Request for Proposal ('RFP') For Selection of Vendor for Upgradation of existing Command Control Centre to Unified Command Control Centre & Implementation of Intelligent Enforcement Management System (IEMS) for State Transport Authority, Odisha

Government of Odisha

Commerce & Transport (Transport) Department

Tender Inviting Authority

Transport Commissioner, Odisha, 6th Floor, Rajaswa Bhawan, Chandini Chowk, Cuttack, Odisha. Pin: 753002, Phone: 0671-2507042

Volume:2 (Scope of Work)

Tender No: Ref Number: **LXVII-424/2022/R.S/T.C -**

Date: **02-02-2024**

E.M.D: **Rs**. **1,00,00,000.00 (One Crore Rupees Only)**

Tender Fee: Non-refundable Rs. 11,800/- {Rs.10,000/- + 18% GST (Rs. 1,800/-)}

List of Abbreviations:

Abbreviation	Description
GOI	Government of India
STA	State Transport Authority
IEMS	Intelligent Enforcement Management System
EMS	Enforcement Management System
AI	Artificial Intelligence
ML	Machine Learning
OCR	Optical Character Recognition
ANPR	Automatic Number Plate Recognition
CCTV	Closed Circuit Television
NLP	Natural Language Processing
ERSS	Emergency Response Support System
SVD	Speed Violation Detection System
CMS	Content Management System
SDK	Software Development Kit
API	Application Programming Interface
SQL	Structured Query Language
DNS	Domain Name System
LAN	Local Area Network
WAN	Wide Area Network
VPN	Virtual Private Network
VID	Video Incident Detection
SMTP	Simple Mail Transfer Protocol
IMAP	Internet Message Access Protocol
FTP	File Transfer Protocol
SFTP	Secure File Transfer Protocol
Telnet	Telecommunication Network
VoIP	Voice over Internet Protocol
VPN	Virtual Private Network
NAT	Network Address Translation
MAC	Media Access Control
TCP	Transmission Control Protocol
UDP	User Datagram Protocol

Abbreviation	Description
SMTP	Simple Mail Transfer Protocol
FTP	File Transfer Protocol
CCC	Command and Control Centre
UCCC	Unified Command and Control Centre
The Authority	Transport Commissioner, Odisha Or Any officer authorized by Office of the Transport Commissioner
Master System Integrator (MSI)	Means the successful bidder / lead member of the consortium

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1 Introduction

State Transport Authority (STA) is an apex body for enforcing and regulating road transport administration in the state of Odisha. STA came in existence as per Motor Vehicle Act, 1939 (M V Act). Besides enforcing restrictions on the movements of vehicles on road in terms of registrations, licensing, permits, tax, and penalties elaborate procedures and rules, M V Act also ensured the formation of STA and RTOs at state and district level.

The office of the Transport Commissioner, Odisha invites proposals from leading and experienced bidders to participate in competitive bidding for procurement supply, design, commissioning installation and maintenance of Intelligent Enforcement Management System.

1.1 Project Background

Enforcement in Road safety has been given the utmost importance by the STA. It is prevalent that strict enforcement on violation of any traffic rules will make drivers more obedient and responsive to comply with traffic rules while driving.

STA has implemented “Driving Electronic Enforcement to Save Human Lives” (DEESHA) project on 140 km stretches of National Highway -16 between various locations from Panikoili to Rameswar wherein the ANPR cameras has been installed and commissioned to detect traffic violations like over speeding, triple riding, wrong direction movement, helmetless riding and imposing appropriate fines through e-Challan system as per M V Act and Rules.

As road network has been ever increasing with urbanization and city development strategy, STA has been placing greater emphasis on managing and operating existing road networks more efficiently and effectively through implementation of Intelligent Enforcement Management System (IEMS) to make the vehicles and drivers abide by strict enforcement policies.

Strict enforcement through IEMS will create awareness regarding road and traffic safety amongst people and will play a very important role in compliance of traffic related laws. This will reduce the loss of human lives through strict enforcement and compliance.

The aim of IEMS can be enumerated as:

a) Result in reduction of over speeding, rash & negligence.
b) Increase awareness of traffic rules and regulations.
c) Reduce processing and disposal time of traffic violations.
d) Bring transparency in the enforcement of traffic laws and rules.
e) Used as an effective tool of e-governance to manage, monitor, and administer.

1.2 Project Objectives

Office of the Transport Commissioner intends to implement IEMS at other stretches of Odisha, where traffic rules violations like over speeding, triple riding, wrong direction movement, riding

without helmet will be captured through cameras, radars, and other field devices installed at identified strategic locations. Further, the provisions to capture other traffic violations like, driving without wearing seatbelts, use of mobile phones while driving will be incorporated into the IEMS system as and when desired by the authority, in future.

The broad objectives of the project can be summarized as:

a) Real time traffic data analysis through IEMS application
b) Dissemination of real time traffic information to the Unified Command and Control Centre (UCCC).
c) Live Camera feed shall be required at UCCC.
d) The UCCC software shall be able to integrate with existing systems and solutions like e-Challan, Vahan 4.0 and Sarathi 4.0 for data access along with CCTNS, ERSS, Highway Patrol, Interceptors, IRAD, VLT for data access and transactions. The Transport Commissioner's office will provide the MSI with the necessary permissions and information, but the MSI will have to coordinate with the relevant agencies to ensure successful integration.
e) Automated penalty/fine calculation based on severity of offence and in compliance with traffic rules and regulations and MV Act provisions.
f) Enhancing road safety throughout the stretches of the highways & district roads.

2 Term of Reference

The scope of work is not limited to the work described below and may vary from time to time as required by the Transport Commissioner.

- The Bidder shall upgrade the existing command and control centre to a Unified Command and Control Centre (UCCC) for traffic violation detection with integrated solution for issuance of challan through e-Challan system developed by NIC. NIC e-Challan Software will issue e-Challans. Manual Cross-validation (adjudication) will be conducted by MSI. Print of e-Challan, courier of e-Challan will be done by Office of Transport Commissioner.
- Incident Management System includes reporting of an incident, log of the whole event, tracking of the incidents response and TAT based analytics of the whole event. Further changes shall be directed by office of the Transport commissioner as and when required. The MSI shall develop and implement such changes in the System.
- The bidder shall supply, install & commission field devices mounted on the Gantry/Cantilever structures to detect the following offences:
    - Driving vehicles with excess speed (Over-speeding).
    - Using Mobile Phone while driving/riding any vehicle.
    - Driving against flow of traffic.
    - Driver and Passenger not wearing seat belt.
    - Riding more than two persons on two-wheeler.
    - Riding without helmet by both rider and pillion rider
    - Vehicles abandoned on Road.
    - Any future scope of violations as added by Office of the Transport Commissioner from time to time. The IEMS solution shall be able to scaled up with violation detections as instructed by the office of the Transport Commissioner.
- The MSI will design an interactive dashboard for health monitoring of all field devices, UCCC devices, real time live video feed from field devices, network passive and active components installed at field location and UCCC, status of uninterrupted power availability.
- The interactive dashboard for health monitoring shall have the following functionalities:
    - System parameters for components such as utilization of Database Server, Recorder Servers, Local Workstation, and Storage System (all available storages).
    - The dashboard should also show the parameters such as CPU Core Usage, RAM Utilization and Storage Utilization.
    - AI based Graphical Analytics such as Vehicle Flow, Traffic Count, offences recorded, offences validated with filters to categorize based on (but not limited to) vehicle type, name of operator, IEMS locations.
- The dashboard for health monitoring should have following features for logs and reports:

  - Reports such as camera uptime availability, camera recording percentage, recording status, critical events alert at gantry location, incident video search, etc.
  - Allow the operator to raise support ticket from the OEM of the product.
  - Continuous log of Server Status Messages, Camera Connectivity, Storage Status, Recording ON/OFF, User Activity Logs, etc. which should be accessed from the workstations using different filters.
  - Continuous recording is required to be stored at UCCC.
  - Generate log reports by incident and IEMS locations.
  - Give full log report of the user activities in the system with time, date, and user filters.
  - Reports should be downloaded in file extension type such as XLXs, PDF, CSVs, and TXT. Videos should be downloaded with multiple resolution (720P, 1080P, etc.) and within specific time brackets.
  - The MSI will design a customized MIS report as per the necessity of Transport Commissioner. Data sharing with all the Govt departments and agencies as required by the Transport Commissioner will be done.

- The mechanical structures installed at strategic locations shall be able to resist the wind speed upto 200km/hr. The mechanical structure should withstand the costal weather climatic condition as well as forest locations where threats from animals are there. The bidder will submit the certificate of wind resistance from appropriate authorized agencies certified by Government.
- Further, the provisions to capture other traffic violations like driving without wearing seatbelts, use of mobile phones while driving will be incorporated into the IEMS as and when desired by the authority, in future.
- There should be additional provisions in IEMS to capture incidents like accident vehicle stranded for a longer period on the Highways causing deadly road accidents, identifying traffic congestion, etc. using live/recorded camera feeds at remote monitoring units and/or Unified Command and Control Centre.

2.1 Proposed Solution

The idea of having a vibrant and dynamic IEMS in place is envisioned keeping in mind that the numbers of vehicles are increasing day by day in the state. The rate of accidents involving drivers, riders and pedestrians on the roads increases due to negligence driving and over speeding.

Therefore, any traffic rules violations along the identified stretches will be captured through Cameras and Radars. The processed data will be transmitted to the UCCC, which will be hosted at cloud infrastructure. The Violator Vehicles details (like Mobile No., Address) will be validated with the VAHAN database. On successful validation offence details will be processed through e-Challan system. The IEMS solution will be integrated with VAHAN 4.0 and e-challans will be generated from e-Challan solution deployed by NIC. NIC will facilitate required supports for integration. However, the MSI/Successful Bidder will be responsible for coordination with NIC time to time for desired functionalities.

The IEMS solution will be integrated with VAHAN 4.0 and e-challans will be generated from e-Challan solution deployed by NIC. NIC will facilitate required supports for integration. However, the MSI/Successful Bidder will be responsible for coordination with NIC time to time for desired functionalities.

The solution shall be developed by Master System Integrator (MSI), who shall be responsible for supply, development, customization, installation, testing and commissioning of the project along with operations and maintenance for the period of 5 years. Further, the operations and maintenance period may be extended up to 2 years on a yearly basis performance review of the MSI.

The MSI will be responsible for providing live feed of the surveillance to the nearby RTO offices and police stations as per the requirements of office of the Transport Commissioner. The solution shall have the provision of providing live feed at different offices as per the requirements of office of the Transport Commissioner.

The solution should also be capable of generating periodic, traffic violation wise and demographic MIS reports based on location, operator, number of enforcement cases, duration of the day, and other data parameters as per the requirements of the client. The MIS reports and dashboard shall be accessed through any RTO office locations or establishments under the purview of the Office of Transport Commissioner along with the police stations.

There shall have provisions to capture incidents like Traffic Congestion Detection at Gantry/Cantilever Locations and Accidents / On road Vehicle stranded / Abandon Vehicle parked on road for a longer period within the limitation of camera field of view, using live / recorded camera feeds at remote monitoring units and/or Unified Command and Control Centre. The system shall be scaled up in the future to have an incident management system to identify the breakdown failure of components.

The MSI shall develop a burglar/Anti-theft alarm system and analytics applications for deployment of intelligent analytics on the cameras/field equipment and raise alarms & triggers in case of offensive and unlawful activities (unauthorized opening of junction box, thefts, vandalism, etc.) within a periphery of gantries or nodes using alarms, hooters, and notifications.

The solution shall comprise of various field systems at IEMS locations, viz. ANPR system, Speed Violation Detection (SVD) System and Video Analytics for detection of traffic violations. E-Challan system and other IT infrastructure available with legacy system at Central Control & Centre (CCC) shall be integrated with new upgraded Unified Command & Control Centre (UCCC) for successful operation of the IEMS.

