specifications for Precision Air Conditioner (PAC)		
#	Parameter	Minimum Specifications
3	Evaporator Coil (Dx)	The evaporator coil shall be constructed of rifled bore copper tubes and louvred aluminium fins, with the aluminum/ GI frame. The coil should be straight/ slant coil configuration and drip tray should be fabricated from heavy gauge steel with powder coating to avoid corrosion. The drip trays must be double angled for condensate flow and easily removable for cleaning. The cooling coil shall be of suitable rows deep and designed for high sensible cooling. The distance between the fins should not be less than 1.8 mm and the face velocity shall not be more than 2.75 m/sec.
4	Compressor	- The compressor shall be of the high efficiency variable capacity Digital scroll design with an E E R of not less than 11.1 BTUH/watt (C O P of not less than 3.25) at ARI rating conditions. Each compressor shall have in- built overloads, HP and LP controllers and mounted on vibration isolators. Compressor can be single / double of the required capacity as per manufacturer standard. - Crankcase heaters are not required as the compressor is mounted in the indoor unit. Compressors should be without Rota lock valves as Ball valves are provided in the refrigerant circuit for service purpose.
5	Vibration Absorber	All units must have VIBRATION ABSORBERS in compressor suction & discharge lines to prevent cracks on high pressure copper pipe lines during start/stop cycle of the compressor.
6	Power Monitoring	All units must be provided with CE certified main power line supervisor switch to monitor under voltage / over voltage / phase reversal of incoming power supply. Provision of one common

	Switch	power monitoring device in electrical panel will not be acceptable. The switch provided must be of reputed make and complying with EU norms.
7	Fan and Motor; ELECTRONICALLY COMMUTATED DRIVES	Fans: Unit must be provided with direct drive backward curved fans each running with DC drive electronically communicated motors, the fans should be aligned and balance statically and dynamically. The fan speed must be controlled based on the room return air Temperatures and also must have automatic speed control without manual intervention. The fans can be one /two/ three no's as per the manufacturer's standard. Units with latest innovative EC fan technology with "COMPOSITE "Blade material will be preferred. Composite blade EC fan saves more energy compared to Standard EC fan with aluminium blade. Units shall be factory balanced in accordance with Section 15071, Mechanical Sound and Vibration Control. Only direct drive fans to be provided in offered units and centrifugal fans with belt drive is strictly not acceptable. Noise Level: 70 db from 1 MT of unit in free filed conditions.

8	Accessibility : Service Area:	• The unit shall be accessed from front which will be enabling to access all the main components of the machine from the front for installation purposes and routine servicing. • The unit shall be serviceable from the front with a maximum service space required of 1 mtr.
9	Electrical Heating	• The electric heating elements shall operate at a level not exceeding 60 KW / sqm. The low watt density elements shall be of finned tubular nickel-plated steel construction. • The heating circuit shall include dual safety protection through loss of of air and high temperature controls.
10	Humidification	• Humidity shall be achieved by using Immersed-electrode type humidifier by which steam shall be produced and the steam shall be distributed evenly into the bypass air-stream of the process cooling unit. The Humidifier operation should have periodic flushing cycle. The Humidifier should guarantee a perfect efficiency with low energy consumption and greater durability of components. The humidifier shall be fully serviceable with replaceable electrodes. • Steam humidifier capacity 3/5/8 or 10 kg/hr with 3 phase electrodes having function of auto drain and proportional control for capacity complete with steam supply and water drain hose pipe.

Minimum Specifications for Precision Air Conditioner (PAC)		
#	Parameter	Minimum Specifications
11	De-Humidification	De- Humidification to be achieved by controlling the evaporator fan speed. De- humidification done via split coil and solenoid valve is an outdated practice and not recommended for the latest generation Precision units.
12	Filtration	Filtration level should be of 90% - 10 microns. Filter should be of HDPE media & washable type. Filters with combustible / dry disposable media are strictly not accepted.
13	Electrical Panel	Control cabinet to be provided with Type 2 enclosure, with grounding lug, combination magnetic starters with overload relays, circuit breakers and cover interlock, and fusible control circuit transformer. The electric panel provided for the unit must be equipped with main incoming power isolation switch, additionally the unit must be provided with under voltage / over voltage / phase reversal / single phasing protection, all three phase motors must be operated only via 24V coil voltage contactors and MPCB's, additionally step down transformer must be provided for power supply to the unit controller. The electrical panel must also be providing with relay block for common alarm.

14	Air Cooled Condenser	• The condensers shall be factory matched to provide an operating range of (-) 5 °C to 45°C ambient. Condensers shall be suitable for 24 hour operation and be capable of providing vertical or horizontal discharge. • The condenser frame shall be constructed from heavy duty steel with powder coating to avoid corrosion and incorporate a copper tube and aluminium fin coil. • The coil shall be a maximum of 6 rows deep, with a minimum fin spacing of 2.0 mm with a maximum face velocity of 3.6 m/s. • The condenser fans shall be direct drive axial type operating at not more than 1440 rpm variable voltage electric motors.
15	Electronic Fan Speed Controller for Condenser fans	• The condensers must be provided with fan speed controllers, the speed of fans must be controlled based on refrigerant pressure monitoring.

Minimum Specifications for Precision Air Conditioner (PAC)		
#	Parameter	Minimum Specifications
16	Micro Processor Controller	- Each Air conditioners should have single microprocessor with following controls: Control Type The controls shall be a microprocessor programmable logic controller. The controls shall have separate indication of operating modes (cooling, heating, humidifying and dehumidifying), alarm conditions (temperature high, loss of sensor, compressor HP & LP, wet floor, no air flow and low humidifier water). The display and indication shall be visible on the front without removing any external panels. Local and remote alarms will be triggered if an alarm condition is reached. Each unit must be provided with large touch screen display. - The control should have an auto-restart feature which will return the unit to normal operation resumption of mains power. - Automatic load / time and alarm sequencing function to be performed by the unit. - Microprocessor must have output point for ON/OFF of motorized damper and must be suitable to be integrated with fire point for unit shut off incase receiving signal from fire panel or fire detectors.
17	Display	In normal operating mode the screen should display unit number, temperature and relative humidity set points and actual, operating status. The unit must have a large touch screen display on controller with user friendly menus and minimum two level password protections.

		RS485 interface port for BMS compatibility with ModBus RTU protocol is required.
18	Alarms	Following alarms should be available: 1. Temperature High / Loss of Sensor 2. Compressor 1 High / Low Pressure 3. Compressor 2 High / Low Pressure 4. Wet floor 5. No Air flow 6. Low Humidifier Water. 7. Temperature high / low 8. Humidity high / low

Minimum Specifications for Precision Air Conditioner (PAC)		
#	Parameter	Minimum Specifications
19	Safety Protections	The unit shall also incorporate the following protections: a) Single phasing preventers. b) Reverse phasing c) Phase unbalancing d) Phase failure e) Overload tripping (MPCB) of all components f) Wet Floor Sensor
20	Safety Interlocks	Operation of heaters & humidifiers shall be possible only when blower fan is in operation.
21	Sequencing	The sequencing should be feature of the PAC units. The units shall be designed to work for equal no of run hours also in case of fault the stand by unit should start.
22	Microprocessor Controls	Following information shall be available on the display on the units: a) Room temperature and humidity. b) Supply fan working status. c) Current date and time. d) Electric heaters working status. e) Manual / Auto unit status. f) Temperature set point. g) Humidity set point. h) Working hours of main component i.e. fan, heater, humidifier i) Unit working hours. j) Modes of operation (cooling, heating, humidification, de- humidification,). k) The last 10 intervened alarms.

23	Microprocessor functions	a) Password for unit calibration values modification. b) Automatic reset of program. c) Cooling capacity control. d) Compressor starting timer e) Date & time of last 10 intervened alarms. f) Start / Stop status storage by switch
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14.39 Rodent Repellent System

Minimum Specifications for Rodent Repellent System	
#	Minimum Specifications
1	Compatible with standard AC power supply, typically around 230V AC, 50Hz. or better
2	The device should be able to produce high frequency ultrasonic sound above 20KHZ.
3	Area of Effectiveness of Coverage area of the one device up to 300 sqft of area for Room void application and up to 150 sqft for ceiling Voids & floor void applications and 8 feet height or better
4	The device should have the testing feature
5	The device should be compact and easy to install.
6	The device should be harmless to humans.
7	The device should be capable to keep away rodent from the room in which the device is installed.

a. 31.40 625 KVA -DG Set

DG Set- 625KVA		
#	Parameters	Minimum Specifications
1	kVA Rating	625 at 0.8 pf (lag) under designed ambient conditions
2	KW Rating	500 at 0.8 pf (lag) under designed

		ambient conditions
3	Rated Ampere	868.75 at 0.8 pf (lag) under designed ambient conditions
4	Voltage	415 between phases with +/- 5%
5	Frequency	50 Hz
6	Number of phases	3
7	Rated Speed	1500 RPM
8	Dry Weight of Generator set	8150 Kg approx
9	DG set Noise level at 1mtr	<= 75dB @1mtr dBA
10	Overall dimensions with +/- 50 mm w/o silencer	
11	Length	6500* mm
12	Width	2125 mm
13	Height	2710 mm
14	CONSUMPTION	
15	Fuel Consumption at 100 % load of specified power factor in Liters/hr	130.50 subjected to tolerance (+5%),sp gravity of fuel as 0.845
16	Fuel Consumption at 75 % load of specified power factor in Liters/hr	98.60 subjected to tolerance (+5%),sp gravity of fuel as 0.845
17	Fuel Consumption at 50 % load of specified power factor in Liters/hr	66.20 subjected to tolerance (+5%),sp gravity of fuel as 0.845
18	Fuel Tank Capacity	990 Lts
19	Lub oil consumption @ 75% of rated load	102 gms/hr approx
20	ENGINE MODEL	
21	Standard Power in KWm as per ISO	561.1
22	Gross Engine Power output in hp	763 HP
23	Rated Speed	1500 RPM
24	No. of cyinders	10
25	Operating Cycle	4 Stroke
26	Class of Governing (as per ISO -8528 Part V)	G3

DG Set- 625KVA		
#	Parameters	Minimum Specifications
27	Bore x stroke	130 x 150mm
28	Aspiration	Turbo charged After Cooled
29	Compression Ratio	16.5 plus /minus 1 is to 1 or as per manufacturer standard design
30	Type of Coupling between Engine & Alternator	Direct
31	Cooling	Water cooled through engine mounted radiator
32	Coolant Quantity	82 liters approx
33	Oil Filter	Spin On type
34	Fuel Type	HSD as per IS :1460 or as per industrial standard
35	Alternator	
36	Make	CG/LS/Kirloskar/Equivalent
37	Alternator Type	Synchronous
38	Enclosure	IP23
39	Voltage	415 between phases with +/- 5%
40	Insulation Class	H
41	Permissible overload	10% for 1 hr in 12 hrs of operation
42	Time permitted to build rated voltage at rated rpm	< 5 sec
43	Speed (rpm)/Frequency (Hz)	1500/50
44	Conformance	IS 13364 and IEC 60034 -1

31.41 Gas suppression system

Minimum Specification for Fire/Gas Suppression System		
#	Parameters	Minimum Specifications
1	Scope	Fire Suppression Systems shall be used to suppress fires in specific hazards or equipment located where an electrically non-conductive agent is required, where agent cleanup creates a problem, where extinguishing capability with low weight is a factor and where personnel normally occupy the hazard. The system should be designed in 42 Bar UL Listing
2	Scope	Fire Suppression Systems shall be designed for the following classes of fire: • Class A: Surface Type Fires—wood or other cellulose-type material • Class B: Flammable liquids • Class C: Energized electrical equipment
3	Scope	1. The design, installation, testing and maintenance of the Fire Suppression Systems, employing FK 1230 (FK-5-1-12), shall be in accordance with the following codes, standards and regulatory bodies: a) NFPA 2001 (2018 edition) : Standard for Clean Agent Fire Extinguishing Systems. b) UL 2166: Standard for Halocarbon Clean Agent Extinguishing System Units c) IS : 15493: Gaseous Fire Extinguishing System - General Requirements) IS : 15496 : Inspection and Maintenance of Gaseous Fire Extinguishing System - Code of Practice e) ANSI B1.20.1 : Standard for pipe threads, General Purpose, 1992 f) NFPA 70 - NEC – National Electrical Code g) NFPA 72 – National Fire Alarm Code h) Requirements of the local Authorities Having Jurisdiction (AHJ)

4	Scope	The FK 1230 System to be supplied by the bidder must satisfy the requirement of the Authority having Jurisdiction over the location of the protected area and must be in accordance with OEM's product design criteria. The delivery of the FK 1230 (FK-5-1-12) system shall provide for the highest degree of protection and minimum extinguishing time. The design shall be as per NFPA 2001.
5	Cylinder	The Clean Agent cylinder valve assembly shall be actuated using an electric control head (Solenoid) the actuator should have facility of manual actuation also. This electric control head should meet the requirement of NFPA 2001, Sec. 4.3.4.1. This regulation addresses the concern of proper installation of the actuator by providing the necessary supervision within the electric control head
6	Cylinder	FK 1230 shall be stored in seamless type Cylinders. Welded cylinders are not permitted. Agent cylinder operating pressure shall be at 360 PSIG @ 70°F (24.8 bar gauge @ 21°C). Offer Cylinder shall be manufactured and tested in accordance with IS 7285 Standard and approved by PESO for their use. Clean Agent storage cylinders shall be equipped with safety rupture disc and pressure gauge to display internal pressures. The gauge shall be an integral part of the equipment and shall be color-coded for fast referencing of pressure readings
7	Cylinder	Pressure operated Control Head, should allow for Pressure actuation of Clean Agent storage FK 1230 Cylinders. This should be mounted directly on top of the master or slave cylinder valve.

8	Cylinder	The Master Cylinder Adapter Kit, should provide a means to connect the flexible actuation hose to the master & slave cylinder valve assemblies.
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9	Cylinder	a) Flexible Discharge Hose should route FK 1230 agent from the storage cylinders to the discharge piping. This hose should be connected to the discharge outlet of the Clean Agent Cylinder Valve. b) The Flexible Actuation Hose, should be usually used in multiple Cylinder Systems
10	Hose	Manifold check valves should be installed at the discharge manifold in a multiple cylinder arrangement to allow removal of any Clean Agent Cylinder from the manifold while still retaining a closed System. Manifold Supervisory Switch, should operate from system pressure upon discharge of FK 1230 gas discharge through piping network.
11	Hoses	Each cylinder valve shall be provided with a plug-in type of flexible rubber discharge hose of minimum 40mm size and shall withstand a test pressure as at least 150 -200% of the cylinder stored pressure. Each hose shall be permanently marked with the test pressure and OEM's part number. Multi cylinder systems shall have an interconnect hose for each cylinder. The interconnect hose shall have a length not less than 700 mm and shall be labeled with the test pressure of 100 Bar and the OEM's part number. All hoses shall be original

31.42 Very Early Smoke Detection (VESDA)

Minimum Specification for Very Early Smoke Detection (VESDA)	
#	Minimum Specifications

1	The System shall consist of a highly sensitive LASER-based smoke detector, aspirator, and filter.
2	System shall consist of an air sampling pipe network to transport air to the detection system, supported by calculations from a FM approved computer-based design modeling tool. Maximum transport time shall not exceed 90 seconds
3	System shall provide very early smoke detection and provide multiple output levels corresponding to Alert, Action, Fire 1 & 2. The levels to be set at sensitivities ranging from 0.005 – 20% obscuration / meter. report any fault on the unit by using configurable fault output relays or via the graphics Software. System will monitor for filter contamination automatically. Shall incorporate a flow sensor in each pipe and provide staged airflow faults. Shall has a clean air supply to maintain Laser chamber clean all the time.
4	The aspiration detector shall be ultra High Sensitive short wave length laser based aspiration smoke detector.