The office of the Transport Commissioner shall make payment for additional requirements as per the unit rates quoted by the bidder in the financial quote for any future expansion above the number of locations as defined by the office of the Transport Commissioner during Contract execution. The MSI shall procure, design, develop, deliver and install the software and allied systems to ensure future scalability above the number of locations as defined by the office of the Transport Commissioner without any additional cost to the Office of the Transport Commissioner.

ANPR system:

The ANPR System shall be used for monitoring vehicle flow at strategic locations. The system will support real-time detection of vehicles at the deployed locations, capture all vehicle, reading its

number plate, database lookup from central server and triggering of alarms/alerts based on the vehicle status and category as specified by the database. The System will automatically detect the license plate in the captured video feed in real-time and then generate the Optical Character Recognition (OCR) of the license plate characters and forward this to UCCC for further processing. ANPR systems are also part of Speed Violation Detection & Video Analytics for Traffic Violation as sub-systems.

The ANPR Camera with IR will interface to LPU (place inside the Junction Box) and real time data of violating vehicles will be transferred to the UCCC via MPLS network. ANPR Camera should be able to detect Number plates of vehicle minimum 180 Kmph without any distortion of image.

In case ANPR system is unable to recognize the number plate for a vehicle, the image will be captured by the software for manual number plate recognition. No predictions or low confidence recognitions will be manually annotated by staff at the UCCC and fed back to improve the model. The software at the UCCC shall allow operators to zoom in, correct number plate recognized from the snapshot.

The ANPR camera shall correctly link the vehicle number plate with the any violation as detected by the radar or video analytical camera. They shall be operating in tandem where required. The ANPR camera shall be able to capture both retro & non-retro reflective number plates.

SVD system:

The SVD System shall be comprised of one Radar Unit with flasher and shall be interlinked with ANPR system. The Radar will detect the vehicles moving over threshold speed and trigger an alert to ANPR system to capture the details of offensive vehicles. The System shall detect the speed of vehicles as per the business rules defined by the office of the Transport Commissioner.

The Radar with Flasher will interface to LPU and LPU will process the data of violating vehicles and transmit the same to the UCCC via MPLS network.

Video Analytic System for detection of Traffic Violations:

This system shall be capable of video-based traffic violation detection and enforcement systems. The primary objective of the systems is to not only detect traffic violations but also impose enforcement on the violators through supporting evidence for generations of e-Challans.

The Video Analytics Camera will be installed for each lane on each side & integrated with AI (by software module) to detect any traffic violation and integrate the same with ANPR system and e-Challan system to generate challans. The cameras shall be capable of recognizing number plates of the vehicles. The Video Analytics Camera should be able to detect Number plates of vehicle minimum 180 Kmph without any distortion of image.

The system shall be capable of detection of offenses as listed below.

- Using Mobile Phone while driving.
- Driving against the flow of traffic.
- Driver and Passenger not wearing seat belt.
- Riding more than two people on a two-wheeler.
- Riding without helmet by both rider and pillion rider
- Vehicles abandoned on Road.

- Any future scope of violations as added by STA.

The system should have the ability to automatically count and classify traffic, providing valuable data for traffic management purposes.

Connectivity:

The ANPR, RADAR and evidence camera will interface to LPU, and real time data of violating vehicles will be transferred to the UCCC via MPLS network.

Indicative Field Equipment Setup:

1. **ANPR camera:** One dedicated camera for ANPR of the ongoing vehicles as well as capturing images of high-speed vehicles on the road. This camera shall be capable of capturing vehicles on all lanes (upto 3 lanes). The ANPR camera shall provide additional accuracy of capturing License number plates of all hi-speed vehicles running on the road.
2. **Speed Violation Detection Radar:** This shall be a multilane radar for detection of speed violation according to conditions mentioned in the tender. One Single radar shall be used for up to three lanes of road. SVD radar will be connected to ANPR camera which will capture images of vehicles.
3. **Video Analytics Camera for Traffic Violation Detection:** This camera shall be used for continuous monitoring of the road traffic and detection of listed video evidence according to the conditions mentioned in the tender. The MSI shall use this camera for doing ANPR of the vehicles on the road. One Camera shall be used per lane of road.
4. **Pole Security camera:** The Pole security camera mounted shall be used to do surveillance of the junction box and its adjoining area of interest to protect the equipment.

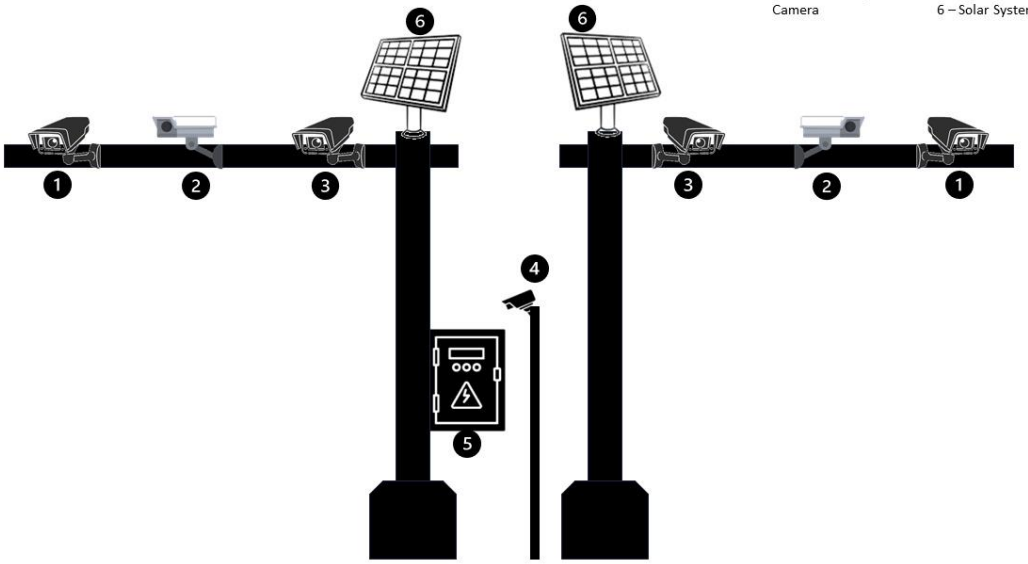
At each location of IEMS implementation, MSI shall install at least following components for surveillance system:

Lane classification	ANPR Camera	SVD Radar	Video Analytics Camera	Pole Security Camera	Total Monitoring Devices
2 Lane (1+1 Lane)	2	2	2	1	7
4 Lane (2+2 Lane)	2	2	4	1	9
6 Lane (3+3 Lane)	2	2	6	1	11

Indicative diagram of field equipment setups is as follows:

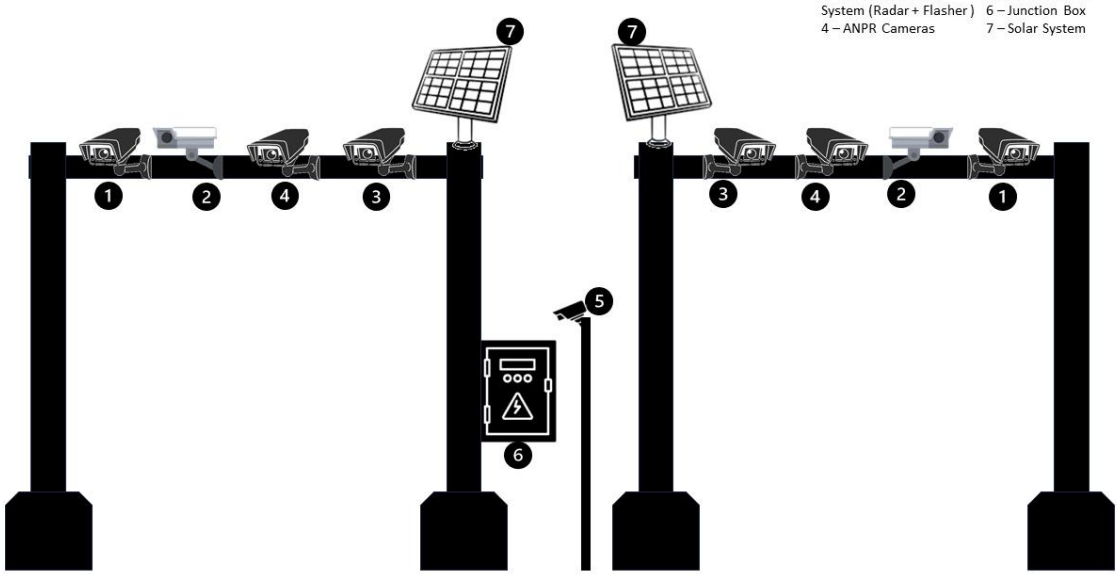
Indicative solution design diagram for 2 Lane road.

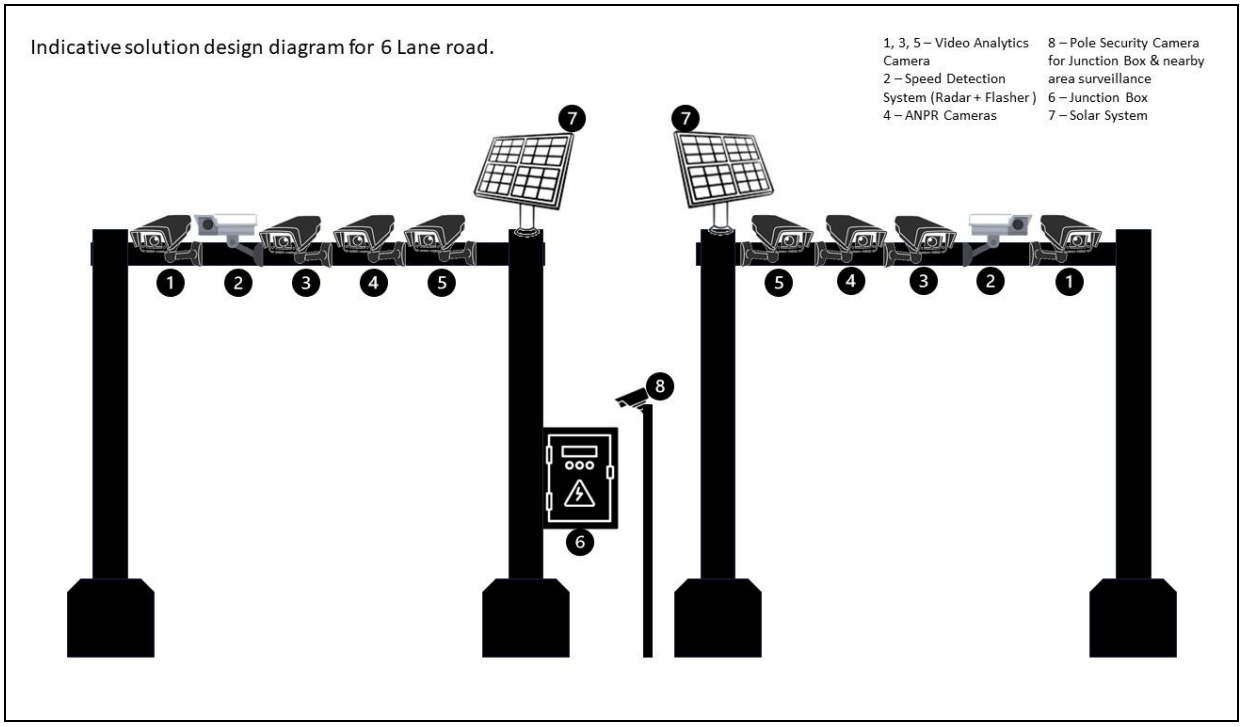
1 – ANPR Cameras
2 – Speed Detection System (Radar + Flasher)
3 – Video Analytics Camera
4 –Pole Security Camera for Junction Box & nearby area surveillance
5 – Junction Box
6 – Solar System



Indicative solution design diagram for 4 Lane road.

1, 3 – Video Analytics Camera
2 – Speed Detection System (Radar + Flasher)
4 – ANPR Cameras
5 – Pole Security Camera for Junction Box & nearby area surveillance
6 – Junction Box
7 – Solar System





The bandwidth requirement at IEMS Locations:

Lane classification	ANPR Camera	Video Analytics Camera	Minimum Bandwidth
2 Lane	2 X 6 Mbps	2 X 3 Mbps	18 Mbps
4 Lane (2 Up & 2 Down)	2 X 6 Mbps	4 X 3 Mbps	24 Mbps
6 Lane (3 Up & 3 Down)	2 X 6 Mbps	6 X 3 Mbps	30 Mbps

Note: *The bandwidth requirement provided is indicative.*

- This solution should be designed for zero interruption-based communication from the links between control room and cameras installed and spread over various locations across the state.
- The number of nodes/locations including field devices and associated units as decided by Office of the Transport Commissioner may be increased during the award of contract or anytime during the project period and the quoted unit prices of items in the bid shall hold unchanged. No revision of unit prices will be considered for the additional nodes during the project period.
- At each location of IEMS implementation, the MSI shall be responsible for providing redundant power and maintain SLA as defined in the RFP. Redundant power may be solar power arrangement for unreliable power locations integrated with UPS or a continuous power source.

2.2 List of Locations

- Office of the Transport Commissioner, Odisha intends to implement IEMS Project across Odisha locations.

- The bill of quantities mentioned under Revised Price Bid format are only for bid evaluation.
- The MSI shall conduct a feasibility survey in consultation with office of the Transport Commissioner, Odisha on Highways and other roads of Odisha to identify the locations for implementation of IEMS as per the requirement of Office of the Transport Commissioner, Odisha.
- The bidder shall conduct Survey in consultation with office of the Transport Commissioner, Odisha to identify the locations which will be powered through UPS, solar power.
- The number of locations will be finalized during Contract execution by Office of the Transport Commissioner, Odisha.
- The MSI shall be responsible for providing redundant power and maintain SLA as defined in the RFP. Redundant power may be solar power arrangement for unreliable power locations integrated with UPS or a continuous power source.

2.3 General System Features

- The system should be capable of processing the data seamlessly across the integrated system. A proper Data Recovery and a Business Continuity Plan need to be set up. This may be understood as if any of the functional module fails then it wouldn't affect the system to disseminate information for processing of e-Challans.
- The Source code of all the bespoke / custom developed software code, data, algorithms, documentation, manuals, any other documents generated as a part of implementation of this project shall be handed over to the Transport Commissioner, Odisha. Authority shall have all rights to use the Source Code of bespoke / custom developed software for IEMS project. The source code of the custom developed application for IEMS should be handed over to the Office of the Transport Commissioner during the time of go-live.
- The Intellectual Property Rights of the custom developed application for IEMS shall be in the name of the Office of the Transport Commissioner
- The Software & Hardware OEM must have support centre in India for any customization or support required in future.
- The system should allow the operator to create a continuous recording schedule for the camera based on the time of day and day of week. It should be possible to set the camera recording schedule for a single camera or a group of cameras or all cameras.
- The system should be compatible with integration with interface of external systems such as DEESHA Command and Control Centre Application, and with other stakeholder application as and when desired by the authority.
- The system should have integration with the e-Challan Management System and should offer the functionality to the operator to help in generating e-Challans automatically or manually.
- The system should have the capability to integrate with the VAHAN / SARATHI IRAD, CCTNS, ERSS, to fetch vehicle related details as required.
- Vulnerability Assessment and Penetration Testing (VAPT) audit for the IEMS software is a must requirement, and the application shall follow the OWASP guidelines.

2.4 Important Instructions for the MSI

- The scope of deliverables for the project by the selected MSI include the complete design, engineering, supply, delivery, Installation, testing, commissioning, and maintenance of a fully functional and complete IEMS Solution (i:e: ANPR system, SVD system and other MV violation detection systems) evidentiary proof for generating e-challan to the offenders across the designated stretch.
- The Command Control Centre will have dedicated primary- secondary link and MSI will be responsible to suggest the bandwidth capacity with due detailed explanation to the Office of the Transport Commissioner for uninterrupted and defect free operation and execution of the system on turnkey basis. The installation and commissioning of the application servers is the responsibility of MSI, to be hosted with managed cloud services.
- The application thus developed by the MSI shall be capable of generating different types of business analytics and intelligence reports from the stored data at managed cloud services along with interactive Dashboard on present statistics. Based on user requirements, the MSI needs to factor in any separate application for user-based access, log data, analysis of data etc. The MSI should ensure that any data transaction between any system, platform should be in encrypted format and log report must be maintained.
- Design, Commissioning, and Installation of Gantry/Cantilever cross the mentioned locations (the parameters provided under scope of work and Annexure). Gantry/Cantilever Design for fixing the various field devices are the responsibility of MSI. Civil and masonry work for Gantry/Cantilever installation shall be in the scope of the MSI including transportation, Excavation, Filling, Ramming, Cementing, Painting, Ducting, any other required work. The commissioning of the gantries/cantilever will be inspected by competent authority from Office of the Transport Commissioner and MSI needs to act accordingly if any deficiency is noticed by Office of the Transport Commissioner.
- In Odisha, Tata Power is into power distribution along with Government of Odisha in a joint venture in all four zones namely TPWODL (for Western Odisha), TPSODL (for Southern Odisha), TPNODL (for Northern Odisha) and TPCODL (for Central Odisha respectively).
- The MSI shall be responsible for electricity connection to each location through an aggregation point. Since this component has dependency on approval from local authorities, it is recommended that MSI plans this requirement well in advance & submits the application to the concerned electricity distribution agency on behalf of the Office of the Transport Commissioner with requisite fees, as applicable.
- MSI shall be responsible for installation of proper earthing at all the outer locations. The electrical connection made by MSI at the gantries/cantilever will be inspected (if required) by competent authority from office of the Transport Commissioner and MSI needs to act accordingly if any deficiency is noticed by Office of the Transport Commissioner.
- The MSI will be responsible for all utility services and bear expenditure.
- The expenditure incurred by appointed MSI on account of electrical charges will be reimbursed to the MSI as per the actual bills raised by the electricity service providers or as per the financial quote submitted by MSI under Price bid, whichever is less.

- The system shall be configured in such a way that, once the violation event is generated & approved, that shall be sent and / or synced to the e-challan module for generating the challan. Office of the Transport Commissioner. The synchronization shall be done with e-Challan module.
- The offending events shall be stored in the storage for 3 three years for any legal requirement. All the data shall be archived every three months duration for proper space utilization.
- The entire system shall be scalable as & when required, without changing the entire infrastructure.
- The MSI is to mention the system infrastructure requirement in their technical bid proposal, i.e., number of VM, total core per VM, space for OS & Application file system, total storage space, VPN (if any), bandwidth requirement etc. all infra related requirement. Office of the Transport Commissioner.
- The Master System Integrator shall provide a Network Intrusion Prevention System (NIPS) as a network security tool (which can be a hardware device or software) that continuously monitors a network for malicious activity and takes action to prevent it, including reporting, blocking, or dropping it, when it does occur.

2.5 Common guidelines regarding compliance of systems / equipment

- The specifications mentioned for various IT / Non-IT components are indicative requirements and should be treated for benchmarking purposes only. MSIs are required to undertake their own requirement analysis and may propose higher specifications that are better suited to the requirements.
- Any manufacturer and product name mentioned in the Tender should not be treated as a recommendation of the manufacturer / product.
- None of the IT / Non-IT equipment's proposed by MSI should be End of Life product. It is essential that the technical proposal is accompanied by the OEM certificate in the format given in Volume I of this Tender, where-in the OEM will certify that the product is not end of life product & shall support for at least 5 years from the date of Bid Submission.
- All IT Components should support IPv4 and IPv6
- Technical Bid should be accompanied by OEM's product brochure / datasheet. SIs should provide complete make, model, part numbers and sub-part numbers for all equipment/software quoted, in the Technical Bid.
- MSI should ensure that only one make and model is proposed for one component in Technical Bid for example all Surveillance cameras must belong to a single OEM and must be of the same model etc.
- SIs should ensure complete warranty and support for all equipment from OEMs. All the back-to-back service agreements should be submitted along with the Technical Bid.
- All equipment and parts should be original and new.
- The user interface of the system should be a user-friendly Graphical User Interface (GUI).
- Critical core components of the system should not have any requirements to have proprietary platforms and should conform to open standards.

- For custom made modules, industry standards and norms should be adhered to for coding during application development to make debugging and maintenance easier. Object oriented programming methodology must be followed to facilitate sharing, componentizing, and multiple use of standard code. Before hosting the application, it shall be subjected to application security audit (by any of the CERTIN empanelled vendors) to ensure that the application is free from any vulnerability; and approved by the Office of the Transport Commissioner.
- The Successful MSI should also propose the specifications of any additional servers / other hardware, if required for the system.
- The indicative architecture of the system is given in this volume. The Successful MSI must provide the architecture of the solution it is proposing.
- MSI is required to ensure that there is no choking point / bottleneck anywhere in the system (end-to-end) and enforce performance and adherence to SLAs. SLA reports must be submitted as specified in the Bid without fail.
- All the hardware and software supplied should be from the reputed Original Equipment Manufacturers (OEMs). The Department reserves the right to ask replacement of any hardware / software if it is not conforming to all the requirements specified in the tender documents.
- All servers, active networking components (for edge level switches), security equipment, storage systems and COTS Application proposed should be from reputed OEMs. MSI is expected to attach the supporting documents such as satisfactory performance certificate from government client along with the Technical Bid.
- System Integrator shall place orders on various OEMs directly and not through any sub-contractor / partner. All licenses should be in the name of the Office of the Transport Commissioner.
- Bidder shall be responsible for filing FIR in nearest Police Station for any theft or physical damage of product under IEMS System Project (including cable & accessories) due to any unforeseen reason. The MSI shall have to submit the copy of FIR to Office of the Transport Commissioner within 7 days from the date of filing FIR. The office of the Transport Commissioner will support MSI to register FIR. However, the MSI shall be responsible to file FIR.
- MSI shall have to take approval from Office of the Transport Commissioner for Schematic drawing of junction box or any fabrication work.
- Painting of pole shall be part of Comprehensive AMC & MSI shall have to do the same in every 2 years till the contract period. Cleaning of public displays such as VMDs & Radar Displays shall have to be cleaned and maintained every 2 months till the contract period.
- Maintaining the visual display board of Command-and-Control Centre, its workstations, servers, UPS, batteries, interior equipment, network connectivity, processing units and all its ancillary peripheries would be a part of the comprehensive AMC.
- Bidder shall ensure compliance to the Office Memorandum for insertion of Rule 144 (xi) in the General Finance Rules (GFR)-2017 bearing reference number F.No. 6/18/2019-PPD dated 23 July 2020, by the Public Procurement Division, Department of Expenditure, Ministry of Finance.

2.6 Compliance to Standards & Certifications

- For a large and complex set up such as the Project, it is imperative that the highest standards applicable are adhered to. In this context, the MSI shall ensure that the entire Project is developed in compliance with the applicable standards.
- During project duration, the MSI shall ensure adherence to prescribed standards as provided below:

Sr. No.	Component/Application/System	Prescribed Standard
1.	Information Security	ISO 27001
2.	IT Infrastructure Management	ITIL specifications
3.	Service Management	ISO 20000 specifications
4.	Project Documentation	IEEE/ISO/CMMi (where applicable) specifications for documentation

- Apart from the above the MSI need to ensure compliance of the project with Government of India IT security guidelines including provisions of:
    - The Information Technology Act, 2000" and amendments thereof and
    - Guidelines and advisories for information security published by Cert-In/MeitY (Government of India) issued till the date of publishing of tender notice. Periodic changes in these guidelines during project duration need to be complied with.

2.7 Project Design Considerations

- The MSI shall identify the customizations / workaround that would be required for successful implementation and operations of the envisaged project. The MSI shall design the project and submit the detailed Technical Architecture, which should take into consideration following guiding principles:

2.7.1 Scalability:

- Important technical components of the architecture must support scalability to provide continuous growth to meet the growing demand of the project. The system should also support vertical and horizontal scalability so that depending on changing requirements from time to time, the system may be scaled upwards. There must not be any system-imposed restrictions on the upward scalability in number of locations, cameras, systems/components/equipment's, server/desktop equipment.