Minimum Specification for Very Early Smoke Detection (VESDA)	
#	Minimum Specifications
5	A. Sensitivity ranging from 0.0003–6% obs/ft (0.001-20% obs/m) with a resolution of 0.00006%obs/ft (0.0002% obs/m) - factory calibrated detection chamber to provide absolute smoke detection without incorporating any adaptive algorithms or drift compensation techniques to adjust the sensitivity or detector output from that established during commissioning.
6	B. Incorporates clean air barrier for protection of optics inside detection chamber (auto cleaning of detection chamber). On-board monitored filter with electronic circuit which identifies the filter uniquely and maintains status information such as the percent of filter life remaining.
7	C. Incorporate particle imaging and light scattering using a two-dimensional image sensing array and scatter pattern measurement using photodiodes.
8	D. LED & touch screen colour LCD display with reset/disable button - display indications include background smoke level in bar graph, alarm indication for each stage of alarm, alarm threshold indication for Alert, Action & Flre1 stages, airflow reading in individual pipe, filter status and faults like airflow fault, filter fault, network fault, system fault etc.,
9	E. Support analytics algorithms based on output data from the sensing method to determine the nature of sampled airborne material and provide probabilities of sampled air containing dust, diesel particulate and smoke from overheating PVC wire.
10	F. RS485, TCP/IP & Wi-Fi connectivity support for monitoring via handheld smart phones (Android/iOS)
11	G. Four in-line sample pipe inlets with ultrasonic flow sensor for each pipe inlet - provide staged airflow faults against flow fault thresholds that may be determined and set for each pipe individually. Support 400m pipe length & 80 Class A sampling holes

12	H. Built-in event and smoke logging - capable of storing 20,000 events (smoke levels, alarm conditions, operator actions and faults).
13	I. Incorporate galvanically isolated General Purpose Input which activates in the event of an applied voltage of 5 to 50VDC and can be assigned by configuration to activate one of several functions - Reset, Disable, Reset/Disable, Stand-by, Mains OK, change between Day/Night smoke thresholds .
14	J. Inbuilt seven relays for indication of alarm, fault and other status like detector in disabled mode, major or minor fault.
15	K. Allow future hardware expansion via stackable modules placed either on top or below the detector as required (e.g.) Gas detection modules, power supply stack, automatic pipe cleaning stack etc.
16	L. Supports use of additional displays for remote indication of alarm and fault status for monitoring purpose - remote display provides all indications same as the inbuilt display.

Minimum Specification for Very Early Smoke Detection (VESDA)		
#	Minimum Specifications	
17	Power	Detectors shall operate on 24V DC input.
18	Sampling tubes/smoke sensors	single/multiple
19	Relays	Relays for fire alarm and fault conditions.
20	Display and operation	LED / LCD / Bar graph / touch screen display for the multiple alarm threshold levels indicated and faults such as detector fault, airflow fault and indication for Isolate and Reset
21	Event memory/ analogue values	minimum 18,000 events
22	Standards/approvals	CODES AND STANDARDS The entire installation shall be installed to comply one or more of the following Codes and standards : NFPA Standards, US British Standards, BS 5839 part :1 APPROVALS All the equipments shall be designed, tested, approved, and listed by : LPCB (Loss Prevention Certification Board), UK FM (Factory Mutual), US UL (Underwriters Laboratories Inc.), US

31.43 Water Leak Detection System

Minimum Specifications for Water Leakage Detection (WLD)	
#	Minimum Specifications
1	Power: 220V/50HZ+10% and 24VDC or better
2	Voltage Scope: 12V or better
3	Technology: AC Sensing Technology
4	The water alarm control panel should provide the audible and visual information to the user, initiating automatic alarm response sequences and providing the means by which the user interacts with the system
5	The water alarm control panel shall be able to be easily configured to meet the exact detection zone and cause/effects output requirement of the building.
6	Each Zone can be configured & Based on AC Sensing Technology

Minimum Specifications for Water Leakage Detection (WLD)	
#	Minimum Specifications
7	The water leak alarm control panel shall have provision to drive and monitor a repeater panels
8	Water Leak Sensor Cable
9	Material: PVC Twisted pair with stainless elements or better
10	Hooter
11	Type: Electronic Siren or equivalent
12	Operating Voltage: 12 Volt DC or better
13	Sound level: up to 80 dB or better
14	Operating Temperature: 0°C to +50° C or better

31.44 Poles/Cantilever

31.44.1 Pole with 1m arm

I-Type Poles with 1 Meter Arm		
#	Parameters	Minimum specifications
1	General Requirement	Shall be minimum 6.5 mts in height above ground level Wall Thickness: 4.5 mm Mild Steel (M.S) Tubular Pipe (B-Class) as per IS-1239 (Part-1)-193
2	General Requirement for fabrication of Gantry	Fabricated from hot dip galvanized pole with coating of 86 micron as per IS:2629. Minimum 10 cm diameter along with base plate size 30 x 30 x1.5 cms suitable for wind speed of 120km / hr. with suitable arm bracket of Min 1 Meter and with J type foundation bolts. Fabrication in accordance with IS 2713 (1980).
3	Foundation	The Pole would be fixed on an adequate and strong foundation so as to withstand city weather conditions and wind speed of 120km / hr. Expected foundation depth of minimum 100 cms or better.

4	Protection	All poles at junctions shall have earthing arrangement for protection against lighting and surge.
5	Sign Board/Logo	All poles shall carry logo/Sticker & Marking of Authority.
6	Mounting	The pole shall support mounting of Surveillance Cameras/IR/Traffic Signals/Aspects/ Speed Detection/PAS/ECB etc. Proper size fixtures shall be provided as per site requirement.
7	Pipes, Tubes	Pipes, Tubes: All wiring must be hidden, through tubes/pipes. No wires shall be visible from outside.

31.44.2 Cantilever Pole with 5m Arm

Minimum Specifications for Cantilever Pole with 5 Meters Arm		
#	Parameter	Minimum Specifications
1	General Requirement	Shall be minimum 6.5mts height above ground as per NHAI norms or as per Solution/ Site Requirement. Wall Thickness: 4.5 mm
2	General Requirement for fabrication of Cantilever Pole	Fabricated from hot dip galvanized pole with coating of 86 micron as per IS:2629 minimum 15 cm diameter along with base plate size 30x30x1.5 cms or better Thickness 3.96 mm +- 5% tolerance suitable for wind speed of 120km / hr. with suitable arm bracket of Min 5 meters and with J type foundation bolts. Fabrication in accordance with IS 2713 (1980).
3	Foundation	The Cantilever Pole would be fixed on an adequate and strong foundation so as to withstand city weather conditions and wind speed of 120km / hr. Expected foundation depth of minimum 100cms or better.
4	Protection	All poles at junctions shall have earthing arrangement for protection against lighting and surge.
5	Sign Board/Logo	All poles shall carry logo/Sticker & Marking of Authority.
6	Mounting	The Cantilever pole shall support mounting of Surveillance Cameras/IR/Traffic Signals/Aspects/ Speed Detection/PAS/ECB etc. Proper size fixtures shall be provided as per site requirement.
7	Pipes, Tubes	Pipes, Tubes: All wiring must be hidden, through tubes/pipes. No wires shall be visible from outside.

31.44.3 Pole for Traffic Light

Minimum Specification for I-Type Poles	
#	Minimum specifications
1	Shall be minimum 6 mts in height above ground level or as per Solution/ Site Requirement. Wall Thickness: 4.5 mm Mild Steel (M.S) Tubular Pipe (B-Class) as per IS-1239 (Part- 1)-193
2	Fabricated from hot dip galvanized pole with coating of 86 micron as per IS:2629. Minimum 10 cm diameter along with base plate size 30 x 30 x1.5 cms suitable for wind speed of 120km / hr. with suitable arm bracket and with J type foundation bolts. Fabrication in accordance with IS 2713 (1980).
3	The Pole would be fixed on an adequate and strong foundation so as to withstand city weather conditions and wind speed of 120km / hr. Expected foundation depth of minimum 100 cms or better.
4	All poles at junctions shall have earthing arrangement for protection against lightning and surge.
5	All poles shall carry logo/Sticker & Marking of Authority.
6	The pole shall support mounting of Surveillance Cameras/IR/Traffic Signals/Aspects/ Speed Detection/PAS/ECB etc. Proper size fixtures shall be provided as per site requirement.
7	Pipes, Tubes: All wiring must be hidden, through tubes/pipes. No wires shall be visible from outside.

31.45 CCTV/ITMS Cameras

#	MINIMUM ELIGIBILITY CRITERIA for CCTV OEM:
	OEM company for Camera & NVR should have its own company registered in

1	India (under Incorporation of Companies Act, 1956/ 2013) since last 10 year. Any representation through a Dealer/ Distributor/ Subsidiary/ consortium shall not be treated as OEM. This has to be supported by necessary statutory documents.
	CCTV OEM should have manufacturing in India since last Five years and Foreign CCTV OEM should have manufacturing unit globally from last 10 Years. (Documentary evidence should be submitted).

2	The OEM of the IP Camera, Storage, NVR/ VMS Software and Network Switches should not be blacklisted or banned by any country or government department in any country. The OEM Should not have any cheating or fraud case filed against their company for their respective product line.
3	The CCTV OEM should have below ISO Certifications for Quality, Environment, Security management and Health & Safty Management system for manufacturing of all types of Cameras. All the CCTV Cameras should be from same OEM. The Bidder/s shall attach the copy of the OEM's ISO Certificate along with the bid. ISO9001:2015, ISO 14001:2015, ISO 27001:2013, ISO 45001:2018, IEC 27032:2012, CMMI Level 5 or above certification
4	The Camera OEM should comply to General Data Protection Regulation (GDPR). OEM should have valid EPR (Extended Producer Responsibility License/ Authorization No. from Central Pollution Control Board for Electrical & Electronic Equipment E-Waste. OEM need to submit its certificate with technical bid.
5	The CCTV OEM must have an office and service/support centre in Bihar. The necessary sales and service tax number/certificate should be submitted along with the bid.
6	The CCTV OEM and product should not be from a country which shares a land border with India in compliance of the General Financial Rule 144 (GFR Rule No. 144) and CCV OEM should be listed in Top 20 Security company of Security 50 by asmag.com.
7	The CCTV OEM must have supplied IP cameras for CCTV installations in at least three Safe/Smart Cities in India within the past seven years, as of the bid submission date. Relevant proof, including purchase orders and supply documentation, must be provided.
8	To establish the reliability and credibility of the CCTV OEM, they must have supplied at least 200,000 IP CCTV cameras to any State Government, Central Government, or Public Sector Undertaking in India within the past seven years,

	as of the bid submission date. Copies of purchase orders and supply documentation must be provided as part of the submission.
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31.45.1 5 MP Bullet IP Camera

Outdoor IP 5MP or better Bullet Cameras for General Surveillance Specifications:		
#	Parameters	Minimum Specifications
1	Type of Camera	Bullet Camera
2	Image Sensor	1/2.7" or better progressive Scan CMOS with starlight function to get colour image even at night condition
3	Signal System	PAL/NTSC
4	Resolution & frame rate	5 MP, 2592(H) × 1944(V) @25/30 fps or better
5	Minimum Illumination	0.01 Lux@ F1.6, AGC ON, 0 lux with IR or better

Outdoor IP 5MP or better Bullet Cameras for General Surveillance Specifications:		
#	Parameters	Minimum Specifications
6	Imaging	1/3s to 1/100000s, Auto Gain Control , White Balance- Auto, Back Light Compensation, Image Rotation, Image Mirror, Multi zone Privacy Masking, HLC, Defog, Region Of Interest (4 Areas, Rectangular) and EIS features.
7	Signal to Noise Ratio	> 56 dB or more
8	Lens Type & Focus	2.7mm ~13.5mm Motorized lens, Vari Focal
9	Angle of View	H: 109°–30°; V: 56°–17°; D: 131°–35° or better
10	Day & Night	True Day & Night High Performance Mechanical IR cut filter with auto switch, IR Source- Inbuilt Smart IR LED's with effective distance upto 60 Mtr or better with the help of Integrated IR.
11	Video Compression (Minimum)	H.265+/ Instastream, H.265, H.264H, H.264
12	Audio Compression	G.711a, G.711Mu, PCM, G.726
13	Wide Dynamic Range	WDR (120db or more)
14	Digital Noise Reduction	DNR (3D) On/Off
15	Video Streaming & Frame Rates	Quad streaming , configurable on below resolution or better :-
		Main stream : 5MP/4MP/2MP/1.3MP/1MP@(1–25/30 fps)
		Sub stream 1 : 2MP/1.3MP/1MP@(1–15fps)
		Sub stream 2 : D1/VGA/CIF@(1–10 fps)
		Sub stream 3 : D1/VGA/CIF@(1–10 fps)

16	Connectivity	1x LAN RJ-45 (10/100Base-T)
17	Image Setting	Rotate Mode, saturation, brightness, contrast, sharpness adjustable through client software or web browser
18	Privacy Mask	Upto 4 Areas
19	Cyber Security	Configuration encryption, AES 256-bit Encryption, Digest, WSSE, account lockout, video encryption, IP/MAC filtering, trusted boot, trusted upgrade, trusted execution
20	Onboard Storage	Camera should support built-in Micro SD/SDHC/SDXC Card slot upto 512 GB. It should be supplied with minimum 128GB memory Card.
21	Recording Management	Format SD, overwrite, storage management, video to NAS device, remote archive access via FTP login

Outdoor IP 5MP or better Bullet Cameras for General Surveillance Specifications:		
#	Parameters	Minimum Specifications
22	Alarm Trigger & Edge Analytics	Motion/tampering detection; audio detection; network disconnection detection; IP conflict detection; memory card state detection; memory space detection, Tripwire/Intrusion, Object Abandon/ Missing, SMD, Face Detection
	Network Compatibility	
23	Network Protocol	SFTP, IPv6, IPv4, DNS, RTCP, NTP, RTP, HTTP, HTTPS, SNMP, TCP/IP, PPPoE, NFS, UDP, ICMP, SSL, DHCP, SMTP, RTSPS
24	User Support	Minimum 20 Users
25	System Capability	ONVIF Profile S, G & T. CCTV Camera OEM should be fulltime member of ONVIF and quoted models should be listed on ONVIF official website (All the certifications & Credentials should be valid on the date of technical evaluation). The CCTV OEM should not be suspended/ blacklisted by ONVIF.
26	VMS	Camera shall support open source VMS
27	Ethernet	1 RJ 45 10/100 Ethernet port
28	Audio In/ Out	Mini. 1 Input & 1 Output port for external Mix & Speaker and 1 x Built-In Mic.
29	Alarm In/ out	Mini. 1 Input & 1 Output port for external sensors etc.
30	Power Input	Standard DC Jack
31	Power Requirement	12VDC/24 VAC/PoE (802.3af)/ePOE
32	Power Consumption	Max 11 W

33	Housing/ Enclosure	IP67 weather proof, IK10, Metallic body
34	Operating Condition	-10°C to 60°C, humidity 95% (max) (non-condensing)
35	Standards	BIS, CE, FCC, RoHS Certified

31.45.2 5 MP PTZ Camera

5MP IP IR PTZ (Pan. Tilt and Zoom) Camera Specifications:		
#	Parameters	Minimum Specifications
1	IP IR PTZ Camera	Motorized PAN TILT ZOOM with IR
2	Image Sensor	1/2.8" or better progressive Scan CMOS
3	Signal System	PAL/NTSC
4	Resolution & frame rate	5 MP, 2592(H) × 1944(V) @25/30 fps or better
5	Minimum Illumination	0.005Lux@ F1.6, AGC ON,, 0 lux with IR, or better
6	Imaging	1/1s to 1/30000s, Auto Gain Control , White Balance- Auto, Back Light Compensation, Image Rotation, Image Mirror, Multi zone Privacy Masking (Upto 24 Area), HLC, Defog, Region Of Interest and EIS features.
7	Signal to Noise Ratio	55 dB or more
8	Lens Type	Focal Length: varifocal 3.95mm (±5mm) ~ 177.75mm (±5mm) or better, Focus Adjustment: Automatic, manual
9	Zoom	45x Optical zoom and 16x Digital zoom with angle of view H: 65.7°–1.9°V: 39.4°–1.1°D: 73.1°–2.1
10	Day & Night	True Day & Night High Performance Mechanical IR cut filter with auto switch, IR Source- Inbuilt Smart IR LED's with effective distance. The camera should have IR LED's and cover distance up to 300 mtr. or above
11	PAN Travel	Pan: 0° ~ 360° endless, Manual Pan: 260° /s, Preset :

		300° /s
12	Tilt Travel	Tilt: -20° ~ 90°, auto flip 180°, Manual Tilt: 120° /s, Preset : 200° /s
13	Presets	300 Presets
14	Video Compression (Minimum)	H.265+/ Instastream, H.265, H.264+, H.264
15	Wide Dynamic Range	WDR (120db or more), HLC & BLC
16	Digital Noise Reduction	DNR (2D+3D) On/Off
17	Streaming	Quad streaming , configurable on below resolution or better :-
		Main stream: 5MP@(1–25/30 fps)
		Sub stream 1 :1080p@(1–25/30 fps)
		Sub Stream2 : D1@(1–25/30 fps)
		Sub Stream3 : D1@(1–25/30 fps)
18	Image Setting	Rotate Mode, ROI ,EIS, Defog, saturation, brightness, contrast, sharpness adjustable through client software or web browser
19	Profile Management	User configuration import, export
20	Cyber Security	Configuration encryption, AES 256-bit Encryption, Digest, WSSE, account lockout, video encryption,

5MP IP IR PTZ (Pan. Tilt and Zoom) Camera Specifications:		
#	Parameters	Minimum Specifications
		IP/MAC filtering, trusted boot, trusted upgrade, trusted execution
21	Onboard Storage	Camera should support built in Micro SD/SDHC/SDXC Card slot upto 512 GB . It should be supplied with minimum 128GB Memory.
22	Recording Management	Format SD, overwrite, storage management, video to NAS device, remote archive access via FTP login
23	Alarm Trigger	Motion/tampering detection; audio detection; network disconnection detection; IP conflict detection; memory card state detection; memory space detection, Tripwire/Intrusion. Object Abandon/ Missing, SMD, Face Detection
	Network Compatibility	
24	Network Protocol	SFTP, IPv6, IPv4, DNS, RTCP, NTP, RTP, HTTP, HTTPS, SNMP, TCP/IP, PPPoE, NFS, UDP, ICMP, SSL, DHCP, SMTP, RTSPS.
25	User Access	Minimum 20 Users
26	System Capability	ONVIF Profile S, G, M & T.
		CCTV Camera OEM should be fulltime member of ONVIF and quoted models should be listed on ONVIF official website (All the certifications & Credentials should be valid on the date of technical evaluation). The CCTV OEM should not be

		suspended/ blacklisted by ONVIF.
27	VMS	Camera shall support open source VMS
28	Connectivity	1x LAN RJ-45 (10/100Base-T)
29	Audio Support	Audio Interface : The camera should have 1/1 Audio In/Out to connect External Mic and Speaker
		Audio Compression : PCM, G.711A, G.711MU, G.726, MPEG2-Layer2, G.722.1
30	Alarm In/Out	Alarm In/out- 7/2 Ch In/Out
31	Power Input	Standard DC/ AC Jack
32	Power Requirement	24 VDC, 2.5 A ($\pm 25\%$), PoE+ (802.3at)
33	Power Consumption	Not to exceed 25W when IR on
34	Enclosure & Weather Proof Standard	IP67 weather proof and IK10, TVS 8000V lightning proof, surge protection, voltage transient protection
35	Operating Condition	-20°C to 70°C, humidity 95% (max) (non-condensing)
36	Standards	BIS, CE, FCC, RoHS Certified

31.45.3 4K UHD Camera

Outdoor IP 4K Bullet Cameras Specifications:		
#	Parameters	Minimum Specifications
1	Type of Camera	Bullet Camera
2	Image Sensor	1/2.7" or better progressive Scan CMOS with starlight function to get color image even at night condition
3	Signal System	PAL/NTSC
4	Resolution & frame rate	8 MP, 3840(H) × 2160(V)@25/30 fps or better
5	Minimum Illumination	0.01 Lux@ F1.6, AGC ON, 0 lux with IR or better
6	Imaging	1/3s to 1/100000s, Auto Gain Control , White Balance- Auto, Back Light Compensation, Image Rotation, Image Mirror, Multi zone Privacy Masking, HLC, Defog, Region Of Interest (4 Areas, Rectangular)) and EIS features.
7	Signal to Noise Ratio	> 56 dB or more
8	Lens Type & Focus	2.7mm ~13.5mm Motorized lens, Vari Focal
9	Angle of View	H: 109°–30°; V: 56°–17°; D: 131°–35° or better
10	Day & Night	True Day & Night High Performance Mechanical IR cut filter with auto switch, IR Source- Inbuilt Smart IR LED's with effective distance upto 60 Mtr or better with the help of Integrated IR.
11	Video Compression (Minimum)	H.265+/ Instastream, H.265, H.264H, H.264
12	Audio Compression	G.711a, G.711Mu, PCM, G.726
13	Wide Dynamic Range	WDR (120db or more)

14	Digital Noise Reduction	DNR (3D) On/Off
15	Video Streaming & Frame Rates	Quad streaming , configurable on below resolution or better :- Main stream : 8MP/5MP/4MP/2MP/1.3MP/1MP@(1–25/30 fps) Sub stream 1 : 2MP/1.3MP/1MP@(1–15fps) Sub stream 2 : D1/VGA/CIF@(1–10 fps) Sub stream 3 : D1/VGA/CIF@(1–10 fps)
16	Connectivity	1x LAN RJ-45 (10/100Base-T)
17	Image Setting	Rotate Mode, saturation, brightness, contrast, sharpness adjustable through client software or web browser
18	Privacy Mask	Upto 4 Areas
19	Cyber Security	Configuration encryption, AES 256-bit Encryption, Digest, WSSE, account lockout, video encryption, IP/MAC filtering, trusted boot, trusted upgrade, trusted execution

Outdoor IP 4K Bullet Cameras Specifications:

#	Parameters	Minimum Specifications
20	Onboard Storage	Camera should support built-in Micro SD/SDHC/SDXC Card slot upto 512 GB. It should be supplied with minimum 128GB memory Card.
21	Recording Management	Format SD, overwrite, storage management, video to NAS device, remote archive access via FTP login
22	Alarm Trigger & Edge Analytics	Motion/tampering detection; audio detection; network disconnection detection; IP conflict detection; memory card state detection; memory space detection, Tripwire/ Intrusion, Object Abandon/ Missing, SMD, Face Detection
	Network Compatibility	
23	Network Protocol	SFTP, IPv6, IPv4, DNS, RTCP, NTP, RTP, HTTP, HTTPS, SNMP, TCP/IP, PPPoE, NFS, UDP, ICMP, SSL, DHCP, SMTP, RTSPS
24	User Support	Minimum 20 Users
		ONVIF Profile S, G & T.
25	System Capability	CCTV Camera OEM should be fulltime member of ONVIF and quoted models should be listed on ONVIF official website (All the certifications & Credentials should be valid on the date of technical evaluation). The CCTV OEM should not be suspended/ blacklisted by ONVIF.
26	VMS	Camera shall support open source VMS
27	Ethernet	1 RJ 45 10/100 Ethernet port
28	Audio In/ Out	Mini. 1 Input & 1 Output port for external Mix & Speaker and 1 x Built-In Mic.
29	Alarm In/ out	Mini. 1 Input & 1 Output port for external sensors etc.

30	Power Input	Standard DC Jack
31	Power Requirement	12VDC/24 VAC/PoE (802.3af)/ePoE
32	Power Consumption	Max 11 W
33	Housing/ Enclosure	IP67 weather proof, IK10, Metallic body
34	Operating Condition	-10°C to 60°C, humidity 95% (max) (non-condensing)
35	Standards	BIS, CE, FCC, RoHS Certified

31.45.4 5MP Box Camera with IR Illuminator

5MP Box Camera Specifications for ANPR/ RLVD Solution		
#	Parameters	Minimum Specifications
1	Type of Camera	Box Type
2	Image Sensor	1/2.8" or better progressive Scan CMOS
3	Signal System	PAL/NTSC
4	Resolution & frame rate	5MP, 2960 (H) × 1668 (V)@25/30 fps
5	Minimum Illumination	0.01Lux@ F1.6, AGC ON, 0 lux with IR or better
6	Imaging	1/3s to 1/100000s, Auto Gain Control, White Balance- Auto, Back Light Compensation, Image Rotation, Image Mirror, Multi zone Privacy Masking (4 Area), HLC, Defog, Region Of Interest (4 Areas, Rectangular) and EIS features.
7	Signal to Noise Ratio	> 56 dB or more
8	Lens Type & Focus	C/CS Mount, 5mm (±1mm) ~ 50mm (±1mm) Vari Focal lens or better
9	Day & Night	True Day & Night High Performance Mechanical IR cut filter with auto switch, IR Source- Inbuilt Smart IR LED's with effective distance upto 100 Mtr or better with the help of External/ Integrated IR.
10	Video Compression (Minimum)	H.265+/ Instastream, H.265, H.264H, H.264
11	Audio Compression	G.711a, G.711Mu, PCM, G.726, G.723
12	Wide Dynamic Range	WDR (120db or more)
13	Digital Noise Reduction	DNR (3D) On/Off
		Quad streaming, configurable
		Main stream: 5MP@(1–25/30 fps)

14	Video Streaming & Frame Rates	Sub stream1 : 720p@(1–25/30 fps)
		Sub Stream2 : D1@(1–25/30 fps)
		Sub Stream3 : D1@(1 fps or more)
15	Connectivity	1x LAN and 1x RS-485 Port
16	Image Setting	Rotate Mode, saturation, brightness, contrast, sharpness adjustable through client software or web browser
18	Cyber Security	Configuration encryption, AES 256-bit Encryption, Digest, WSSE, account lockout, video encryption, IP/MAC filtering, trusted boot, trusted upgrade, trusted execution
19	Onboard Storage	Camera should support built-in Micro SD/SDHC/SDXC Card slot upto 512 GB. It should be supplied with minimum 128GB memory Card.
20	Recording Management	Format SD, overwrite, storage management, video to NAS device, remote archive access via FTP login

5MP Box Camera Specifications for ANPR/ RLVD Solution		
#	Parameters	Minimum Specifications
21	Alarm Trigger & Edge Analytics	Motion detection, Tampering detection, audio detection, network disconnection detection, IP conflict detection, memory card state detection, memory space detection, Tripwire, Object Abandoned/Missing, Face Detection.
	Network Compatibility	
22	Network Protocol	SFTP, IPv6, IPv4, DNS,RTCP, NTP, RTP, HTTP, HTTPS, SNMP, TCP/IP, PPPoE, NFS, UDP, ICMP, SSL, DHCP, SMTP, RTSPS
23	User Support	Minimum 20 Users
24	System Capability	ONVIF Profile S, G & T.
		CCTV Camera OEM should be fulltime member of ONVIF and quoted models should be listed on ONVIF official website (All the certifications & Credentials should be valid on the date of technical evaluation). The CCTV OEM should not be suspended/ blacklisted by ONVIF.
25	VMS	Camera shall support open source VMS
26	Ethernet	1 RJ 45 10/100 Ethernet port
27	Audio In/ Out	Mini. 1 Input & 1 Output port for external Mix & Speaker and 1 x Built-In Mic.
28	Alarm In/ out	Mini. 2 Input & 2 Output port for external sensors etc.
29	Power Input	Standard DC Jack
30	Power Requirement	12VDC/24 VAC/PoE (802.3af)/ePoE

31	Power Consumption	Max 15 W
32	Housing/ Enclosure	IP67 weather proof, IK10, Metallic body
		Water-proof coating film
		Built-In Heater & Blower/ Cooling fan.
		Operating Temperature : -10°C ~ 60°C
33	IR Illuminator (External/ Built-In in Housing)	Range : Min. 100 meters to cover the complete field of view at specified locations
		Minimum Illumination: High sensitivity at Zero Lux
		Power : Automatic on/off operation
		Casing : NEMA 4X / IP-66 rated
34	Operating Condition	-10°C to 60°C, humidity 95% (max) (non-condensing)
35	Standards	BIS, CE, FCC, RoHS Certified

31.46 Radar Speed Display warning system with Infra

Minimum Technical Specification for RADAR based Vehicle Actuated Speed Display (VASD) System	
#	Minimum Specifications
1	The proposed RADAR based VEHICLE ACTUATED SPEED DISPLAY (VASD) shall be ultra slim, low power consumption with accuracy better than 95% in all-weather as well as Heterogeneous traffic conditions
2	Speed threshold of the proposed VASD for a particular carriageway can be configured using a dedicated PC tool, as per Site requirements.
3	Ease of Installation shall allow the proposed VASD to be installed on existing gantries or sideways on a Pole of carriageway, at a height of 5-7 Meters
4	The proposed VASD shall detect all vehicles of different shapes and sizes like a Bicycle, Motorcycles, Three-wheelers, Cars, Trucks and Buses. Using configuration tool, the detection sensitivity can be adjusted to discard small vehicle like Bicycles/ Motorcycles.
5	The proposed VASD shall incorporate white LED Strobe output, to indicate detection of vehicle within its detection range.
6	Portable Design of the proposed VASD shall allow it to be installed as Interceptor on top of the Vehicle or trolley.
7	The proposed VASD shall be a 7 segment LED Numeric display as default.
8	The proposed VASD with 7 segment Numeric display to be available with YELLOW LED, 2½ digit with digit height of 400mm as default option.
9	Digits flashing upon vehicle crossing speed threshold shall be default.
10	The proposed VASD shall be compatible for Solar-Battery or Hybrid option.