2.7.2 Availability:

- The architecture components should be redundant and ensure that there is no single point of failures in the key solution components. Considering the high sensitivity of the system, design should be in such a way as to be resilient to technological sabotage. To take care of remote failure, the systems should be configured to mask and recover with minimum outage. The MSI shall make the provision for high availability for all the services of the system. Redundancy must be considered at the core / server room / data centre applications/components level.

2.7.3 Security:

- The architecture should adopt an end-to-end security model that protects data and the infrastructure from malicious attacks, theft, natural disasters etc. MSI should make provisions for security of equipment procured under the scope of this project as well as protection of the hardware system from hackers and other threats. Additional infrastructure must be taken into consideration while designing the system.

2.7.4 Manageability:

- Ease of configuration, ongoing health monitoring, and failure detection are vital to the goals of scalability, availability, and security and must be able to match the growth of the environment. Network should be auto/manual configurable for various future requirements for the ease of maintenance / debugging.

2.7.5 Interoperability:

- The system should have interoperable capability with the existing/proposed/future Systems and shall integrate with systems provided by the authorities in line with the Government of Odisha/India.

2.7.6 Open Standards:

- Systems should use open standards and protocols. Keeping in view the evolving needs of interoperability, especially the possibility that the solution shall become the focal point of delivery of enforcement services and may also involve cross-functionality and integration with the traffic violation management initiatives of Central/State Government, other departments / businesses in future, the solution should be built on Open Standards.
- The MSI shall ensure that the hardware/software application developed and implemented is easily integrated with the existing/proposed/future applications. The hardware/software does not

build a dependency on any proprietary software/hardware, particularly, through the use of proprietary ‘stored procedures’ belonging to a specific database product. The standards should at least comply with the published eGovernance standards, frameworks, policies, and guidelines.

3 Scope of the Work

3.1 Upgradation of CCC to UCCC

3.1.1 Command and Control Centre (CCC)

The Office of the Transport Commissioner is operating DEESHA project as Enforcement Management System. The Project was started in July 2021 for 5 months of implementation and 3 Years of Operation and Maintenance. Under DEESHA project, Command and Control Centre (CCC) has been set up in an approximate area of 300 Sq Ft. at Bhubaneswar by the Office of the Transport Commissioner. The CCC is used by the Office of the Transport Commissioner for monitoring traffic violations identified through DEESHA Project. Based on the same, CCC is issuing the traffic challans through e-Challan System using the data available through Vahan 4.0 portal. The CCC situated at RTO-1, Bhubaneswar had been deployed by M/s - NIS Facility Management Services Pvt. Ltd. and developed on software platform provided by M/s - Videonatics. The National Informatics Centre (NIC) has provided the e-Challan software, which is integrated into the current solution for generating and communicating challans for traffic violations to relevant stakeholders. The CCC will be shifted to RTO-2, Chandrashekharpur, Bhubaneswar and will be upgraded to UCCC. Shifting is in process & existing system integrator will complete the shifting task. Present CCC has bare minimum civil infrastructure, furniture setup, networking components and power supply.

The details of the indicative hardware, networking, and infrastructure components available and installed at CCC are as follows:

Sr. No.	Major Component	Quantity	Make & Model
1	Video Wall	1 Unit	Delta, Icon Pro Series - D
2	Desktop	4 Nos	HP 280 Pro G6
3	Online UPS	1 No	10KVA
4	Application Server	2 Nos	HP Make
5	Workstations Furniture	6 Nos	Standard

The MSI shall conduct its own study of DEESHA CCC Solution and its accessories like hardware, application server, UPS & operators' workstation. The MSI shall prepare a strategy for optimum use of the available legacy systems and its components along with new requirements given in the Financial Bid format for UCCC. For example, the MSI shall utilize the existing application server for analytics of the data received from new IEMS locations through Video Analytic Cameras installed for detection of traffic violations and the same should be demonstrated at the time of PoC.

3.1.1.1 Video Wall and Controller

Sr. No.	Feature	Specification
1.	Configuration	Video wall cubes of 50" diagonal in a 2 x 2 configuration complete with base stand
2.	Native Resolution	Full HD (1920x 1080)
3.	Light Source Type	Laser light source, Individual cube should be equipped with multiple laser banks and each laser bank should have an array of diodes.
4.	Brightness of Projection engine	Minimum 2000 lumens
5.	Brightness of Cube	Minimum >500 nits
6.	Brightness Uniformity	≥ 95%
7.	Dynamic Contrast	1000000:1
8.	Control	IP based control
9.	Remote	IR remote control quick access
10.	Screen to Screen Gap	≤ 0.2 mm
11.	Inputs	Digital DVI, HDMI
12.	Cube Depth	Total Cube depth should be <=744 mm
13.	Monitoring of critical parameters	Internal Temperature, Brightness, Cooling, Light Source Status, should be possible to demonstrate these parameters through active monitoring interface
14.	Maintenance Access	Rear
15.	Cube Size	Each cube should have a screen size of 1107mm wide and 623mm high and depth ≤ 470 mm
16.	Display & Controller	Display & Controller should be from the same manufacturer
17.	Display controller	Controller to control 4 displays with 4 outputs, 4 DVI Inputs along with necessary software's
18.	Chassis	19" industrial Rack mount, Lockable front door to protect drives
19.	Operating System	Window 7- 64 bit
20.	Processor	Xeon/ i3/i5/ i7
21.	RAM	Std. 4 GB DDR3
22.	HDD	Support up to minimum 2 HDD, Std.: 500 GB
23.	Networking	Dual-port Gigabit Ethernet Controller inbuilt, Supports Add on copper/ optical fiber adapters

Sr. No.	Feature	Specification
24.	Input / Output	Serial ATA, LAN, 2x RJ45 LAN ports, USB 2.0 port
25.	RAID	RAID 0, 1, 5, 10 supports
26.	Power Supply	(1+1) Redundant hot swappable
27.	Cooling	Forced cooling
28.	Indicators	LED's for HDD activity and Power status
29.	Switches	Power On/Off and System Reset
30.	Monitoring options	CPU, FAN, Temperature
31.	Accessories	DVD +RW, Keyboard and mouse
32.	Voltage	100-240V @ 50/60 Hz
33.	Redundancy	Power Supply, HDD, Cooling FAN, LAN ports
34.		Minimum 2000 lumens
35.	Scalability	Display multiple source windows in any size, anywhere on the wall
36.	Control functions	Brightness / contrast / saturation/ Hue/ Filtering/ Crop / Rotate
37.	Outputs	4 DVI
38.	Resolution support	DVI: 1920x1200 RGB: 2048x1536
39.	DVI Inputs	4 DVI
40.	Accessories	DVD-R, DVD+RW, Keyboard, mouse
41.	Power Supply	(1 + 1) Redundant AC-DC high-efficiency power supply, AC Voltage 100 – 240V, 50-60Hz
42.	Operating	Operating Temperature: 10° to 40°C, Humidity: 10 – 90% non-condensing
43.	Scaling and display	Software to enable the user to display multiple sources in any size and anywhere on the display wall.
44.	Auto Source Detection	Software should support for auto source detection
45.	Layout Management	Support for Video, RGB, DVI, Internet Explorer, Desktop Application and Remote Desktop Monitoring Layouts
46.	Scenarios	Software Save and Load desktop layouts from Local or remote machines
47.	Layout Scheduler	Software support auto launch of Layouts according to specified time or event by user
48.	SNTP	System support SNTP function

3.1.1.2 Desktop

Sr. No.	Feature	Specification
1.	Processor	9th Generation Intel Core i7- or equivalent/ higher AMD Processor, minimum 4 Core
2.	Speed	4 GHz
3.	Chipset	Compatible Chipset on OEM Motherboard
4.	Graphics	NVIDIA Quadro P620 or Better
5.	Memory	8 GB GDDR5, Memory Interface 128-bit, dual channel expandable up to 64 GB with minimum 4 DIMM slots
6.	Hard Disc	2TB SATA II 3.0 Gbps HDD, 7200 RPM or better
7.	Optional Drive	22X Internal SATA DVD WRITER
8.	Audio	Integrated HD audio with 5.1 surround sound & multi streaming capability
9.	Network	On-board Gigabit (10/100/1000 Mbps) Ethernet Controller with WOL support
10.	Expansion Bus	Minimum 1 x PCI E X16 slot ,2x PCI E X1 slot
11.	Interfaces	Minimum 4 nos. SATA on-board, 1serial port, min 3 USB (V3.0) ports (2 front), 1 Line in , 1 Line out, 1 RJ-45 , 1 VGA, Display Connectors 4x Mini DisplayPort 1.4
12.	Keyboard &	USB Mechanical Keyboard 107 Keys or more, USB Optical Scroll Mouse with antistatic mouse pad (Same Make as PC)
13.	Mouse	
14.	Monitor	32” LED Monitor , Maximum resolution – 1366 x 768; Response time (typical)- 5ms ; 24x7 Industrial Monitor
15.	OS	Windows 10 Professional or higher OS Pre-Loaded.
16.	OS Support	Microsoft Windows 10 Professional
17.	Warranty	comprehensive on-site OEM Warranty

3.1.1.3 Online UPS

Sr. No.	Feature	Specification
1.	INPUT	Nominal Voltage: 380V / 400V / 415V AC (3P+N+PE) Operating Voltage Range: 190V~499V AC Load Dependent Operating Frequency Range: 50 / 60 Hz ± 10% (Auto Sensing) Power Factor: ≥0.99 Bypass Voltage: - 40% ~ +15% (Configurable) Frequency: ± 5% (Configurable) ECO Range: Same as the Bypass, can be configured. Generator Input: Compatible
2.	OUTPUT	Rated Voltage: 220V / 230V / 240V AC L+N+PE (Configurable)

Sr. No.	Feature	Specification
		Power Factor: 0.8 (Standard) 0.9 / 1.0 (Optional) Voltage Regulation: ±1% Frequency: Auto Sensing 50 / 60 Hz ± 1~10% Sync Mode (Configurable), 50/60 Hz ± 0.5 Hz Battery Mode Crest Factor: 3:1 Overload: ≤105% for Continuous, ≤ 125% for 10 Min, ≤ 150% for 60 Sec, ≥ 150% for 200ms Harmonic Distortion (THDv): ≤2% with Linear Load, ≤5% with Non Linear Load Efficiency: Up to 94% Dual Conversion Mode, 99% ECO Mode
3.	BATTERY	Battery Voltage: 192V DC / 216V & 240V DC (Configurable) Typical Recharge Time: 6~8 Hours to 90% of full Capacity Charge Current: 10A Configurable (optional)
4.	SYSTEM FEATURES	IP Protection: IP 20 Transfer Time: Zero EPO / ECO / CVCF: Shutdown UPS Immediately / ECO and CVCF Mode can be Configurable. Alarm / Protection: Short Circuit, Input Under/Over Voltage, Over Temperature, Over Current, Overload, DC BUS Under / Over Voltage and Battery low
5.	Display	Line Mode, Backup Mode, ECO Mode, Bypass Mode, Battery Low, Battery Bad, Overload & UPS Fault, Input Voltage, Input Frequency, Output Voltage, Frequency, Current; Load Percentage, Battery Voltage, Charging/ Discharging/Current Temperature & Remaining Battery Backup Time, Load VA/W, Load and Battery Barograph
6.	INVIRONMENTAL	Temperature: Operating: 0~45°C, Storage: -20ºC ~ 55ºC Humidity / Altitude: 0~95% RH Non-condensing / <1500 M Noise: <65dB at 1meter distance Quality: ISO 90001, ISO 14001, OHSAS 18001, ISO 27001 ISO 50001, BIS, RoHS, FCC Safety: IEC/EN62040-1; Conformity to IEC / EN EMC / Performance: IEC/EN62040-2; IEC/EN62040-3, Complying to CE, Compliance to UL
7.	COMMUNICATION INTERFACE	Standard: RS-232 Optional: SNMP / ModBus / Dry Contact / USB / RS-485 Monitoring Software