11	The proposed VASD shall be available with choice of faceplate colour. YELLOW faceplate will be default.	
12	The proposed VASD can monitor and store data for vehicles passing through multiple lane s simultaneously.	
13	The proposed VASD shall be provided with universal mounting arrangement.	
14	RADAR SPECIFICATIONS	
15	Operating frequency	: 24.125 GHz
16	Beam-width	: 12° x 24° (Horizontal vs. Vertical)
17	Communication	: RS-232/RS-485 communication.
18	Speed measurement range	: 7 - 199 kmph or mph, with Km/Mile option selection.
19	Speed Accuracy	: +/- 2 Km/Hr
20	Mounting Height	: 1.5 to 6.0 m above the road surface.
21	Multiple Vehicles in Radar Beam	: Should be able to detect multiple vehicle speeds within the range of detection
22	Accuracy	: Better than 98-99%
23	OTHER FEATURES	

Minimum Technical Specification for RADAR based Vehicle Actuated Speed Display (VASD) System

#	Minimum Specifications	
24	Speed Display	: Numeric 7 Segment display (Single or Dual Colour) ,2 digit (for 99 Kmph) or 2½ digit (for 199 Kmph)
25	Display Area	: 435x325mm
26	Communication	: RS232/RS485
27	Power	: 230VAC+/-15% OR 12VDC for Solar Operation
28	Environmental	: Operating Temperature: -15 to 60°C,
29	Humidity	: 30% to 90% RH, Non-condensing
30	CONFIGURATION SOFTWARE TOOL FEATURS	
31	Target	: User can set either Strongest Target (Size) or Fastest Target or Nearest target.
32	KPH / MPH	: User can set the unit as KPH (Kilometres per Hour) or MPH (Miles per Hour)
33	Cosine Angle	: This function is to correct the angle of incidence.
34	Zero Suppression	: Enabling the zero-suppression check box will not report zero speed and report only when there's target.
35	Sensitivity	: The sensitivity can be increased to increase the sensing distance.
36	Update Rate (MS)	: User can set-up the speed update rate.
37	Speed Limit	: This will set the speed threshold to trigger.

38	REPORTS	
39	Traffic speed data reports, Logs files for list of Vehicle Date, Detection Time and Detected Speed of Vehicles	
40	Report Analysis: For Average speed and Maximum speeds	
41	Optional Feature/capability: to export the reports using GSM modem or other media drive	

31.47 Variable Message Display

Minimum Technical & Functional Specifications for Variable Message Display (VMD)	
#	Minimum Specifications
Functional Specification for Variable Message Display (VMD)	
1	The system should be capable to display warnings, traffic advice, route guidance and emergency messages to motorists from the ICCC in real time.
2	The VMD should display text and graphic messages using Light Emitting Diode (LED) arrays.
3	The System should support Display characters in true type fonts and adjustable based on the Operating system requirement.
4	The VMD workstation at the ICCC should communicate with the VMD controller through the network. It should send out command data to the variable message display controller and to confirm normal operation of the signboard. In return, the VMD workstation should receive status data from the VMD controller.
5	VMD controllers should continuously monitor the operation of the VMD via the provided communication network.
6	Operating status of the variable message display should be checked periodically from the ICCC.
7	It shall be capable of setting an individual VMD or group of VMD's to display either one of the pre-set messages or symbols entered into the computer via the control computer keyboard or by another means.
8	It shall be capable of being programmed to display an individual message to a VMD or a group of VMDs at a pre-set date and time.
9	A sequence of messages/pictures/ pre- decided sign or group of signs shall be possible to assign for individual VMD or group of VMDs.
#	Variable Message Displays (VMD) application
10	Central Control Software allows controlling multiple VMDs from one console.
11	Capable of programming to display all types of Message/ advertisement.

12	The system should have capability to divide VMD screen into multi-parts to display diverse form of information like, text, still images, advertisements, weather info, city info etc.
13	Capable of controlling and displaying messages on VMD boards as individual/group.

14	Capable of controlling and displaying multiple font types with flexible size and picture sizes suitable as per the size of the VMD.
15	Capable to continuously monitor the operation of the Variable Message Display board, implemented control commands and communicate information to the ICCV via communication network.
16	Configurable scheduler on date/day of week basis for transmitting pre-programmed message to any VMD unit.

Technical Specification for Variable Message Display (VMD)

#	Parameters	Minimum Specifications
1	Display Size (W x H)	2880 mm x 1600 mm
2	Pixel Pitch	Not less than 10mm (Only 10mm suitable for outdoor application)
3	LED/ SMD Configuration	RGB 3 in 1 SMD Luminance Class / Ratio: L3 as per IRC/ EN 12966 Viewing Angle: B6 as per IRC/ EN 12966
4	Pixel Density	Min 10000 pixels per sqm or higher
5	Half Gain Horizontal / Vertical Viewing Angle	H 140 deg / V 120 deg or better
6	Refresh Rate	>1920 Hz or better
7	Temp Range	- 10 Deg C to + 55 Deg C
8	Gray Scale Processing	15 Bit or better
9	Brightness (Calibrated)	5500 cd/m ² or better
10	Maximum Power Consumption	650 w/sqm or lower
11	Dimming Capability	256 levels
12	Power Input	100 ~ 240 VAC

13	Cabinet Dimensions Mounting arrangement Gantry Arrangement	3000 mm X 1720mm X 150mm ± 100mm
14	Contrast Ratio	2000:1 or better
15	Access For Maintenance	Rear with walkaway provision in the gantry.
16	IP Level	Front IP65 / Rear IP54
17	LED package	LED chip should be from any of these OEM OSRAM / EVERLIGHT / EQUIVALENT

18	International Safety Certifications (Mandatory to submit along with the bid)	BIS Registration (Bureau of Indian Standards) of Indian factory for this item.
19	The OEM should be an Indian-registered company with a minimum of ten (10) years of incorporation prior to the bid submission date and must have at least ten (10) years of proven experience in the field of Variable Message Displays (VMD). The OEM must have successfully executed at least two (2) VMD projects within India in last 10 years, including at least one project involving a single order of minimum forty (40) VMD locations for any State or Central Government organization, having a display area of no less than 2800 mm x 1200 mm, or a comparable size as specified in the tender requirements.	
20	Key Certifications: The OEM shall have the following Certifications valid at the time of Bidding: • ISO 9001:2008 / ISO 9001:2015 • CMMI Level 3 • BIS as per IS 13252(Part 1):2010/ IEC 60950-1: 2005 • EN12699--1:2005+A1:2009	

31.48 24U Outdoor Cabinet/JB

24U Junction Box	
SN	Minimum Specification
1	All the junction boxes shall be outdoor type with IP55 protection from rain, water. Provision for theft prevention.
2	JB made from CRCA Powder Coated with 70-120 microns. Steel Welded Construction and Vandal Proof Design
3	Thickness ranges from 1.2mm to 1.5mm 24U JB

4	Should be outdoor type, Floor mounting with 3-point locking option, suitable to mount the switches and required UPS. The opening lever/handles shall be made of metal. Each Cabinet will be mounted on a raised height concrete Plinth, 300 - 600 mm high, as per site requirements.
5	The cabinet will be provided with a dimension of Min 800 mmW x 1200mmH (24UH) x 800mmD or as per Solution with 19" mounting arrangement suitable for the mounting of the associated network, power, UPS and Split Battery components securely and safely within the cabinet.
6	The junction box shall have floor mount type with required mounting accessories to provide a flexible solution for space constrained traffic applications.
7	Power Distribution Unit – Vertically Mounted, 16 AMPs with 12 Power Outputs of 5/15Amp sockets. Electronically controlled circuits for Surge & Spike protection, LED readout for the total current being drawn from the channel, 16AMPS MCB. 2 x 230V AC Fans with 100% Duty Cycle to provide ventilation to cool the equipment.

8	Rain Canopy, Cable entry with glands, proper earthing and Fans/any other accessories as required for operation of equipment within junction box Proper Locking arrangement should be provided. Opening lever/handles should be made of metal.
9	Painting: 7 tank process with PP Powder Coating. Colour - RAL7035, Powder coating thickness between 70-to-120-micron finish
10	Stickers depicting the authority Logo and details as provided by authority.
11	The OEM is compliance to Regulatory Standards such as ISO 9001:2015, 14001:2015 & 45001:2015 & UL Certifications

31.49 9U Pole Mount Junction Box

9U Field Junction Box		
#	Parameters	Minimum Specifications
1	Cabinet Material & Construction	JB made from CRCA Powder Coated with 70-120 microns. Steel Welded Construction and Vandal Proof Design
2	Size	9U min 600 mm x 600mm (DxW) or as per Solution
3	Material Thickness	Thickness ranges from 1.2mm to 1.5mm. 9 U JB with load bearing capacity of Min 35 kgs
4	Number of Locks	High quality compression lock must be available.
5	Protection	IP 55, Junction Box design should ensure to keep the temperature within suitable operating range for equipment's and should also avoid intentional water splash and dust intake. Offered item shall be certified for IP55. This is applicable for across the RFP for Field Junction Boxes.
6	Mounting	On Camera Pole / Ground mounted on concrete base
7	Form Factor	Rack Mount/DIN Rail/Floor mount

8	Other Features	Rain Canopy, Cable entry with glands, proper earthing and Fans/any other accessories as required for operation of equipment within junction box
9	Locking Arrangement	Proper Locking arrangement should be provided. Opening lever/handles should be made of metal.
10	Certificate	The OEM should have a manufacturing Unit along with the ISO 9001:2015, 14001:2015 & 45001:2015 & UL Certifications

31.50 Local Processing Unit (LPU) Specifications

31.50.1 LPU Type-1

Minimum Specification for Industrial Grade LPU Type-1			
#	Parameters		Minimum Specifications
1	System	Processor	Intel® Core™ i9 12th Generation Processor
		Chipset	Intel® H610E
		Graphics	OpenGL up to 5.0, DirectX 11, OpenCL 2.1 HW Decode: HEVC/H.265, H.264, M/JPEG, MPEG2, VC1/WMV9, VP8 (8-bit), VP9 (10-bit) HW Encode: HEVC/H.265, M/JPEG, MPEG2, VP8
		Memory	DDR4 3200MHz SODIMM up to 64GB LPU to be Populated with Min. 16 GB RAM from Day 1.
2	I/O Interface	Ethernet	4 x Intel® I225IT PCIe with TSN (10/100/1000Mbps)
		USB	4x USB 3.1 Gen1 ports 2x USB2.0 ports
		Video Port	Three Independent Displays 1 VGA + 2 HDMI/DP++ (auto detection)
		Serial Port	4 x RS-232/422/485 (DB-9) 2x RS-232 ports
		DIO	8 Bit DIO (DB-9)
3	Storage	SATA SSD	2 x 2.5" SATA 3.0 Drive Bay RAID Support LPU to be Populated with Min. 1 TB SSD from Day 1.
		m.2 Slot	1 x M.2 2280 M key (PCIe x4 NVMe/SATA)
		Wi-Fi	1 x M.2 2230 E key (PCIe/USB 2.0)

4	Communication interface	4G LTE/ 5G Module	1 x M.2 3042/3052 B key (PCIe) with 5G Communication support (Module to be Supplied if required)
5	Audio	Audio Codec	Realtek ALC888 1 x Line-out , 1 x Mic-in
6	Upgradation	Firmware Update	Out of band Management facility for future upgradation of the Firmware and Software
7	Power	Type	Wide Range 9~36VDC
		Connector	3-pole terminal nlock 3-pin power extension switch connector
8	Environmental	Operating Temperature	Wide-Temperature Operating temperature: -20 to 70°C
		Construction	Metal + Aluminum
		Humidity	5%~90% , non-condensing
		Vibration	IEC68-2-64
		Shock	Half sine wave 3G, 11ms, 3 shock per axis
		Certificate	CE, FCC Class A, RoHS, BIS,

31.50.2 LPU Type-2

Minimum Specification for Industrial Grade LPU Type-2			
#	Parameters		Minimum Specifications
1	System	Processor	Intel® Core™ i7-9700 /8C/8T
		Chipset	Intel® H310 platform controller hub
		Graphics	Intel® HD Graphics (OpenGL up to 5.0, DirectX 11, OpenCL 2.1)
		Memory	Up to 64GB DDR4 LPU to be Populated with Min. 16 GB RAM from Day 1.
		Ethernet	4x Gigabit Ethernet ports by Intel I210-IT

2	I/O Interface	USB	4x USB 3.1 Gen1 ports 2x USB2.0 ports
		Video Port	1x VGA connector 1x HDMI/DP connector (Auto Detection)
		Serial Port	4 x RS-232/422/485 (DB-9) 2x RS-232 ports
		DIO	8 Bit DIO (DB-9)
3	Storage	SATA SSD	2 x 2.5" SATA 3.0 Drive Bay RAID Support LPU to be Populated with Min. 1 TB SSD from Day 1.
		m.2 Slot	1 x M.2 2280 M key (SATA)
4	Communication interface	Wi-Fi 4G LTE/ 5G Module	1 x M.2 2230 E key (PCIe/USB 2.0) 1 x M.2 3042/3052 B key (PCIe)

5	Audio	1 x Line-out 1 x Mic-in	
6	Power	Type	Wide Range 9~36VDc
		Connector	3-pole terminal nlock 3-pin power extension switch connector
7	Environmental	Operating Temperature	Minus 20°C to 70°C fanless operation
		Construction	Metal + Aluminium
		Humidity	5%~90% , non-condensing
		Vibration	IEC68-2-64
		Shock	Half sine wave 3G, 11ms, 3 shock per axis
		Certificate	CE, FCC Class A, RoHS, BIS

31.51 UPS 2 KVA with 60 min battery backup

Technical Specification of 2 KVA Online UPS with 60 minutes Battery Backup		
#	Parameter	Minimum Specification
AC Input		
1	Rating	2 KVA
2	Voltage	160 V – 270 V
3	Frequency	45 Hz - 55Hz
4	Phase	Single
5	Input Power Factor	0.99
AC Output		
6	Technology	High Frequency PWM with IGBT
7	Output Voltage	230V AC Single Phase
8	Voltage Regulation	± 1%
9	Frequency	50Hz ± 0.1Hz

10	Waveform	Pure Sine wave
11	Harmonic Distortion	<2% (Linear load), <3% (Non – linear load)
12	Efficiency (AC-AC)	>92%
13	Power Factor	$\phi = 0.8$
14	Overload	110 % for 10 min, 120% for 1 min
15	Crest Factor	03:01
16	Backup Time	60 minutes through minimum 3024 VAH or more
17	Battery Type	SMF Batteries with self-standing Cabinet
DC Voltage		

Technical Specification of 2 KVA Online UPS with 60 minutes Battery Backup		
#	Parameter	Minimum Specification
18	System Voltage	72 Volt
Protection		
19	Overcharging	Cut–Off feature available
20	Deep Discharge	Cut–Off feature available
21	Surge Protection	Advanced Electronics protection for device safety backed with fast acting fuses, Short Circuit protection etc.
General		
22	Monitoring (optional)	SNMP Interface.
23	Operating Temperature	0 – 45 °C
24	Indications	Mains On, Inverter On/Faulty, Battery level, Bypass
25	Bypass	Provided.
26	Display	LCD for input & output voltage, input & output frequency, Battery voltage, Battery level bar graph, Load level bar graph, Load %, Fault Code, Self-test, Temperature, etc.
27	Battery Stand	Powder coated rust & corrosion-free battery stand
OEM Certification & Criteria		
28	OEM Certification	ISO 9001, ISO 14001, ISO 45001, ISO 50001, ISO / IEC 14025:2016 & EPR certification as per notification from Central Pollution Control Board (CPCB) under MoEFCC, Govt. of India.
		OEM must have deputed minimum one Service Engineers in all 38 Districts of Bihar and at least one Service Centers in all 9 Commissionaires / Division of the state, to provide prompt service support.