3.1.1.4 Application Server

Sr. No.	Feature	Specification
1.	Certification(s) Required	OEM - ISO 9001 Manufacturer, VM Ware, HyperV, Red Hat Virtualization

Sr. No.	Feature	Specification
2.	Std. Compliance(s) Req.	UL, FCC & RoHS
3.	Rack	2U Rack Mountable
4.	CPU	2x Minimum 2.4GHz. Latest series/ generation X86 based Processor. Core per CPU is 16.
5.	Chipset	OEM Chipset or equivalent OEM motherboard/ chipset.
6.	GPU	Should support minimum 4 Co-Processor/ GPU
7.	GPU Card	4*NVIDIA T416GB Card/ NVIDIA A10/Higher Co-Processor or GPU card
8.	RAM	256 GB DDR4 RAM, supports with up to 1TB
9.	Storage	Minimum 4 Hot Plug 2.5/ 3.5-inch SATA/SAS HDD Bays
10.	Storage	Minimum 2x500GB SSD Hard disk drive
11.	GPU Slot	Minimum 6xPCIe 4.0, X16 single slot half Height for GPU
12.	RAID	RAID, supports RAID 1,5,6
13.	Cluster Support	Cluster support for high availability
14.	Ethernet Port	Minimum 2x10Gb Ethernet Port, Support for 2x1/10G Base-T
15.	Ports	USB 3.0 support with minimum 4 ports, DVD/CD-RW combo drive
16.	Power Supply	Redundant hot swappable Power Supplies, Redundant hot swappable Fans
17.	Operating System	Compatible with Microsoft Windows Server latest version Standard and datacenter Edition (32 bit and 64 bit), Ubuntu Latest version (32 bit and 64 bit)
18.	Operating System	OS Ubuntu 18.4
19.	Warranty	5 years comprehensive onsite warranty
20.	Server Management	Server Management software with the device drivers
21.	Processor	2x Minimum 2.4GHz. Latest series/ generation X86 based Processor. Core per CPU is 16.

3.1.2 Unified Command and Control Centre (UCCC)

The MSI shall be responsible for upgrading the existing command and control centre including but not limited to hardware and software components to a Unified Command and Control Center (UCCC) which will be capable of processing live feeds from the identified locations.

The MSI shall upgrade the existing CCC to the UCCC to ensure all required hardware like videowall, IT equipment, third party software, antivirus, firewall, etc. are seamlessly integrated on UCCC platform.

The MSI shall set up operator workstations, network connectivity and software for processing traffic violations, power backups, firewall, antivirus licenses, etc.

The MSI shall provide dedicated primary- secondary link along with link load balancer at UCCC for connecting IEMS locations and UCCC.

The MSI shall be responsible for providing 1:1 network bandwidth according to the number of field locations i.e. bandwidth requirement at each location multiplied by number of locations.

The MSI shall ensure data security by provisioning point to point secured encrypted leased lines from IEMS locations to UCCC as well as the OSDC / cloud infrastructure.

The new IEMS application shall be integrated with the e-Challan System developed by NIC for the entire project duration and UCCC operators deployed by MSI shall be responsible for manually validating offenses and transmitting this validated data to the e-Challan solution. NIC e-Challan Software will issue e-Challans. Manual Cross-validation (adjudication) will be conducted by MSI. Print of e-Challan, courier of e-Challan will be done by Office of Transport Commissioner.

The MSI shall be responsible for the complete operation and maintenance of the Unified Command & Control Centre (UCCC).

The UCCC solution shall have capability of integration with other third-party solutions/systems like towing system, Highway police in case of accidents, interceptor vehicles, Toll gates system etc. The UCCC solution shall have capability of capturing data from other systems and analyze the same as per the requirements from Office of the Transport Commissioner.

The UCCC solution shall be capable of processing information obtained from ANPR System, Speed Violation Detection System and Video Analytic System for detection of Traffic Violations through a Video Image processing unit and shall perform real- time remote incident detection at designated IEMS locations, record information on violators at IEMS software end for generation of e-Challans. On requirement the system shall have the capability to communicate with nearby RTO offices or Police Stations as per directions from the office of the Transport Commissioner. It shall also communicate such detected incidents to DC hosted on Managed Cloud for storage, analysis & reporting.

Minimum Requirements for MSI

The Unified Command & Control Centre (UCCC) shall be IP enabled centralised solution that will support the all-in-one unification of various systems including existing legacy systems like DEESHA system and its CCC software, e-Challan system, storage management, emergency response support system, etc. A single security interface for managing, configuring, monitoring, coordinating, gathering intelligence, and reporting on different embedded systems and related field devices shall be provided.

The following are the indicative functional requirements of UCCC required for IEMS operations. MSI is expected to use all the functionalities of IOT platform for holistic management within the scope of this RFP.

The required features of UCCC are as follows:

- Integrated Dashboard: This feature allows for the creation of customizable reports via the dashboard in addition to real-time tracking and alert systems.
- DEESHA Video Wall and Controller System Integration with Operator Workstation
- Notifying system services via email services.
- Emergency Operation and Help Desk Service.
- Essential electrical and civil work, including fire safety.

The UCCC shall support the seamless unification of various traffic enforcement management system, IP automatic number plate recognition system (ANPR), Incident management, Emergency response system. Record management with future scalability to include Traffic violation management solutions also under a single platform. The UCCC 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 field devices.

The platform must be Cloud ready from day 1 and must have the ability to host either in total or some of the modules in a private cloud environment approved by Meity.

The platform shall have natively failover.

The UCCC platform must be a true unified management experience for critical infrastructure, simplifying control room operation and legacy system integration, and increasing operational efficiency critical to rapid decision-making.

The UCCC shall be integrated with other independent legacy systems through a single Unification point with consistent user interface and better operational efficiency.

The system shall integration scalability of various equipment like Cameras, Radars, Storage devices, field sensors from IEMS locations.

The UCCC platform shall provide a dashboard functionality to manage workflows by integrating information from different agencies and systems to facilitate responsive decision making.

The system shall enable cross-system and cross-agency coordination to monitor, operate and manage the enforcement for traffic violations in an integrated & unified manner.

UCCC Architecture:

- The system shall be IP-enabled solution using standard TCP/IP protocol with TLS encryption for secure communication.
- It shall have ability to handle up to a hundred (100) connected clients simultaneously and unlimited installations.
- It shall have support for unlimited logs and historical transactions based on available storage.
- The system shall have native failover options for hardware and application levels without external dependencies.

Video Image Processing:

The system offered shall be modular and multi-functional. The Video Image processing coupled to the video analytics camera & pole security camera shall have the capacity to detect the presence of objects/vehicles in the entire field of view of the camera. If the service provider wants to centralize the analytics for detection of incidents at the command centre or on cloud, they need to ensure the inference times shall not be more than 5 seconds. Further, in case of internet connectivity is lost, incidents will be automatically stored and processed at LPU, on retaining internet connectivity the same shall be transmitted to UCCC.

Alarm management:

- The system shall have capability of creation and modification of user-defined alarms with time schedules and priority levels.
- The system shall have capability of grouping alarms by source and type, assigning recipients, and managing alarm notifications.

- The system shall be able to push alarm notifications via designated email addresses or devices using the SMTP protocol.
- The UCCC shall also support alarm notification to a designated email address or any devices (may be a Laptop/Computer/Tablet) using the SMTP protocol.

Video Management System (VMS)

The proposed Video Management System (VMS) shall provide a complete end-to end solution for traffic surveillance application. The VMS shall be an enterprise class IP based application with Server-client architecture. The VMS shall support cameras using the industry standards ONVIF Profiles. The VMS shall have Servers for Recording management and Client Interface as integral part of the solution.

The VMS shall be capable to record the live streaming flow of videos with appropriate codec and security certifications in place. The Analytical platform shall revert the derived outcomes to the VMS which shall be forwarded to the VMS clients located in the UCCC.

The Surveillance System shall not have any limit on the number of cameras to be connected for Surveillance, Monitoring and Recording. Any increase in the no. of cameras shall be possible by augmentation of Hardware components.

The UCCC operators shall have following access to the video feeds.

- Viewing of the live Video Streams from IEMS locations.
- Viewing rights to the stored feeds.
- Viewing of video feeds basis upon the Alerts / Exceptions / Triggers raised by Video Analytics, and ANPR system.
- Provide search of recorded video, advanced search should be possible based on various filters like alarm / event, area, camera, etc.
- Export rights of video / other critical incident data based on appropriate rights and privileges.
- Ability to back up data on demand/ schedule based.
- Viewing of video feeds from DEESHA system through integration

Video Management Server(s) for Camera feeds

The Video Management Servers shall provide centralized management of all cameras installed at IEMS locations. The database shall be able to support at least 300 cameras / IP end points in a single server. The Server shall provide with 1:1 redundancy. The failover time shall not be beyond 60 Seconds and there should not be any loss in the Live and Recorded Videos of the connected cameras.

The solution shall be capable to be running in virtualisation / physical server environment in the UCCC. The Standby server shall support data recovery scenarios where a server can be on managed cloud and only take over if Primary server become offline. The Standby Server shall support real-time synchronization of the configuration databases for high reliability.

Video Recording Server(s) for Camera feeds

In the IEMS solution, the Video Recording Servers shall be running centrally in the best possible efficient environment in UCCC. The recording Servers shall have N:1 redundancy. There should not be any loss in the Live and Recorded Videos of the connected cameras due to failover.

There shall be 10% buffer to handle the additional storage database or failover requirements.

Storage requirement for Camera Video Streams

In the IEMS solution, there shall be centralized storage for all cameras at UCCC. The centralised storage shall be planned at UCCC to store all camera feeds for 365 days 24/7 at least with Full HD or better resolution at 30 FPS with suitable (H264 or higher) video compression.

The recordings of all cameras shall happen at UCCC. In case UCCC goes down, traffic incidents, related evidence, and any other critical incidents along with supportive evidence shall be transmitted to DR available in Managed Cloud Services, which shall have provision of scalability.

The system shall have scalable storage capacity for additional IEMS locations at UCCC which shall be added in future as per the instructions from office of the Transport Commissioner.

The video feeds related to incidents and important in nature and which may be required for evidence purposes shall be flagged by the UCCC operators. The flagged data shall be archived in the storage as defined by the office of the Transport Commissioner.

Technical Requirements:

The MSI shall ensure all the licenses shall be provided for 350 camera licenses (scalable up to 1000).

The VMS application must seamlessly Integrate with the UCCC platform including the sub modules like ANPR, SVD and Video Analytics systems for all the functionalities outlined.

The VMS shall integrate with IEMS field devices using dedicated driver or using the industry standards ONVIF Profiles.

The Proposed VMS Solution shall support native Fail over with in application with no dependency on any external application for both hardware and application redundancy. The Standby VMS server shall support disaster recovery scenarios where a server can be on managed cloud and only take over if Primary server become offline. The Standby Server shall support real-time synchronization of the configuration databases for high reliability. The solution shall allow evidence videos/images to be protected against normal disk clean-up routines.

The proposed solution shall be scalable to support live viewing and automatic transfer of video recorded to the cloud on demand basis from UCCC, based on the age of the video for future scalability and the hosted Cloud Platform must be among the approved vendors as per the MeiTY approved GI Cloud initiative from Govt of India. The proposed application must provide a single interface to monitor, collaborate and action for all IEMS devices like cameras, radar devices etc.

The VMS Platform must have the capability to real time and scheduled backup video/ Flagged and critical data to Managed Cloud Services.

The VMS platform must have the flexibility to deploy rules for storing and avoiding data deletion of the flagged data, critical data, & Incident reports based on the criticality of the data.

The Monitoring UI shall provide an interface to support the following tasks and activities common to Various systems.

- Monitoring the events from a live security system.
- Generating reports, including custom reports.
- Monitoring and acknowledging alarms.
- Creating and editing incidents and generating incident reports.
- Displaying dynamic graphical maps and floor plans as well as executing actions from dynamic graphical maps and floor plans Unified with UC&C.