29	OEM Criteria	(HR certificate on company's letterhead stating with Engineers Name, Qualification, Contact Number, Deployed District Name and Number of years on OEM Pay-role and documentary evidence along with complete addresses of Service Centers should be enclosed along with the bid document. Must have experience for supply & installation of minimum 2 KVA or higher rating of Online UPS within PAN Bihar state in a Single Government project during the past Seven (07) years or more. Bidder should enclose the Work Order and installation or Work Completion certificates along with the bid document. The OEM should have the presence in India from during past 10 years. Incorporation Certificate should be attached.
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31.52 UPS 3 KVA with 60 min battery backup

Technical Specification of 3 KVA Online UPS with 60 minutes Battery Backup		
#	Parameter	Minimum Specification
AC Input		
1	Rating	3 KVA
2	Voltage	160 V – 270 V
3	Frequency	45 Hz - 55Hz
4	Phase	Single
5	Input Power Factor	0.99
AC Output		
6	Technology	High Frequency PWM with IGBT
7	Output Voltage	230V AC Single Phase
8	Voltage Regulation	± 1%
9	Frequency	50Hz ± 0.1Hz
10	Waveform	Pure Sine wave
11	Harmonic Distortion	<2% (Linear load), <3% (Non – linear load)
12	Efficiency (AC-AC)	>92%
13	Power Factor	Ø =0.8
14	Overload	110 % for 10 min, 120% for 1 min
15	Crest Factor	03:01
16	Backup Time	60 minutes through minimum 4680 VAH or more
17	Battery Type	12V SMF Batteries with self-standing Cabinet
DC Voltage		
18	System Voltage	72 Volt
Protection		
19	Overcharging	Cut–Off feature available
20	Deep Discharge	Cut–Off feature available

21	Surge Protection	Advanced Electronics protection for device safety backed with, fast acting fuses, Short Circuit protection etc.
General		
22	Monitoring (optional)	SNMP Interface
23	Operating Temperature	0 – 45 °C
24	Indications	Mains On, Inverter On/Faulty, Battery level, Bypass
25	Bypass	Provided
26	Display	LCD for input & output voltage, input & output frequency, Battery voltage, Battery level bar graph, Load level bar graph, Load %, Fault Code, Self-test, Temperature, etc.
27	Battery stand	Powder coated rust & corrosion-free Battery stand
OEM Certification & Criteria		

Technical Specification of 3 KVA Online UPS with 60 minutes Battery Backup		
#	Parameter	Minimum Specification
28	OEM Certification	ISO 9001, ISO 14001, ISO 45001, ISO 50001, ISO / IEC 14025:2016 & EPR certification as per notification from Central Pollution Control Board (CPCB) under MoEFCC, Govt. of India.
29	OEM Criteria	OEM must have deputed minimum one Service Engineers in all 38 Districts of Bihar and at least one Service Centers in all 9 Commissionaires / Division of the state, to provide prompt service support.
		(HR certificate on company's letterhead stating with Engineers Name, Qualification, Contact Number, Deployed District Name and Number of years on OEM Pay-role and documentary evidence along with complete addresses of Service Centers should be enclosed along with the bid document.
		Must have experience for supply & installation of minimum 3 KVA or higher rating of Online UPS within PAN Bihar state in a Single Government project during the past Seven (07) years or more. Bidder should enclose the Work Order and installation or Work Completion certificates along with the bid document.
		The OEM should have the presence in India from during past 10 years. Incorporation Certificate should be attached.

31.53 Passive Infra (OFC/Ethernet/Power Cabling & Accessories) Specifications

31.53.1 Armored Twisted Pair Category 6 Cable

Technical Specification for Armoured Twisted Pair Category 6 Cable	
#	Minimum Specifications
1	4 Pair Cable with integral cross -member pair separator for uniform characteristic impedance.
2	Category 6 Unshielded Twisted 4 Pair cable shall be compliant with ANSI/TIA-568-C.2, ISO/IEC 11801 Class E. Transmission Performance Specification for Category 6 Cabling at 250Mhz shall be mentioned on datasheet.
3	Category 6 U/UTP armoured cable shall meet CAT6 specifications upto min 70 mtr under indoor / outdoor environment.
4	Conductor: 23 AWG Solid bare copper
5	Insulator High Density Polyethylene/Polyolefin
6	Aarmor: ECCS tape Aarmor of min 0.125mm thickness
7	Outer jacket material: Polyethylene with UV protection
8	Outer jacket thickness: min 1.3mm or higher
9	Cable OD: 10.0 +/- 1mm
10	Operation Temperature: -20°C to +70°C
11	Shall be ROHS compliant
12	Performance specification @250Mhz (to be mentioned on spec sheet): Insertion loss: <36.0dB; NEXT: >33.0dB; PSNEXT: >30.0dB; Return Loss: $\geq$ 8.0dB; ACR-F: >15.0 dB
13	Shall have rip cord beneath outer jacket
14	It is advisable that Manufacturer should have RCDD certified technical manpower on-role based in India for design audit and Training .

31.53.2 24 Port UTP Patch/Jack Panel

Technical Specification for 24 Port UTP Patch/Jack Panel	
#	Minimum Specification

1	Category 6 Patch Panel should be 24 Port modular Patch panel loaded with 24 nos of CAT6 modular jacks
2	Mounts in standard 19 inch racks, 1U
3	Patch panel should have rear cable manager for improvement management.
4	Each port shall have cable strain relief and bend limiting boot mechanism for secured termination
5	Material: UL 94V-0 rated flame retardant thermoplastic jack housing, powder coated steel material body.
6	Current rating: 1.5A; min insulation resistance: 500 mOhm
7	Dielectric withstand voltage 1500 Vac
8	Safety Voltage rating: 150 Vac
9	Should be UL listed and RoHS complied
10	Patch Panel should comply with TIA/EIA-568-C.2 and ISO 11801 Class E component specifications.
11	Should support IEEE 802.3bt Type 4 (90 W) application upto 3000 plug to jack mating cycles
12	Ports must be certified for IEC 60603-7 compliant plug performance.
13	Operating temperature should be up to 60° Celsius.
14	Shall be certified for Zero BER transmission performance as per IEEE 802.3 for 1000BASE-T applications.
15	Manufacturer must have ISO 9000 certified manufacturing unit in India, functioning for min. 10 years.
16	Shall comply to IEC 60512-99-002 for unmating under electrical load.
17	Shall support termination of all 4 pairs on a single port in single impact, using special tool to minimize damage and installer dependency.
18	Min re-termination support on each port 200 cycles.

31.53.3 U/UTP Category 6 Patch Cord

Technical Specification for Unshielded Twisted Pair Category 6 Patch Cord

#	Minimum Specification
1	CAT6 UTP RJ45 Patch Cord complying to ANSI/TIA 568.2-D, ISO/IEC 11801 and IEEE 802.3bt (Type 4)
2	Shall be constructed with slim boots for plug protection
3	Cable shield: U/UTP
4	Number of conductors: 8
5	Stranding: 24 AWG, multi- strands.
6	Cable jacket characteristics: LSZH IEC 60332-3 compliant
7	Shall be UL 1863 listed
8	Color code for Patch Cord: Red/ Blue / Green /Gray/Yellow
9	EN 50575 compliant with min Dca or higher rating
10	Temperature range should support upto Celsius to 60° Celsius.
11	Shall support 92% relative humidity (non condensing)
12	Shall be Intertek 4 connector channel certified for 100m TIA 568 CAT6 performance

31.53.4 UTP Cat 6 Cable

Technical Specification for UTP Category 6 Cable	
#	Minimum Specifications
1	Unshielded Twisted Pair, Category 6 cable, 4 pair with cross filler, compliant to ANSI/TIA 568.2-D, IEEE 802.3bt & ISO/IEC 11801 Class E.
2	23 AWG Solid bare copper
3	Insulation material Polyolefin
4	LSZH jacket complying to: Fire rating IEC 60332-3-22; Acid gas IEC 60754-2; Smoke density IEC 61034-2. 3rd party test report to be submitted for all above standards with bid.
5	Pair separator of Cross-member (x) fluted Spline.
6	Intertek 4 connector channel certified for upto 600Mhz, for 100mtr channel.

7	Transmission tested for Zero BER performance to the requirements of IEEE 802.3 for 1000BASE-T protocol.
8	Shall be certified by Intertek for 4 connector channel compliance as per ANSI/TIA 568-C.2 for CAT6, under Short channel ($\leq 15\text{m}$) configuration. (Intertek lab Reports to be submitted with bid.)
9	Performance spec upto 600 MHz to be mentioned on datasheet;
10	Shall comply to the requirements of IEEE 802.3bt (Type 4) for the safe delivery of power over LAN cable
11	Available in Box of 305 meters
12	Cable OD 5.9mm +/- 0.2 mm
13	Delay Skew: 45ns @ 100Mhz
14	Impedance: 100 Ohms + / - 15 ohms, 1 to 600 MHz.
15	Mutual capacitance: 5.6 NF MAX /100 Mtr.
16	Max DC resistance: 7.61 ohms/100 m
17	Safety Voltage rating: 300 V
18	Shall be ROHS Compliant
19	OEM offered must be registered and operating in India for more than at-least 10 years
20	Cable must be ETL verified for ANSI/TIA 568-C.2 and ISO/IEC 11801. Report to be submitted.
21	All passive cabling components must be from any single OEM.

31.53.5 Outdoor Armored Optical Fiber Cable

Minimum Specification for Outdoor Armoured Optical Fiber Cable	
#	Minimum Specification
1	12 cores Single mode, Armored loose-tube, ECCS armor (0.15mm), Gel Free 9/125, ICEA S- 87-640, Telcordia's GR-20 and ITU-T 652.D OS2 Compliance @1310nm $\leq$

	0.34 dB/Km. @1386nm<0.31 dB/KM @1550nm < = 0.22 dB/Km or better.
2	The fiber should be optimized for operation at 1310 nm and at 1550 nm and the water peak wavelengths (1380-1386nm) for low loss uniform performance across Single mode spectrum
3	Should fulfill the requirements of ITU-T G.652D type OS2, G.657.A1, IEC 60794/60794-1-2
4	Fiber protection (Tubes): Multitube 4 / 6 Core Each Tube
5	Armoring: ECCS Tape/Corrugated Steel Tape Armor of min 0.15 mm thickness
6	Outer Sheath: UV proof HDPE (1.5 mm Nominal Thickness) or better
7	Central Strength Member: FRP Non-Metallic
8	Water Blocking: Dry water blocking loose tube
9	Cable Diameter (D): 12.0 mm $\pm$ 0.3 mm or better
10	Mass (Nominal): 110 $\pm$ 10%kg/km or better
11	Min. Bending Radius (during Installation): 15 D; D-Outer Diameter
12	Min. Bending Radius (during service): 10 D; D-Outer Diameter
13	Max. Tensile Strength-Max: 2700 N or better
14	Max. Crush Resistance-: 44N/mm or better
15	Impact strength: 3.0N-M
16	Cable shall have min 2 rip cords beneath outer jacket
17	Operating Temperature range: -40°C to +70°C or as per industrial standard
18	Manufacturer shall have ISO 9001, 14001 and 45001 certified manufacturing facility in India for development of LAN & WAN equipment.

31.53.6 Optical Fiber Patch Cord

Minimum Specifications for Optical Fiber Armoured Patch Cord	
#	Minimum Specifications
1	LC/UPC to LC/UPC or SC/UPC Duplex Armoured Fiber Optic Patch Cord, G.657A1 Bend insensitive Single mode.
2	Cord constructed with aramid yarns strength member.
3	Shall have stainless steel flexible spiral armouring.
4	Outer sheath LSZH with UV protection
5	Tensile rating up to 500N or better
6	Crush resistance 3500 N/100mm or better
7	Connector body: Blue colour connector
8	Fiber identification: Dual coloured boot for easy identification.
9	Insertion Loss < 0.30 dB
10	Return Loss > 50 dB

31.53.7 LIU- 24 Port Fully Loaded

Technical Specification for Fiber Rack Mount LIU- 24 Port Fully Loaded		
#	Parameter	Minimum Specification
1	Fiber	Should be fully loaded and factory fitted Fiber drawer 1U rack mount unit for storing and terminating incoming fibre cable. Fiber LIU Shelf shall be fully loaded, and factory fitted with all adapters, pigtails, splice trays and accessories for fast and hassle free installation at site.
2		Shall have mechanism within system to accommodate excess fibre cordage behind the trough adapters and maintain fibre bend

	Management Shelf	radius
3		Management rings within system to accommodate excess fibre cordage behind the trough adapters and maintain fibre bend radius
4		Sliding drawer for ease of reconfiguring fibres with locking option
5		Rugged steel /CRCA Sheet material of min 1.6mm finished with powder coating
6		Accommodates 2 x 12 fibre Splice Trays
7	Rack Hight	1U standard 19" rack mount
8	Optical Fiber Adapter Plates Loaded	12 Port LC Fiber SM Plate or as per requirement
9	No of Adapter Plate Required	As per Requirement
10	Pigtail	LC/SC, Single mode, 9/125 µm as per requirement pre-loaded in Shelf
11	No of Pigtail Required	As per Requirement
12	Depth of Shelf	Min 320mm for storage of fibre slack / buffer tubes within shelf maintaining bend radius.
13	Cable termination	Shall have pre-installed grounding lugs 2 nos for safe installation of metallic armoured cables.

31.53.8 Outdoor Fiber Termination enclosure

Minimum Specification for Outdoor Fiber Termination enclosure	
#	Minimum Specification

1	Outdoor Wall / pole mountable fibre splicing closure, suitable for distribution and drop fibre in FTTX networks.
2	Shall be supplied loaded with 6F / 12 LC SM adapters or better, pigtails and splice trays.
3	Dimension: L x W x H: 250 x 210 x 70
4	Anti UV and IP 65 rated for suitable installation in outdoor environment
5	All cable ports and door openings to be securely sealed using rubber seals.
6	Wall mount or pole mountable. Wall mounting kits to be included in supply.
7	Shall have multiple cable entry ports for cables ranging from 3mm – 13mm.
8	Shall have splicing capacity of up to 12 fibres or better
9	Storage space for 1.5m pass through cable.
10	Accommodate up to 12 standard LC adapters or better
11	Operating Temp: -10 °C to + 65 °C
12	ABS grade plastic material.
13	Shall have front door with lock

31.53.9 Outdoor Fiber Joint closure

Minimum Specification for Outdoor Fiber Joint closure	
#	Minimum Specification
1	Fiber Optic Joint closure shall be of single ended environmentally sealed enclosure for fiber management in the outside plant network
2	Shall be available for 12 fiber / 24 fiber / 48 fiber splice options.
3	Base and dome to be sealed with a clamp and O-ring system.
4	The sealing agent must be of re-usable mechanical type. Heat shrink type is not accepted.