The live video viewing capabilities of the Monitoring UI shall include:

- The ability to display all cameras attached to the system both Public, Collaborative monitoring and Cloud based entities.
- The ability to drag and drop a camera into a display tile for live viewing.
- The ability to drag and drop a camera from a map into a display tile for live viewing.
- Support for digital zoom on live camera video streams.
- The ability to bookmark important events for later retrieval on any archiving camera and to uniquely name each bookmark in order to facilitate future searches.
- The ability to start/stop recording on any camera in the system that is configured to allow manual recording by clicking on a single button.
- The ability to activate or de-activate viewing of all system events as they occur.
- The ability to switch to instant replay of the video for any archiving camera with the simple click of button.
- The ability to take snapshots of live video and be able to save or print the snapshots.
- The ability to browse through a list of all bookmarks created on the system and select any bookmarked event for viewing.
- Tools for exporting video and a self-contained video player on various media such as USB keys, CD/DVD-ROM and external hard disk. This video player shall be easy to use without training and shall still support reviewing video metadata. However, the MSI shall be responsible for providing appropriate training and user manuals.
- Tools for exporting video sequences in standard video formats, such as ASF, MP4.
- The ability to encrypt exported video files with industry standard encryption.
- A tool building and exporting a set of videos into a single platform (physical/cloud).
- The VMS shall support only secured media stream requests, unless explicitly configured otherwise. Secured media stream requests shall be secured with strong certificate-based authentication.

Network Connectivity:

- The MSI shall make provision for network services so that the entire network shall be scalable as & when required without interrupting the services. The MSI will be responsible for any LAN cabling requirement at UCCC.
- The MSI will be responsible for providing outer boxes for network components at UCCC, if required any.

3.2 IEMS Software Components & Services

3.2.1 Brief Overview of IEMS

The proposed system shall host the software and analytics applications to facilitate deployment of intelligent analytics on the cameras and raise alarms & triggers in case of unwanted activities around gantries/cantilever or nodes.

The solution will identify the violations by identifying the registration number of violator vehicle. The system should be capable of considering the background illumination conditions or any blur effect conditions and elimination of background noise. They should be capable of identifying and taking photographs and video of detected vehicles (violating rules & norms as per MV act) even if it is within line of vehicles. The system would be compatible in the future to get integrated with police database. Any hot listed category of vehicles like wanted/suspicious/stolen vehicles can be identified by the system.

If an offence is detected, digital image along with video (as proof of evidence) of the vehicle is recorded. The image evidence should clearly show the information regarding the vehicle available with VAHAN portal and number plate of the vehicle. Digital images also include:

- Date of the offence
- Time of the offence
- Location details of the camera (Lat., Long, chainage) of the gantry/cantilever or node location that took the picture.
- Direction of travel of the offending vehicle
- Speed of the offending vehicle
- Speed limit on the road where the camera is positioned.

Thus, any Traffic rules violation event will be recorded, and all the above details will be sent to Unified Command Control Centre (UCCC) for diligence check with the digital Image/image evidence taken by the camera and registration number plate identified by the camera system. The UCCC will be equipped with a new IEMS solution for real time Business Intelligence and Incident Tracking. The UCCC solution shall have capability of integration with other third-party solutions/systems like towing system, Highway police in case of accidents, interceptor vehicles, Toll gates system etc. The UCCC solution shall have capability of capturing data from other systems and analyze the same as per the requirements from Ofiice of the Transport Commissioner.

Once the diligence is completed, the data will be pushed to e- Challan system of Vahan 4.0 and / or any other third-party application as deemed by Office of the Transport Commissioner suitable for further actions on issuance of e-challan, booked under which offence, calculation of fine amount, communication to the offenders.

This is also to be noted that, the Office of the Transport Commissioner may wish to increase the software features in future (without changing the cameras and/or changing the cameras) to meet the increasing requirements, the software should be capable to accommodate the changes. The Source code of all the bespoke / custom developed software code, data, algorithms, documentation, manuals, any other documents generated as a part of implementation of this project shall be handed over to the Transport Commissioner, Odisha. Authority shall have all rights to use the Source Code of bespoke / custom developed software for IEMS project.

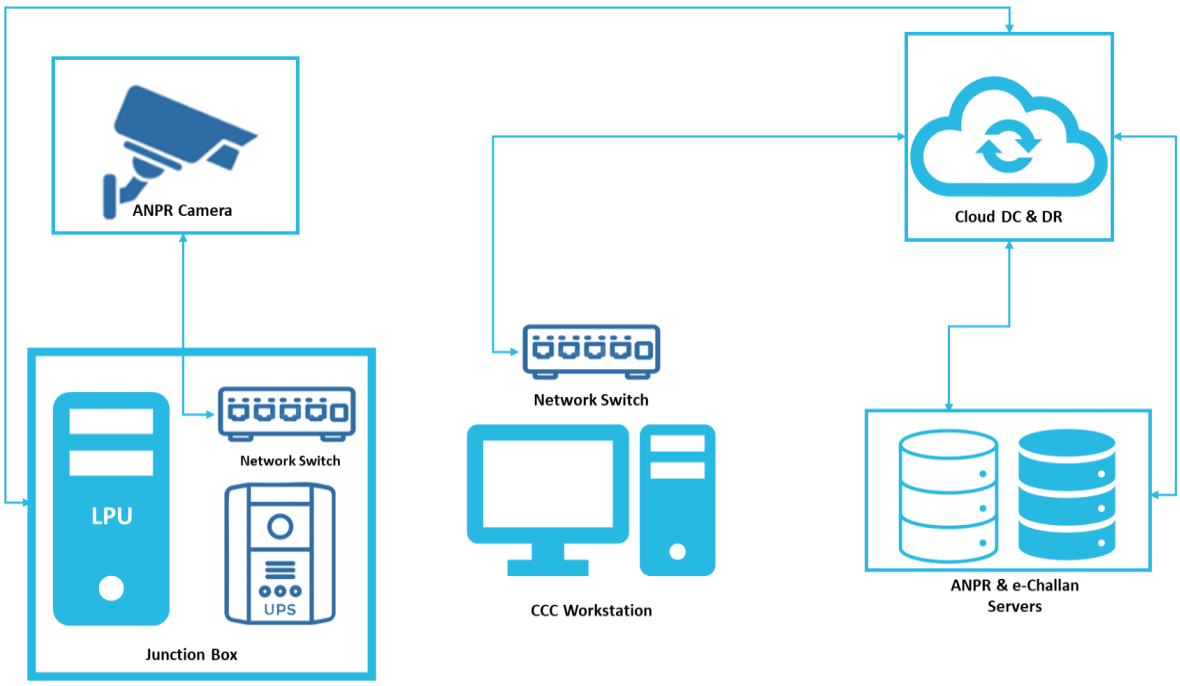
The MSI will be responsible for the customization of the solution as per the instruction and requirements of office of the Transport Commissioner.

3.2.1.1 License

The MSI shall procure, provide, and install all authorized and licensed hardware as per requirement of RFP. The MSI must supply Authorized license of

- Channel licenses for IEMS (Cameras & Field Devices).
- All licenses must be perpetual, and ownership must lie with office of the transport commissioner.

3.2.2 Automatic Number Plate Recognition (ANPR) System

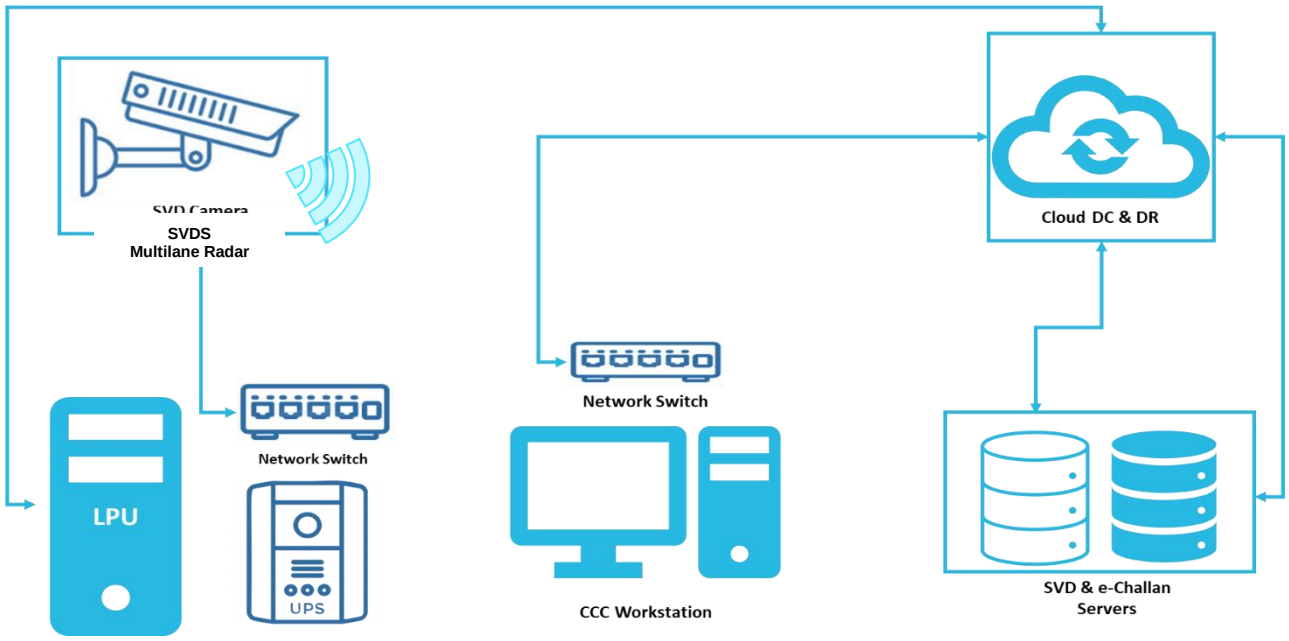


Automatic Number Plate Recognition (ANPR) system shall be capable of capturing the registration plates of any vehicle(s) in the field of view (FOV) of the camera so that even if there is more than one vehicle within the camera FOV, then all of them will be independently processed and their registration plates will be recognized irrespective of the type of vehicle – car, taxi, bus,

truck, auto rickshaw, motorcycle, or any others that require valid registration plates to ply on the road.

1. The System should automatically detect a vehicle in the camera view using video detection and activate Registration plate recognition. One ANPR camera shall be utilized for up to 4 lanes of road for doing ANPR.
2. The System should automatically detect the registration plate (for all states & UTs of India) including new and old registration marks, in the captured video feed in real-time and the system should perform Optical Character Recognition (OCR) of the registration plate characters. The ANPR camera should be able to capture the violating vehicle with speed of up to 180 kmph.
3. System should be able to detect and recognize the English alpha numeric registration plate in standard fonts and formats for classes of vehicles such as Light Motor Vehicle, Heavy Motor Vehicle, Heavy Commercial Vehicles, Public Passenger Vehicle.
4. The system should capture HSRP & standard vehicle's number plates with an accuracy of at least 97% during day & night across all weather conditions throughout 24x7.
5. The System should store JPEG image of vehicle and registration plate and validate the registration plate number into the database along with the date, time stamp, Lane No, Lane Details, and Gantry/Cantilever location details including the Latitude and Longitude.
6. The system should generate an automatic alert in the UCCC when it detects any vehicle violating predefined MV rules through the ANPR camera. The Emails to be sent to the designated authorities of the office of Transport Commissioner by MSI. The SMS will be sent through eChallan System.
7. The system should provide an option to the operator to edit the registration plate number of the vehicle when compared to digital Image and if any misrepresentation of data is witnessed. The system should show the registration plate of the vehicle in a zoomed window for easy inspection of the registration plate number. The system should keep an audit trail of any registration plate number edited by the operator.
8. The Emails to be sent to the designated authorities of the office of Transport Commissioner by MSI. The SMS will be sent through eChallan System.
9. The system should have function of searching the vehicles based on the following search criteria:
    - number of the registration plate
    - Junction/Location Name
10. The search should yield a result along with the cropped image of the registration plate in a matrix format.
11. The system should be capable of providing all the above functionality on multi lane (up to 6 (3+3) Lane) with simultaneous incident detection and recording.