Minimum Specification for Outdoor Fiber Joint closure	
5	Multiple cable inlet options from upto 4 round cable ports and at least 1 oval port shall be provided
6	Splice trays to be hinged for access to any splice without disturbing other trays
7	Closure shall be compatible with most common cable types: e.g. loose tube, central core, slotted core, ribbon fibre
8	Cable OD support: 8mm to 20mm
9	Shall be from the same OEM as of the fibre cables.
10	The closure shall be suitable for usage in aerial, pedestal and underground environments.
11	Shall be IP 68 rated for outdoor usages.
12	Atmospheric pressure upto 105 Kpa
13	Operating Temperature upto 65 Deg C
14	UV protected for outdoor usage
15	Must be ROHS / ELV compliant

31.53.10 HDPE-50 mm Conduit

Minimum Specification for HDPE-50 mm Conduit	
#	Minimum Specification
1	Should be Heat/Flame resistant durable and chemical resistant mechanically protective Conduit Pipe with required accessories (couplers etc.) for underground/wall mount cable laying. The conduit shall be laid along the length of cable & shall be glands at both ends. Supply of necessary Glands, couplers, etc. shall be part of bidder's scope.
2	Diameter:50 mm outer diameter (OD)

3	Strength: 10 Kg/cm ² or better
4	Wall Thickness: 4.0±0.3
5	Weight - 150gm, Strength - 10Kg/cm ² or better
6	Must be TSEC Certified, and certificate need to be submitted

31.53.11 3-Corex 2.5 Sq mm Power Cable

Minimum Specification for Power Cable : 3-Corex 2.5 Sq mm	
#	Minimum Specification
1	3-Core, 2.5 Sq mm, with annealed electrolytic multistrand copper conductor with resistance > less than 41 Ohm/Km; Fire retardant, low smoke, low toxic, PVC black outer sheath meeting BS-5308, insulated (min 0.3 mm inner+1.8 mm outer sheath) Rated for 1.1KV,
2	For Outdoor: GI round wire Armored with galvanized steel wire with 90%+ coverage; IS 694:1990 reaffirmed 1995 or latest compliant. Cable drum lengths shall be adequately considered to minimize joints. er Cable sizes (if required) to meet the distance/er current consumption requirements (from sources up to 500 Mtrs away) shall be considered by the bidder instead of the 2.5 sq.mm cables indicated, at no extra cost to customer.
3	Shall prevent moisture ingress even due to outer sheath damage / poorly sealed joints.
4	Cable shall be suitable for direct burial also. Cable shall have its running meter stamped/marked every 1 Mtr (to be resistant to damages caused by cable pulling activities). UV resistant outer insulation of Black color or as per industrial standard.

31.54 Vehicle Mounted Camera System

31.54.1 Vehicle Mounted: 2MP IP PTZ Camera

Outdoor IP 2 MP or better Mobile PTZ Camera Specifications:		
#	Parameters	Minimum Specifications
1	Type of Camera	Mobile PTZ Camera
2	Image Sensor	1/2.8" or better progressive Scan CMOS
3	Signal System	PAL/NTSC
4	Resolution & frame rate	1920(H) x 1080(V)@25/30 fps or better
5	Minimum Illumination	Color:0.005Lux/F1.6(Color), B/W:0Lux/F1.6
6	Imaging	1/1 ~ 1/30,000s, Auto Gain Control , White Balance-Auto, Back Light Compensation, HLC, Defog,

		Day/Night: IR Cut Filter and EIS features.
7	Signal to Noise Ratio	> 50 dB or more
8	Lens Type & Focus	4.5mm ~ 135mm Motorized lens, Vari Focal
9	Angle of View	H: 60°~2.4 or better
10	Day & Night	True Day & Night High Performance Mechanical IR cut filter with auto switch, IR Source- Inbuilt Smart IR LED's with effective distance upto 100 Mtr or better with the help of Integrated IR.
11	Video Compression (Minimum)	H.265, H.264H, H.264 or better
12	Wide Dynamic Range	WDR (120db or more)
13	Digital Noise Reduction	DNR (3D) On/Off
14	Video Streaming	Triple Stream Supported
15	Connectivity	1x LAN RJ-45 (10/100Base-T)
16	Pan Travel	360° endless, 0.1° ~ 90°/sec;
17	Tilt Travel	-20° ~ 90°, 0.1° ~60°/sec
18	Presets & Tour	Up to 256 Presets, 8Tour,
19	Optical Zoom	30X or better
20	Onboard Storage	Camera should support built-in Micro SD/SDHC/SDXC Card slot upto 128 GB. It should be supplied with minimum 128GB memory Card.
21	Network Protocol	IPv4/IPv6, HTTP, Qos, UPnP, ICMP, RTSP, RTP, SMTP, NTP, DNS, PPPOE, DDNS, FTP, ONVIF
22	User Support	Minimum 20 Users
23	VMS	Camera shall support open source VMS
24		ONVIF Profile S, G & T.

25	System Capability	CCTV Camera OEM should be fulltime member of ONVIF and quoted models should be listed on ONVIF official website (All the certifications & Credentials should be valid on the date of technical evaluation). The CCTV OEM should not be suspended/ blacklisted by ONVIF.
26	Power Input	Standard DC Jack
27	Power Requirement	12VDC/24 VAC
28	Power Consumption	Max 25 W with IR ON
29	Housing/ Enclosure	IP66 or better
30	Operating Condition	-30°C ~ 60°C / Less than 90% RH
31	Standards	BIS, CE, FCC, RoHS Certified

31.54.2 Mobile Network Video Recorder (MNVR) with 2 TB storage

4 Channels Mobile Network Video Recorder (NVR), Inbuilt GPS		
#	Parameters	Minimum Specifications
1	Main Processor	High-performance industrial Embedded microprocessor
2	Operating System & Interface	LINUX /windows 8 and above with WEB, AV, VGA, HDMI operation interface.
3	IP Camera Input	4 channels
4	Video Compression	H.265 or better
5	Audio Port & Compression	Audio In : 4 (with Built-in Mic camera)
		Audio Out : 1 aviation port for audio output, Compression : G.711A/G.711U/PCM

6	Record Mode	Auto, Manual, motion detection, schedule, alarm Record alarm > alarm > motion detection >
		schedule
7	OSD Overlay	Channel, time, GPS position, license plate
8	Built-In Video Analytics	Face capture, Face comparison, Motion Detection & Tampering.
9	Alarm input	9 channels (8 channels for alarm input, 1 channel for pulse speed measuring)
10	Alarm Output	1 channel
11	Alarm Types	It should have capacity to detect alarms : Motion detection, video tampering and loss, local alarm, camera offline, manual alarm, control and face blacklist, No HDD, HDD error, insufficient capacity, illegal login, ACC off, high temperature, rollover,
		battery low voltage, over speed, low speed, collision, tapid turn, rapid speedup, hard braking, low battery safety exception, network security exception
12	Backup Mode	HDD, USB flash drive and network backup
13	Internal Storage	It should support minimum 1x 2.5-inch HDD Slot upto 2TB and SD card support 256 GB
14	Ethernet	- 1 Ethernet RJ-45 Port (10/100Mbps) Port
		- 4 PoE Ethernet RJ-45 Port (10/100Mbps) Ports.
		- Total output power of PoE: 36 W

		- Max. output power of a single port: 25.4 W
15	Wireless Network	Built-in 3G/4G & built-in 2.4 G Wi-Fi modules
16	Inbuilt GPS Module	Mobile NVR should have inbuilt GPS for Live Real Tracking, Multiple Vehicle Tracking (Device Grouping)
17	Network Function	TCP/IP, UDP, DHCP, DDNS, FTP, Email, Alarm Server
18	Gyroscope	Its should have built-in Gyroscope to support event detection and alarm such as rollover, collision, rapid speedup/slowdown/turn etc.
19	USB	3 USB 2.0 (Front panel : 2 × USB 2.0
		Rear panel: 1 × USB 2.0 from EXTEND port)
20	Interface Ports	3 No x RS232, 2x RS485, 1x Pulse Count, 1x CAN Port
21	Display Ports	1x VGA, 1x AV OUT, 1x HDMI Ports

22	Power Supply	DC 6-36V with the built-in UPS (Enables system protection in normal power cut-off and in under voltage of vehicle battery.) and built-in fan cooling.
23	Power Consumption	10.2 W (without peripheral)
		Low power consumption: < 0.1W
24	Operating Temperature	-20°C ~ +70°C/10 ~ 90% RH
25	Certifications	CE, FCC, BIS

31.54.3 Multi-function Touch Display

Technical Specification for 7-inch Touch Display	
#	Minimum Specifications
1	Touch Screen Size: Min 7 Inch
2	Aspect Ratio 16:09
3	Brightness: Min 600 cd/m ²
4	Contrast ratio: Min 1000: 1
5	View Angle: Horizontal and Vertical 176 degree
6	Touch: Multi touch display (USB Interface)
7	I/O
	Audio: 1 x Line-in (Green)
	USB: 2 x USB 2.0 (1 x USB 2.0 OTG Port inside)
	Display: 1 x HDMI ,1 x DP,1 x VGA
	Power: 1 x DC Jack For DC 12V/24V
8	ENVIRONMENT
	Working Temperature: -30°C ~ 65°C
	Working Humidity: 10 ~ 90%
	MECHANISM

9	IP Rating: IP31
	Dimensions (W x H x D): 195 x 170 x 37 mm
10	STANDARDS AND CERTIFICATIONS
	Shock: Operational: G Value ≤ 10 g
	Vibration: Operational: Frequency 10 - 150Hz G Value 0 - 1 g ≤ 0.35 mm
	Certifications: CE/FCC Class B

31.54.4 1KVA UPS with 60 min Backup

Technical Specification of 1 KVA Online UPS with 60 minutes Battery Backup		
#	Parameter	Minimum Specification
AC Input		
1	Rating	1 KVA
2	Voltage	160 V – 270 V
3	Frequency	45 Hz - 55Hz
4	Phase	Single
5	Input Power Factor	0.99
AC Output		
6	Technology	High Frequency PWM with IGBT
7	Output Voltage	230V AC Single Phase
8	Voltage Regulation	± 1%
9	Frequency	50Hz ± 0.1Hz
10	Waveform	Pure Sine wave
11	Harmonic Distortion	<2% (Linear load), <3% (Non – linear load)
12	Efficiency (AC-AC)	>92%
13	Power Factor	Ø =0.8
14	Overload	110 % for 10 min, 120% for 1 min
15	Crest Factor	03:01
16	Backup Time	60 minutes
17	Battery Type	SMF Batteries with self-standing Cabinet
Protection		
18	Overcharging	Cut–Off feature available
19	Deep Discharge	Cut–Off feature available
20	Surge Protection	Advanced Electronics protection for device safety backed with fast acting fuses, Short Circuit protection etc.
General		
21	Monitoring (optional)	SNMP Interface.

22	Operating Temperature	0 – 45 °C
23	Indications	Mains On, Inverter On/Faulty, Battery level, Bypass
24	Bypass	Provided.
25	Display	LCD for input & output voltage, input & output frequency, Battery voltage, Battery level bar graph, Load level bar graph, Load %, Fault Code, Self-test, Temperature, etc.
26	Battery Stand	Powder coated rust & corrosion-free battery stand
OEM Certification & Criteria		
27	OEM Certification	ISO 9001, ISO 14001, ISO 45001, ISO 50001, ISO / IEC 14025:2016 & EPR certification as per notification from Central Pollution Control Board (CPCB) under MoEFCC, Govt. of India.
28	OEM Criteria	OEM must have deputed minimum one Service Engineers in all 38 Districts of Bihar and at least one Service Centers in all

Technical Specification of 1 KVA Online UPS with 60 minutes Battery Backup		
#	Parameter	Minimum Specification
		9 Commissionaires / Division of the state, to provide prompt service support.
		(HR certificate on company's letterhead stating with Engineers Name, Qualification, Contact Number, Deployed District Name and Number of years on OEM Pay-role and documentary evidence along with complete addresses of Service Centers should be enclosed along with the bid document.
		Must have experience for supply & installation of minimum 2 KVA or higher rating of Online UPS within PAN Bihar state in a Single Government project during the past Seven (07) years or more. Bidder should enclose the Work Order and installation or Work Completion certificates along with the bid document.
		The OEM should have the presence in India from during past 10 years. Incorporation Certificate should be attached.

31.55 Prefabricated Structure

Minimum Specification for Pre-Fabrication Requirements	
#	Minimum Specifications
1	General Requirements
2	Structure Type: Pre-fabricated modular construction, utilizing steel or

	reinforced concrete (depending on local regulations and environmental conditions).
3	The structure should allow for easy expansion by adding additional pre-fabricated modules (whether for office space, Data Centre equipment, or operational areas).
4	Dimensions: Customizable based on the specific needs of the ICC and Data Centre, allowing for flexibility in floor plans and expansion.
5	Foundation: Suitable foundation type based on soil conditions (e.g., slab-on-grade, pile foundations).
6	Design Life: Minimum 50 years for structural integrity, with regular maintenance schedules.
7	Seismic Considerations: Compliance with local seismic standards (where applicable), including vibration dampening systems for sensitive equipment.
8	Building Shape: Rectangular or modular for scalability and ease of expansion
9	denotes hysd reinforcement of grade fe:500 conforming to latest version of is:1786
10	All walls is min 100 Thick Puff Pannel (both side GI Sheet, inside PU Forms) or as per industrial standard.
11	Materials:
12	Frame: Steel or reinforced concrete (as per design loads and seismic considerations).
13	Cladding: Pre-painted metal panels, glass (for windows), or insulated panels (to ensure energy efficiency and safety).

Minimum Specification for Pre-Fabrication Requirements	
#	Minimum Specifications
14	Insulation: Thermally insulated panels for walls and roofing to minimize energy consumption and ensure stable internal temperatures.
15	Roofing: Steel or composite materials with water-resistant coatings and proper drainage systems to prevent water accumulation.
16	Flooring: Anti-static raised flooring system in Data Centre areas, solid and load-bearing floors in control/Server areas.
17	Floor Load Capacity:
18	Data Centre: 1,500 kg/sqm or higher (to support server racks and heavy equipment).\
	or as per industrial standard/solution
19	ICCC: Min 500 kg/sqm (for control room furniture and equipment) or as per industrial standard/solution
20	Roof Load Capacity: Designed to support HVAC units, antennas, solar panels, and other roof-mounted systems.
21	The Pre-fabricate Structure shall be inclusion of RCC (Reinforced Cement Concrete), AAC (Autoclaved Aerated Concrete), and PCC (Plain Cement Concrete) components (including deck slabs, pedestal footings, and the reinforcement specifications) requires detailed structural planning
22	Deck slabs: used for floors or ceilings, typically have a thickness between min 150 mm and 250 mm, depending on load and span. M25 or higher concrete grade is used for durability. Main reinforcement includes T12 or T16 bars at 150 mm to 200 mm centres, with secondary T8 or T10 bars. The top and bottom reinforcement may use 8 mm to 25 mm bars, especially in high-load areas like server racks in data centres or as per offered

	solution
23	Pedestal Footing (Pile Foundation) :Pedestal footings transfer load from columns to deeper soil, with depths ranging from 600 mm to 1000 mm and diameters from 600 mm to 800 mm. M25 or M30 grade concrete is used. Main reinforcement consists of 20 mm to 25 mm bars, with 8 mm to 12 mm stirrups at 150 mm to 200 mm centres. Larger bars (25 mm) are used in critical load-bearing areas or as per offered solution.
24	PCC for Foundation and Base Slab :PCC is used as a base layer for foundations and slabs, typically with M10 or M15 grade concrete. The thickness ranges from 100 mm to 150 mm, and no reinforcement is required or as per offered solution
25	Use of AAC Blocks :AAC blocks, used for non-load-bearing walls, range from 75 mm to 300 mm in thickness.
26	Reinforcement includes 8 mm to 12 mm bars for vertical and horizontal support, with 12 mm to 20 mm bars for lintels or load-bearing walls or as per offered solution .
27	Other Civil work
28	Civil Work
29	Brick Work (4"): Use of 4" thick bricks for partition walls and internal divisions, ensuring proper bonding and compliance with structural codes.
30	Civil Work - Plaster and Others: Application of cement-based or gypsum plaster on walls (10-15 mm) and ceilings (8-12 mm) for a smooth, durable finish, with proper surface preparation and curing.
31	TILE WORKS

Minimum Specification for Pre-Fabrication Requirements	
#	Minimum Specifications
32	Toilet Wall Tile (4 Nos): Installation of ceramic or vitrified tiles on toilet walls using tile adhesive or cement mortar, ensuring uniform grout joints (2-3 mm) for a seamless, waterproof finish.
33	Toilet Floor Tile (4 Nos): Anti-slip floor tiles installed with a minimum 2% slope for proper drainage, using appropriate adhesive.
34	Pantry Granite: Polished granite countertops (18-20 mm thick) for the pantry, with polished edges and proper sealing to prevent stains and ensure durability.
35	Pantry Wall Tile: Ceramic or vitrified wall tiles installed 600 mm above countertops to protect from splashes and stains, using cementitious adhesive.
36	Floor Tiles for Other Areas: High-quality ceramic, porcelain, or similar floor tiles for living areas, corridors, and offices, ensuring durability and easy maintenance.
37	Pantry Works
38	Wood Work: Fabrication of wooden cabinetry, shelves, and storage solutions with finishes like laminate, veneer, or solid wood.
39	Kitchen Sink & Tap: Installation of stainless steel or composite sink with mixer taps, properly sealed and connected to plumbing.
40	Wardrobe: Custom-designed wardrobes and shelves made from durable materials like engineered wood or MDF.
41	Doors: Installation of solid wood, engineered wood, or glass doors with necessary hardware.
42	Partition Gypsum: Lightweight gypsum board partitions mounted on metal studs, finished and painted/laminated.
43	Raised Flooring: Modular raised flooring systems to accommodate electrical wiring, HVAC, and plumbing, designed for easy access and load-bearing capacity.
44	Water Supply / Sanitary / Drainage Works

45	Plumbing Work in Toilet: Installation of CPVC or UPVC pipes for water supply and PVC pipes for waste drainage, ensuring proper slope, fittings, and isolation valves.
46	Sanitary Fittings - Labor Only: Labor charges for installing sanitary fixtures such as WC commodes, wash basins, urinals, and bidets, securely connected to the plumbing system.
47	Pantry Plumbing Includes Piping: Installation of cold and hot water supply pipes and drainage pipes for sinks and appliances, with concealed and insulated piping where possible.
48	Sanitary Fittings: Installation of standard-quality sanitary fixtures like faucets, showerheads, and taps with water-tight fittings and connections.
49	Pipes for Water Supply: Supply and installation of CPVC/UPVC pipes for water distribution throughout the building, with insulation for hot water pipes to prevent condensation.
50	Water Tank with Accessories: Installation of overhead or underground water tanks with necessary accessories such as float valves, overflows, and inlet/outlet pipes, sized according to water usage needs.
51	Waste Pipe with T-Traps: Installation of waste pipes with T-traps to prevent odors and ensure efficient drainage, using PVC or equivalent material with proper sealing and alignment.

G) Proposed Bill of Material

This only a indicative bill of material as provided for all 6 cities, however, RailTel shall receive PO for only 3 cities (likely Purnia, Darbhanga & Saharsa). Bidders to study the requirement accordingly.

Bihar 6 Cities Indicative Bill of Material									
#	Description	UOM	Gaya Qty	Chapra Qty	Munger Qty	Purnia Qty	Darbhanga Qty	Saharsa Qty	Total Qty for All Cities
	One Time Supply, Installation & Commissioning Services								
A	Command & Control Centre								
1	Video Wall Screen Cubes 55" Inch LED Backlit (4 x 4 pattern) - FHD	Set	1	1	1	1	1	1	6
2	Video Wall Controller along with Cabling & Other Fixtures	Nos.	1	1	1	1	1	1	6
3	LED TV (Professional Displays) 65 Inch	Nos.	3	3	3	3	3	3	18
4	Monitoring Workstations with Two Monitors for operator	Nos.	12	12	12	12	12	12	72
5	Desktop PC for officials	Nos.	5	5	5	5	5	5	30
6	Network Color Laser printer with scanner	Nos.	1	1	1	1	1	1	6
7	Indoor Fixed Dome/Bullet camera for Surveillance	Nos.	15	15	15	15	15	15	90
8	8 Port POE Switch to connect POE Enabled Devices	Nos.	3	3	3	3	3	3	18
9	Workstation Furniture and Fixtures	Nos	12	17	12	12	12	12	77
10	Ergonomic Chairs for Operators, Project Manager, Engineers and Conference Room etc.	Nos.	50	50	50	50	50	50	300
11	250 KVA Online UPS in Parallel Configuration (30min backup)	Set	1	1	1	1	1	1	6
12	EPABX System	Lot	1	1	1	1	1	1	6
13	IP Phone	Nos	25	25	25	25	25	25	150
14	Access Control System- Card Reader and Biometric	Nos	5	5	5	5	5	5	30
15	Fire and Smoke Detection and Alarm System for ICCC and NOC Room	Nos	40	40	40	40	40	40	240
16	Fire extinguisher - Gas suppression system	Lot	1	1	1	1	1	1	6
17	Air Conditioning - Cassette AC 4 Ton with controller	Nos.	10	10	10	10	10	10	60
18	Air Conditioning - Split 2 Ton	Nos.	15	15	15	15	15	15	90

B Application Software									
1	ICCC Application including integration	Lot	1	1	1	1	1	1	6
2	Video Management Software Licenses	Nos.	683	540	530	436	402	371	2962
3	Video Analytics	Nos.	171	119	128	94	90	84	686
4	Facial Recognition System	Nos.	30	30	40	32	20	35	187
5	ANPR System Software - Base Application	Lot	1	1	1	1	1	1	6
6	ANPR Licenses	Nos	58	50	43	50	42	39	282
7	RLVD System Software - Base Application	Lot	1	1	1	1	1	1	6
8	RLVD Licenses	Nos	56	44	34	36	48	26	244
9	Integration with existing E-Challan application and Other Integrations of ITMS components	Lot	1	1	1	1	1	1	6
10	ATCS System	Lot	1	1	1	1	1	1	6
11	Public Addressing System with Emergency response	Lot	1	1	1	1	1	1	6
12	GIS System	Lot	1	1	1	1	1	1	6
13	Enterprise Management Systems (EMS)	Lot	1	1	1	1	1	1	6
14	Building Management System	Lot	1	1	1	1	1	1	6
15	Centralized Anti-virus Solution	Lot	1	1	1	1	1	1	6
C Network Operations Room (NOC)									
1	Core Router	Nos.	2	2	2	2	2	2	12
2	Core Switch	Nos.	2	2	2	2	2	2	12
3	48 Port Distribution/TOR Switch	Nos.	4	4	4	4	4	4	24
4	24 Port Layer 2 Switch	Nos.	3	3	3	3	3	3	18
5	SAN Switch	Nos.	2	2	2	2	2	2	12
6	Storage System of Min 750TB usable capacity	Nos.	1	1	1	1	1	1	6
7	Backup Solution	Nos.	1	1	1	1	1	1	6
8	WAN / Intranet Router	Nos.	2	2	2	2	2	2	12
9	Firewall with IPS for Intranet	Nos.	2	2	2	2	2	2	12
10	Firewall with IPS for Internet	Nos.	1	1	1	1	1	1	6
11	Server Load Balancer	Nos.	2	2	2	2	2	2	12
12	Network, Server & Storage rack- 42U Rack	Nos.	14	13	13	12	12	12	76
13	Non- GPU Servers for Application Software	Nos.	15	15	15	15	15	15	90

14	GPU Server for Analytics Application Software	Nos.	4	4	4	4	4	4	24
15	Operating system and DB licenses (As per Solution quoted for Servers)	Lot	1	1	1	1	1	1	6
16	Virtualization software as per Solution Design or Requirement	Lot	1	1	1	1	1	1	6
17	Precision AC for Server Room as per Design	Lot	1	1	1	1	1	1	6
18	Rodent Repellent System	Lot	1	1	1	1	1	1	6
19	Diesel Generator set (625 KVA)	Nos.	1	1	1	1	1	1	6
20	Gas Suppression System	Lot	1	1	1	1	1	1	6
21	VESDA	Lot	1	1	1	1	1	1	6
22	Water Leak Detection System	Lot	1	1	1	1	1	1	6
D	Field Infra for Surveillance/ITMS/ATCS								
1	I-Type Pole with 1m arm	Nos	238	188	193	154	125	118	1016
2	Canteliver Pole with 5m Arm	Nos	43	36	30	34	35	26	204
3	I-Type Pole for Traffic Light	Nos	56	44	34	36	40	26	236
4	Canteliver Pole for traffic light with 5m Arm	Nos	28	22	17	18	20	13	118
5	5 MP Bullet IP Camera with 128GB SD card	Nos	428	298	319	234	226	209	1714
6	5 MP PTZ Camera with 128GB SD card	Nos	96	83	83	70	55	49	436
7	4K UHD Camera with 128GB SD card	Nos	30	28	36	31	16	33	174
8	5 MP Box Camera with 128GB SD card	Nos	114	94	77	86	90	65	526
9	IR Illuminator	Nos	58	50	43	50	42	39	282
10	Radar Speed Display warning system with Infra	Nos	15	15	15	15	15	15	90
11	Variable Message Display board with Infra	Nos	10	10	10	10	10	10	60
12	24U Outdoor Cabinet	Nos	75	56	58	44	39	36	308
13	9U Pole Mount Rack	Nos	281	224	223	188	160	144	1220
14	08 Port Industrial Grade Switch with SFP	Nos	158	114	120	95	88	83	658
15	LPU Type-1	Nos	8	6	5	5	7	4	35
16	LPU Type-2	Nos	5	4	5	4	3	4	25
17	ATCS Controller with Rack	Nos	8	6	4	5	5	4	32
18	Countdown timer for Traffic Light	Nos	28	22	17	18	20	13	118

19	Traffic Light Aspects - RED with complete mounting accessories	Nos	84	66	51	54	60	39	354
20	Traffic Light Aspects - GREEN with complete mounting accessories	Nos	216	180	153	144	180	90	963
21	Traffic Light Aspects - AMBER with complete mounting accessories	Nos	84	66	51	54	60	39	354
22	Pedestrian lamp heads - Stop Man	Nos	56	44	34	36	40	26	236
23	Pedestrian lamp heads - Walk Man	Nos	56	44	34	36	40	26	236
24	Pedestrian Countdown Timer and Push Button	Nos	56	44	34	36	40	26	236
25	UPS 2 KVA with 60 min battery backup	Nos	62	46	49	35	29	28	249
26	UPS 3 KVA with 60 min battery backup	Nos	13	10	9	9	10	8	59
27	Lot comprising of Passive items including supply and installation of surge protector, media converter, injector, LIU, Patch Panel, HDPE, PVC, DWC, Flexible Pipes and Clamps etc., Optical Fiber cables, Cat 6 PoE Cable, Electrical cables of different sizes, Cable terminations etc. including all other items required for successful installation & commissioning of field Network and Cameras etc. at field locations.	Lot	75	56	58	44	39	36	308
28	Supply and installation of Maintenance free Earth, Lighting Arrestors etc. at Field locations.	Lot	75	56	58	44	39	36	308
29	Spare 2% of all Field Devices	Lot	1	1	1	1	1	1	6
E	Public Addressing System with Emergency response								
1	25 W IP Speaker with Builtin Amplifier	Nos	30	30	30	30	30	30	180
2	Emergency call button	Nos	10	10	10	10	10	10	60
3	Control desk basic terminal in ICC	Nos	1	1	1	1	1	1	6
F	Zonal Viewing Center (ZVC)								
1	65 Inch LED Display	Nos.	6	3	3	5	4	3	24
2	Work Station for Operators with single Monitor	Nos.	6	3	3	5	4	3	24
3	L2 Switch	Nos.	6	3	3	5	4	3	24

4	UPS 3 KVA with 60 min battery backup	Nos.	6	3	3	5	4	3	24
5	Air conditioner 2 Ton	Nos.	6	3	3	5	4	3	24
6	9U Rack	Nos.	6	3	3	5	4	3	24
7	Workstation Furniture and Fixtures with Ergonomic chair	Nos	6	3	3	5	4	3	24
G	Vehicle Mounted Camera System								
1	2MP IP PTZ Camera with complete vehicle mounting accessories for Vehicle Mounted Camera System.	Nos	10	10	10	10	10	10	60
2	MNVR with 2 TB storage for Vehicle Mounted Camera System.	Nos	10	10	10	10	10	10	60
3	1KVA UPS with 60 Min Backup for Vehicle Mounted Camera System.	Nos	10	10	10	10	10	10	60
4	7" Multi-function Touch Panel / Monitor for Vehicle Mounted Camera System.	Nos	10	10	10	10	10	10	60
5	Other Miscellaneous (CAT6/Fibre Patch Cords, Fixtures)	Nos	10	10	10	10	10	10	60
H	Site Preparation/ Pre-Fabrication Structure (including Civil, Electrical, Interior, furnishing etc) for NOC and ICCC- Total Area Approx 4000 Sqft.								
1	One time Site Preparation/ Pre-Fabrication (Civil/pre-Fabrication & Electrical) Cost for NOC room (approx size 1500 SFT) including complete site preparation/Pre-Fabrication of NOC inclusive but not limited to false flooring,Raise flooring, lighting fixture, electrical works, Masonry Works (RCC/ACC/Structural Beams) wall finishing (painting, whitewashing),Doors & window/Tiling etc.), Dismantling existing any structure of any material etc	Lot	1	1	1	1	1	1	6
2	Setting up of state of the art ICCC room (approx 2500 SFT) with required Furniture & Fixture, Civil/ Masonry/interior and structural components including false flooring, lighting fixture, electrical works, Water & Sanitary work and beautification of ICCC and high-quality interior finishes such as panels,	Lot	1	1	1	1	1	1	6

	partitioning, and a viewing gallery and other essential enhancements ensure a modern, functional, and aesthetically designed ICCC space								
3	EARTHING: Preparation of All Earth Pits, Necessary Repair, Testing earth resistivity and electrode resistance	Lot	1	1	1	1	1	1	6
I	Installation								
1	Installation & Commissioning of ICCC setup	Lot	1	1	1	1	1	1	6
2	Installation & Commissioning of NOC setup	Lot	1	1	1	1	1	1	6
3	Installation & Commissioning of Field Infra	Lot	1	1	1	1	1	1	6
4	Training and capacity building	Lot	1	1	1	1	1	1	6
	Operation & Maintenance Services								
J	Manpower for O&M for 5 Years								
1	Project Manager	Nos.	1	1	1	1	1	1	6
2	System Admin	Nos.	1	1	1	1	1	1	6
3	Network & Security Admin	Nos.	1	1	1	1	1	1	6
4	Application Engineer	Nos.	1	1	1	1	1	1	6
5	IT Support Engineer	Nos.	2	2	2	2	2	2	12
6	Field Engineer	Nos.	4	3	3	2	2	2	16
7	Field Technician	Nos.	8	6	6	4	4	4	32
8	Helpdesk Engineer	Nos	3	3	3	3	3	3	18
K	AMC for ICT Infrastructure for complete solution 5 years	Months	60	60	60	60	60	60	360
L	Network Connectivity Services for 5 years	Months	60	60	60	60	60	60	360

H) Make & Model List

The bidder has to quote for the following indicative Make & Model. However, RailTel reserves the right to change the Make/Model in case of change required by the customer at the time of project execution.