3.2.3 Speed Violation Detection (SVD) System (Over speeding)



1. The system should be an object frame rate & radar-based speed violation detection system shall be used for speed detection. MSI will make provision to install one radar which will accommodate upto 3 lanes on one side of road. One Radar for 3 lanes will ensure scalability of the system in case of future expansion of roads and it should be of advanced technology.
2. The accuracy of the radar speed detection system should be at least 98% and capture up to minimum 180 kmph speeds during day and night for all types of vehicles.
3. The system should generate an automatic alert in case of a speed violation exceeding the speed limit as earmarked across the stretch and generate a unique case number for each violation detected.
4. The system should have been certified/tested by a reputed Indian test laboratory or institute under central government or equivalent international institution. Relevant certificate/test report should be submitted along with bids.
5. The system should have the capability to classify the vehicle under categories such as car, three-wheeler, two-wheeler, heavy vehicle, etc.
6. The system should allow the operator to set different speed limits for different categories of vehicles and different stretches of road.
7. The event window should display cropped image of the number plate of the vehicle along with the over speeding event. The window should also display at least 2 clear snapshots from camera associated with the event ensuring clear visibility of the number plate.
8. The system should allow the operator to flag the event for storing the event perennially.
9. The system should have an algorithm to calculate the segmental speed of a vehicle between two gantries/cantilevers.

10. The system should be capable of multi lane (up to 6 (3+3) Lane) functioning with simultaneous incident detection and recording.
11. The MSI shall design, supply, and install the speed violation detection system as per functional requirement, all wiring connections for the system shall be installed by the MSI.
12. The MSI shall be responsible for providing warning signs at the IEMS locations.

3.2.4 Evidence Camera for detection of Traffic Violations

The Single Overview Cameras will be installed for up to 4 lanes on each side & integrated with AI (by software module) to detect any traffic violation and integrate the same with ANPR system and e-Challan system to generate challans.

The MSI shall procure, supply, design and install the traffic violation detection system as per functional requirements of the below listed violations:

- Driving vehicles with excess speed (Over-speeding).
- Using Mobile Phone while driving.
- Driving against flow of traffic.
- Driver and Passenger not wearing seat belt.
- Riding more than two persons on two-wheeler.
- Riding without helmet by both rider and pillion rider
- Vehicles abandoned on Road.
- Any future scope of violations as added by STA.

3.2.5 Using Mobile Phone while driving detection system

1. The system should be able to detect the use of mobile phones while driving.
2. In the case of drivers using mobile phones while driving, the system should be able to identify the vehicle and provide an alert message.
3. The system should be able to capture Vehicle Number, Vehicle Type and evidence through ANPR.
4. The system should provide monitoring capabilities to detect and respond to instances of mobile phone use while driving as they happen. This includes live alerts and notifications to relevant authorities.
5. The system should log all incidents of mobile phone use while driving, including timestamps, location, and vehicle information. These logs can be used for enforcement, analysis, and reporting.
6. Utilize machine learning and AI algorithms for improved accuracy in detection and decision-making.
7. Data collected by the system shall be securely stored in the cloud for long-term archiving and

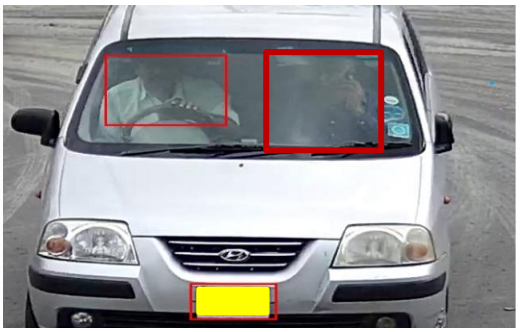
analysis.

8. Implement reporting capabilities that allow authorities to generate reports on mobile phone use incidents, including statistics, trends, and analysis. These reports can be used for law enforcement, policy evaluation, and public awareness.
9. Ensure that the system complies with all relevant legal and privacy regulations. This may include data protection laws and regulations governing the use of surveillance technology.
10. Design the system to scale as the number of monitored areas and vehicles increases. This includes the ability to add more cameras and processing resources as needed.
11. Enable remote configuration and software updates to ensure that the system can adapt to changing requirements and regulations.
12. The bidder shall provide additional features to enhance the effectiveness and functionality of a mobile phone use detection system while driving, making it more comprehensive and versatile for traffic safety and law enforcement purposes.

3.2.6 Driving against flow of traffic Detection System

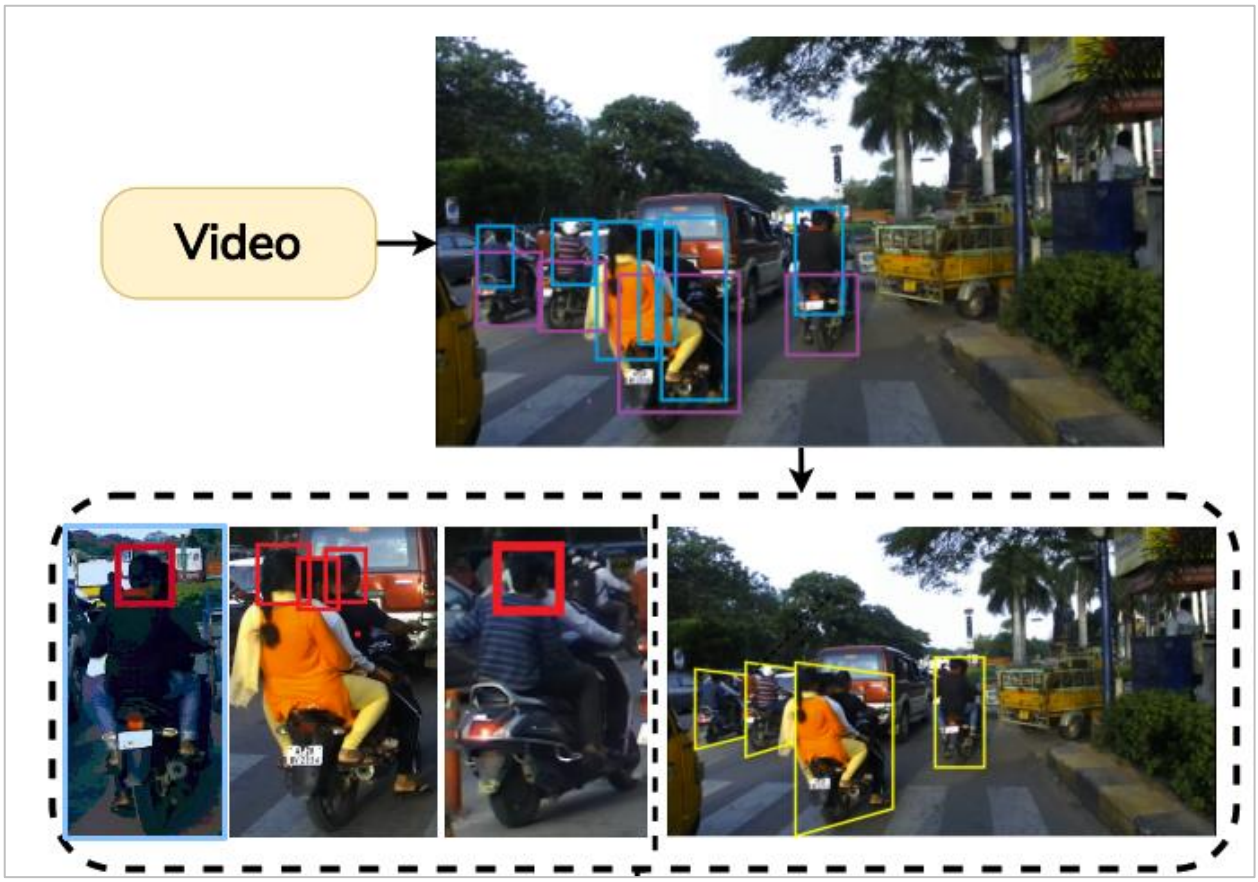
1. The system should be able to monitor highway ramps in both directions 24 hours a day without interfering with other traffic detection systems.
2. As a wrong-way vehicle approaches the system should detect the incoming vehicle and simultaneously trigger the warning alerts and activate the ANPR cameras and analytics.
3. The system should be able to capture vehicle details along with the evidence.
4. The system should be able to use appropriate enforcement measures as per the MV Act & direction from Office of the Transport Commissioner.
5. Implement reporting capabilities that allow authorities to generate reports on mobile phone use incidents, including statistics, trends, and analysis. These reports can be used for law enforcement, policy evaluation, and public awareness. Utilize machine learning and AI algorithms for improved accuracy in detection and decision-making.
6. Data collected by the system shall be securely stored in the cloud for long-term archiving and analysis.
7. Enable remote configuration and software updates to ensure that the system can adapt to changing requirements and regulations.
8. Ensure that the system complies with all relevant legal and privacy regulations. This may include data protection laws and regulations governing the use of surveillance technology.
9. Design the system to scale as the number of monitored areas and vehicles increases. This includes the ability to add more cameras and processing resources as needed.
10. The bidder shall provide additional features to enhance the effectiveness and functionality of driving against flow of traffic detection system and adaptability for use in law enforcement and traffic safety.

3.2.7 Driver and Passenger not wearing seat belt detection system



1. The system should be able to detect the seat belt status in 4 wheelers.
2. The Driver & the front-line passenger should wear seat belts. In case of not wearing the system should be able to identify the vehicle and provide an alert message.
3. The system should be able to capture Vehicle Number, Vehicle Type and evidence through ANPR.
4. Data collected by the system shall be securely stored in the cloud for long-term archiving and analysis.
5. Enable remote configuration and software updates to ensure that the system can adapt to changing requirements and regulations.
6. Ensure that the system complies with all relevant legal and privacy regulations. This may include data protection laws and regulations governing the use of surveillance technology.
7. These technical requirements will help in the development and implementation of a comprehensive seat belt violation detection system for 4-wheelers, promoting traffic safety and enforcement of seat belt regulations.
8. The bidder shall provide additional features to enhance the effectiveness and functionality of driver and Passenger not wearing seat belt detection system and adaptability for use in law enforcement and traffic safety.