S.No	Description	UOM	HSN	Make	Model
Command & Control Centre					
1	Video Wall Screen Cubes 55" Inch LED Backlit (4 x 4 pattern) - FHD	Set	8528	LG	55VSM5J or Equivalent Series
2	Video Wall Controller along with Cabling & Other Fixtures	Nos.	8543	LG	Black-Box ST-VWP-410
3	LED TV (Professional Displays) 65 Inch	Nos.	8528	LG	65UR640S or Equivalent Series
4	Monitoring Workstations with Two Monitors for operator	Nos.	8471	HPi	Z2 Tower G9
5	Desktop PC for officials	Nos.	8471	HPi	Elite SFF 800
6	Network Color Laser printer with scanner	Nos.	8443	HPi	Color JaserJet Pro MFP 3303sdw
7	Indoor Fixed Dome/Bullet camera for Surveillance	Nos.	8525 8523	CP PLUS	CP-UNC-VE21ZL4C-VMDS-Q + CP-UM128C
8	8 Port POE Switch to connect POE Enabled Devices	Nos.	8517	CISCO	C9200CX-8P-2X2G-E
9	Workstation Furniture and Fixtures	Nos	9403	COSMOS	Series 13
10	Ergonomic Chairs for Operators, Project Manager, Engineers and Conference Room etc.	Nos.	9401	COSMOS	Fulkrum
11	250 KVA Online UPS in Parallel Configuration (30min backup)	Set	8504	PowerOne	PMM 50
12	EPABX System	Lot	8517	Neox	Neox SIP Gateway
13	IP Phone	Nos	8517	Neox	Neox N6 Audio IP Phone with Power Adapters
14	Access Control System- Card Reader and Biometric	Nos	8543	Union Community	AC 5000IK PLUS SC
15	Fire and Smoke Detection and Alarm System for ICCC and NOC Room	Nos	8531	Notofire	NF5109
16	Fire extinguisher - Gas suppression system	Lot	8424	Notofire	ETS Series
17	Air Conditioning - Cassette AC 4 Ton with controller	Nos.	8415	LG	ZTNQ48GMLH2 Or Series
18	Air Conditioning - Split 2 Ton	Nos.	8415	LG	US-Q24ENXE Or Series
Application Software					
19	ICCC Application including integration	Lot	9973	Nirasys	OMNIdash V3.2
20	Video Management Software Licenses	Nos.	9973	i2V Systems	Enterprise VMS
21	VMS Licenses	Nos.	9973	i2V Systems	Enterprise VMS
22	Video Analytics - Base License	Nos.	9973	i2V Systems	Enterprise AIVAS
23	Video Analytics - Licenses	Nos.	9973	i2V Systems	Enterprise AIVAS
24	Facial Recognition System - Base Application	Nos.	9973	i2V Systems	Enterprise FRS
25	FRS Licenses	Nos.	9973	i2V Systems	Enterprise FRS

26	ANPR System Software - Base Application	Nos.	9973	i2V Systems	Enterprise ITMS
27	ANPR Licenses	Nos.	9973	i2V Systems	Enterprise ITMS
28	RLVD System Software - Base Application	Nos.	9973	i2V Systems	Enterprise ITMS
29	RLVD Licenses	Nos.	9973	i2V Systems	Enterprise ITMS
30	Integration with existing E-Challan application and Other Integrations of ITMS components	Lot	9973	i2V Systems	Enterprise ITMS
31	ATCS Application Software	Lot	8523	Amnex	SYNCNEX Live
32	Public Addressing System with Emergency response - Base Application Software	Nos.	8473	Roxwell	SIP Server-RXW-SIP80PBX with Application software for PA and ECB
33	Public Addressing System with Emergency response - License	Nos.		Roxwell	
34	GIS System Software	Lot	8523	Amnex	Spectator
35	Enterprise Management Systems (EMS)	Lot	9983	Everest	Infraon
36	Building Management System	Lot	9983	Netix-AI	UniView Supra
37	Centralized Anti-virus Solution	Lot	8523	Quickheal	SEQRITE ENTERPRISE SUITE (5 YEARS)
Network Operations Room (NOC)					
38	Core Router	Nos.	8517	Cisco	NCS 5504
39	Core Switch	Nos.	8517	Cisco	N9K-C9504
40	48 Port Distribution/TOR Switch	Nos.	8517	Cisco	N9K-C93180YC-FX3
41	24 Port Layer 2 Switch	Nos.	8517	Cisco	C9200L-24P-4X-E
42	SAN Switch	Nos.	8517	Cisco	DS-C9148V-24PITK9
43	Storage System capacity	TB	8471	NetApp	FAS 2820
44	Backup Solution	Nos.	8523	Commvault	COMMVAULT-BR-NVF-FETB,CV-TS-FT
45	WAN / Intranet Router	Nos.	8517	Cisco	NCS 5504
46	Firewall with IPS for Intranet	Nos.	8517	Cisco	FPR3130
47	Firewall with IPS for Internet	Nos.	8517	Cisco	FPR3110
48	Server Load Balancer	Nos.	8517	Haltdos	HD-CAN-6200
49	Network, Server & Storage rack- 42U Rack	Nos.	8517	Manifold	MeCL/25-26/MSSS/42U/009
50	Non- GPU Servers for Application Software	Nos.	8471	HPE	HPE Proliant DL380 Gen11
51	GPU Server for Analytics Application Software	Nos.	8471	HPE	HPE Proliant DL380 Gen11
52	Operating system and DB licenses (As per Solution quoted for Servers)	Lot	8523	As per OEM	NA
53	Virtualization software	CPU	9984	HPE	HPE Morpheus VM Essentials
54	Precision AC for Server Room as per Design	Nos.	8415	Stulz	SEC 692 A
55	Rodent Repellent System	Lot	8531	J3	VHFO V2
56	Diesel Generator set (625 KVA)	Nos.	8502	Kirloskar	KG4-625WS
57	Gas Suppression System	Lot	8424	Notofire	FK112
58	VESDA	Lot	9027	Notofire	ASTM Series
59	Water Leak Detection System	Lot	8543	J3	WLD4ZMD

	Field Infra for Surveillance/ITMS/ATCS				
60	I-Type Pole with 1m arm	Nos	7308	Standard	Standard
61	Canteliver Pole with 5m Arm	Nos	7308	Standard	Standard
62	I-Type Pole for Traffic Light	Nos	7308	Standard	Standard
63	Canteliver Pole for traffic light with 5m Arm	Nos	7308	Standard	Standard
64	5 MP Bullet IP Camera with 128GB SD card	Nos	8525 8523	CP PLUS	CP-UNC-TE81ZL6C-VMDS-Q + CP-UM128C
65	5 MP PTZ Camera with 128GB SD card	Nos	8525 8523	CP PLUS	CP-UNP-F4551L30-DPQ + CP-UM128C
66	4K UHD Camera with 128GB SD card	Nos	8525 8523	CP PLUS	CP-UNC-TE81ZL6C-VMDS-Q + CP-UM128C
67	5 MP Box Camera with 128GB SD card	Nos	8525 8529 8529 8529 8523	CP PLUS	CP-UNC-BE51E-VMD-Q + CP-UML-AF550 + CP-UA-H14L100B-V + CP-UA-B14 + CP-UM128C
68	IR Illuminator	Nos		CP PLUS	Included in Solution
69	Radar Speed Display warning system with Infra	Nos	8530	Envoys	SDS SC400
70	Variable Message Display board with Infra	Nos	8530	Envoys	EEPL/VMS/PH20/MC/02
71	24U Outdoor Cabinet	Nos	8517	Manifold	MeCL/25-26/MSSS/24U/003
72	9U Pole Mount Rack	Nos	8517	Manifold	MeCL/25-26/MSSS/9U/001
73	08 Port Industrial Grade Switch with SFP	Nos	8517	CISCO	IE-3200-8P2S-E
74	LPU Type-1	Nos	8471	Roxwell	RXW-1200 Series
75	LPU Type-2	Nos	8471	Roxwell	RXW-900 Series
76	ATCS Controller with Rack	Nos	8530	Amnex	SYNCNEX NX0801
77	Countdown timer for Traffic Light	Nos	9107	Amnex	SYNCNEX_T_001004
78	Vehicle Detection Camera (Bullet Camera)	Nos	8525	CP PLUS	CP-UNC-TE81ZL6C-VMDS-Q
79	Traffic Light Aspects - RED with complete mounting accessories	Nos	8530	Amnex	SYNCNEX_L_001002
80	Traffic Light Aspects - GREEN with complete mounting accessories	Nos	8530	Amnex	SYNCNEX_L_001002
81	Traffic Light Aspects - AMBER with complete mounting accessories	Nos	8530	Amnex	SYNCNEX_L_001002
82	Pedestrian lamp heads - Stop Man	Nos	8530	Amnex	SYNCNEX_P_001005
83	Pedestrian lamp heads - Walk Man	Nos	8530	Amnex	SYNCNEX_P_001005
84	Pedestrian Countdown Timer and Push Button	Nos	8530	Amnex	SYNCNEX_T_001004
85	UPS 2 KVA with 60 min battery backup	Nos	8504	Power One	UHF202A08
86	UPS 3 KVA with 60 min battery backup	Nos	8504	Power One	UHF302A08
87	LIU 24 Port Fully Loaded	Nos	8536	Commscope	X-2122146-Y

88	Patch Panel 24 Port Fully loaded	Nos	8536	Commscope	CPP-6-UDDM-XX
89	Outdoor Armoured CAT6 Cable	Mtr	8544	Commscope	X-2225454-Y
90	12 C Optical Fibre Cable	Mtr	9001	Commscope	2223112-X
91	3 Core 2.5 Sqmm Power Cable	Mtr	8544	Reputed	Reputed
92	HDPE 50mm	Mtr	3917	Standard	Standard
93	Lot comprising of Passive items including supply and installation of surge protector, media converter, injector, PVC, DWC, Flexible Pipes and Clamps etc., Electrical cables of different sizes, Cable terminations etc. including all other items required for successful installation & commissioning of field Network and Cameras etc. at field locations.	Lot		Standard	Standard
94	Supply and installation of Maintenance free Earth, Lighting Arrestors etc. at Field locations.	Lot		Standard	Standard
Public Addressing System with Emergency response					
95	25 W IP Speaker with Builtin Amplifier	Nos	8518	Roxwell	RXW-HS25P
96	Emergency call button	Nos	8517	Roxwell	RXW-EC2BSIP
97	Control desk basic terminal in ICC	Nos	8518	Roxwell	RXW-DCS1010-T
Zonal Viewing Center (ZVC)					
98	65 Inch LED Display	Nos.	8528	LG	65UR640S or Equivalent Series
99	Work Station for Operators with single Monitor	Nos.	8471	Hpi	Z2 Tower G9
100	L2 Switch	Nos.	8517	Cisco	C9200L-24P-4X-E
101	UPS 3 KVA with 60 min battery backup	Nos.	8504	Power One	UHF302A08
102	Air conditioner 2 Ton	Nos.	8415	LG	Q24ENXE Or Series
103	9U Rack	Nos.	8517	Manifold	MeCL/25-26/MSSS/9U/001
104	Workstation Furniture and Fixtures with Ergonomic chair	Nos	9403 9401	COSMOS	CMPL-WS-12W-6D + Fulkrum
Vehicle Mounted Camera System					
105	2MP IP PTZ Camera with complete vehicle mounting accessories for Vehicle Mounted Camera System.	Nos	8525 8523	CP PLUS	CP-UNP-3020R1 + CP-UM128C
106	MNVR with 2 TB storage for Vehicle Mounted Camera System.	Nos	8521	CP PLUS	CP-UNR-404T1-AI
107	1KVA UPS with 60 Min Backup for Vehicle Mounted Camera System.	Nos	8504	Power One	UHF102A03
108	7" Multi-function Touch Panel / Monitor for Vehicle Mounted Camera System.	Nos	8537	DFI	HB070
109	Other Miscellaneous (CAT6/Fibre Patch Cords, Fixtures)	Nos		Commscope	Commscope

Pre-Fabricated Structure					
110	One time Site Preparation/ Pre-Fabrication (Civil/pre- Fabrication & Electrical) Cost for NOC room (approx size 1500 SFT) including complete site preparation/Pre- Fabrication of NOC inclusive but not limited to false flooring,Raise flooring, lighting fixture, electrical works, Masonry Works (RCC/ACC/Structural Beams) wall finishing (painting, whitewashing),Doors & window/Tilling etc.), Dismantling existing any structure of any material etc			Rontel	Rontel
111	Setting up of state of the art ICCC room (approx 2500 SFT) with required Furniture & Fixture, Civil/ Masonry/interior and structural components including false flooring, lighting fixture, electrical works, Water & Sanitary work and beautification of ICCC and high-quality interior finishes such as panels, partitioning, and a viewing gallery and other essential enhancements ensure a modern, functional, and aesthetically designed ICCC space			Rontel	Rontel
112	EARTHING: Preparation of All Earth Pits, Necessary Repair, Testing earth resistivity and electrode resistance			Reputed	Reputed

Note:

- 1.Warranty certificate must be issue with the name of end customer.
2. Any other Hardware/Software required for the functional requirement of the project should be included in the total Bid price. Bidder needs to evaluate their solution & requirements and in case of any additional requirement apart from the components mentioned in the list, it is bidders responsibility to consider the same in the total Bid price.