3.2.8 Riding more than two persons on two-wheeler Detection System



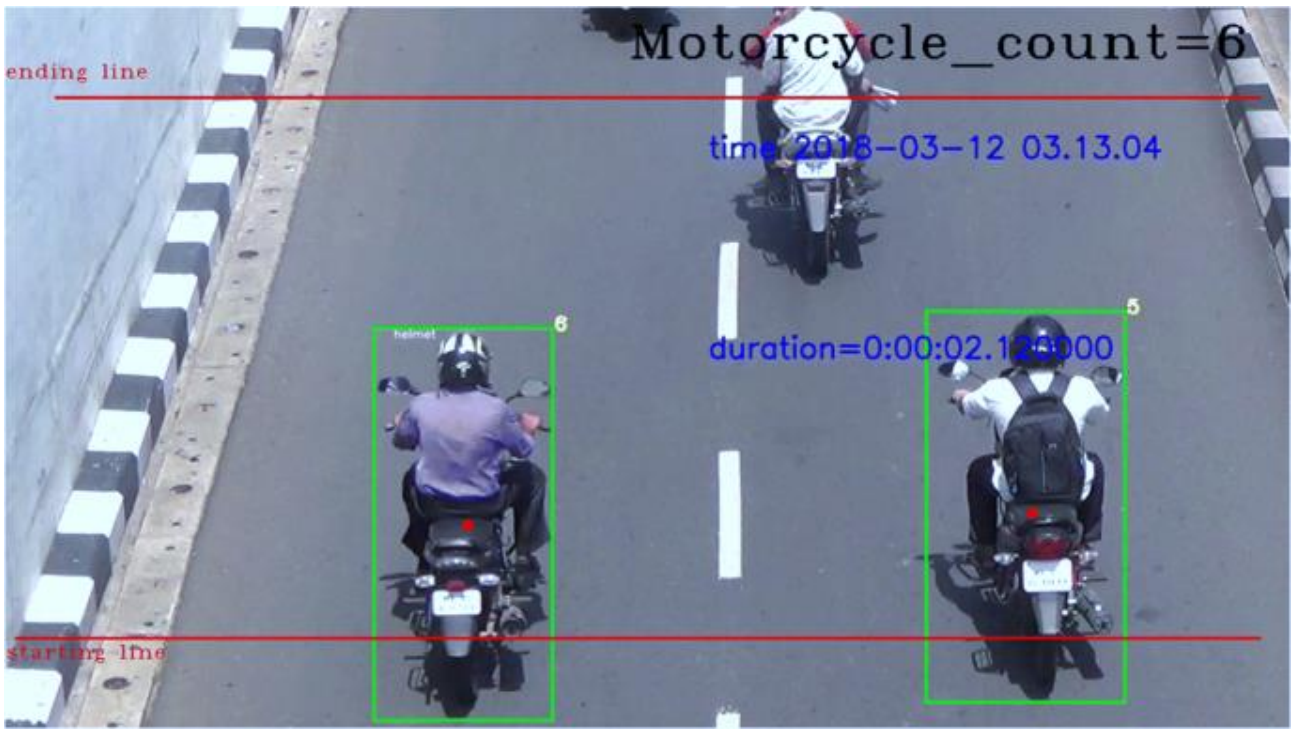
1. The system should have the capability to detect the people riding in triple seats on the motor bike. The system should capture the number plate of the motor bike from ANPR system and generate an alert with the evidence video.
2. Further the system will validate the adequate information of the vehicle from Vahan portal and challan will be generated through e challan system.
3. The system shall detect triple riding in real-time including identifying multiple riders on a single motorbike simultaneously.
4. The system shall Integrate an Automatic Number Plate Recognition system (ANPR) to capture the number plate of the motorbike.
5. The system should capture video evidence of the triple riding violation. This includes high-resolution images or videos that clearly show the violation and the faces of the riders.
6. Each incident should be timestamped and geotagged.
7. The system shall connect to the Vahan portal or a similar vehicle registration database to validate the vehicle's information, such as ownership, insurance, and registration status.
8. The system shall maintain a history of violations for each vehicle and rider. This information can be used for tracking repeat offenders and enforcing stricter penalties for habitual violators.
9. The system shall Implement role-based access control to ensure that only authorized personnel can access, review, and manage the system, including viewing evidence and

generating challans.

10. The system shall provide tools for analyzing data collected by the system, such as generating reports on the frequency of violations, areas with the highest occurrence, and trends over time. This data can inform traffic safety strategies and policy decisions.
11. The system complies with legal and privacy regulations, including data protection laws and regulations governing the use of surveillance technology.

3.2.9 Riding without helmet by both rider and pillion rider system

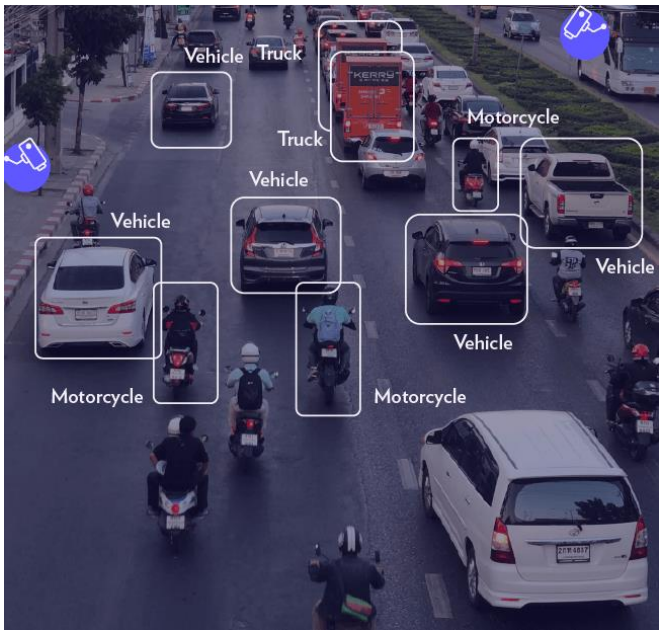
1. The system should collectively identify the incident where helmet less riding for both the rider and the pillion, shall be detected. This clause is applicable for the helmets meeting ISI and MVA standards.
2. This clause is applicable for the helmets meeting ISI and MVA standards.
3. The system should be able to detect the speed of the motor bike, if violating the speed rule.
4. The system should be able to search and show the report of the helmet violations based on the day, time of the day, registration plate number, location name, etc.
5. The system should integrate with e-challan generation software and RTO database to generate challans for No-Helmet violation event with details like violation image, time stamp, date, vehicle number.
6. The helmetless riding violations detection system should seamlessly communicate with systems like ANPR, Speed Detection and should have unified user interface.



3.2.10 Vehicle Classification

The system should be used for detection, recognition and tracking of the vehicles in the ANPR footage and would be able to classify as:

- Two Wheelers
- Three Wheelers
- Four Wheelers
- Heavy Vehicle any Non-Motorized Vehicle



In the future the system would be compatible enough to capture the traffic count at places of traffic congestion and should be able to send alert to the control room depending on the volume of vehicles permitted to ply on the roads.

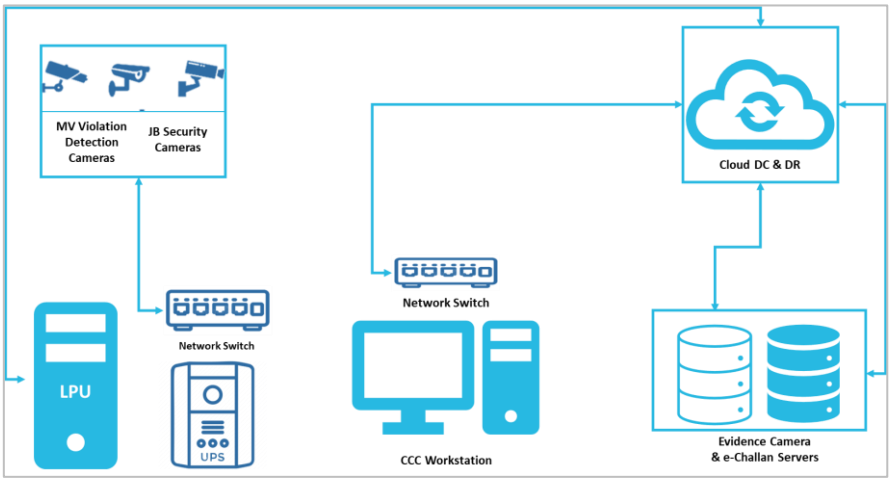
The system should facilitate to identify the vehicle that caused traffic congestion on NH or other designated places.

3.2.11 Artificial Intelligence (AI) and Deep Learning (DL) based IEMS.

1. The system should have the deep learning-based video analytics for IEMS such as:
   - Driving vehicles with excess speed (Over-speeding).
   - Using Mobile Phone while driving.
   - Driving against flow of traffic.
   - Driver and Passenger not wearing seat belt.
   - Riding more than two persons on two-wheeler.
   - Riding without helmet by both rider and pillion rider
   - Vehicles abandoned on Road.
   - Any other MV violations or Incidents as required by office of the Transport Commissioner
2. The deep learning-based IEMS system should work on edge processing and de-centralized architecture. The system should get the live data stream from the cameras and edge devices to the data center hosted on cloud infrastructure for processing.
3. The monitoring dashboard shall show status (connected / disconnected/ faulty/ working) for all devices (ANPR Cameras, Radars, Evidence Cameras, LPUs, Overview Cameras, other units etc.) when connected for a particular node from monitoring dashboard at Unified Command &

Control Center.

4. The deep learning based ANPR system should improve the number plate detection for up to 97 percent for all vehicles with standard number plates during the day and nighttime (with low illumination and provision of night vision).
5. The system should be capable of multi lane (up to 6 Lane (3 + 3 Lane)) functioning with simultaneous incident detection and recording.



3.2.12 Pole mounted Junction Box security System

1. The MSI should supply, deliver, and install pole/gantry mounted outdoor industrial security boxes.
2. The boxes should be able to trigger alarm when there is any attempt for following actions.
   - Opening of the door/box
   - Unavailability of power supply
   - Cutting or Tampering of the box
   - Unmounting of the boxes
3. A surveillance camera should be provided for the field area surveillance of junction boxes. The image/video data should be transmitted to the UCCC and other monitoring stations such as RTO offices and nearest police stations.
4. The MSI will be responsible for providing live feed of the surveillance to the nearby RTO offices and police stations as per the requirements of office of the Transport Commissioner. The solution shall have the provision of providing live feed at different offices as per the requirements of office of the Transport Commissioner.

3.2.13 Service Level Agreement (SLA) Monitoring Tool

- The MSI shall establish an SLA Monitoring Tool, which would undertake enterprise-wide proactive monitoring and management.
- This system shall enable proactive monitoring and reporting of any and every issue faces in the enterprise.
- The System shall communicate with the IT assets using Network Management Tool or equivalent technology.
- All the devices that will be installed in the IEMS Project as part of the physical infrastructure should be SNMP enabled and shall be centrally and remotely monitored and managed on a 24x7x365 basis. Industry leading infrastructure management solution should be deployed to facilitate monitoring and management of the IEMS Infrastructure on one integrated console.
- This system shall be set up in a highly available mode.
- The system shall be able to provide helpdesk support on a 24X7X365 basis.
- In future if required then the system shall have the capability of integrating SLA monitoring alerts with Mobile Application. The system should provide real-time alerts and notifications via various channels (email, SMS, mobile app, etc.) to relevant stakeholders when SLA thresholds are in danger of being breached or when critical issues arise.
- The system shall allow customization of SLA thresholds for different services or components, so that each service can have its own specific monitoring and alerting criteria.
- The system shall store historical data and provide analytical tools to track SLA performance over time, helping in identifying trends and making informed decisions.
- The system shall utilize machine learning and data analytics to identify performance trends and potential issues before they impact SLAs, allowing for proactive problem resolution.
- The system may include tools like Ping, Traceroute, Telnet , SNMP Walk, or any other such tools for finding root cause & to pinpoint the exact issue/aiding in faster resolution and to avoid SLA violations.
- The system shall enable automated remediation for common issues and workflows, reducing the need for manual intervention and minimizing downtime.
- The system shall provide customizable dashboards and reports to give a real-time overview of SLA compliance and issue status to both IT and business stakeholders.
- The tool can scale horizontally and vertically to handle the growing volume of data and services.
- The system shall implement security and compliance monitoring to ensure that the enterprise adheres to relevant regulations and industry standards.
- The system shall define escalation paths and procedures for handling SLA violations, including automatic escalation to higher tiers of support or management.
- The system shall maintain an audit trail of all changes and activities within the monitoring tool for compliance and reporting purposes.
- The system shall offer advanced reporting capabilities, such as ad-hoc reports, predictive analytics, and trend forecasting.

3.2.14 Integration with legacy systems

The UCCC solution shall have capability of integration with other third party solutions/systems like towing system, Highway police in case of accidents, interceptor vehicles, Toll gates system etc. The UCCC solution shall have capbility of capturing data from other systems and analyse the same as per the requirements from Ofiice of the Transport Commissioner.
The Transport Commissioner's office will provide the MSI with the necessary permissions and information, but the MSI will have to coordinate with the relevant agencies to ensure successful integration.
List of legacy system:

- e-Challan
- CCTNS (Crime and Criminal Tracking Network and Systems)
- Vahan 4.0
- Sarathi 4.0
- ERSS (Emergency Response Support System)
- IRAD (Integrated Road Accident Database)
- DEESHA Solution

The UCCC software shall be able to integrate with existing systems and solutions like e-Challan, Vahan 4.0 and Sarathi 4.0 for data access along with CCTNS, ERSS, Highway Patrol, Interceptors, IRAD, VLT for data access and transactions. The Transport Commissioner's office will provide the MSI with the necessary permissions and information, but the MSI will have to coordinate with the relevant agencies to ensure successful integration. However, the office of the Transport Commissioner will provide administrative support to MSI for successful integration.

The office of the Transport Commissioner has placed mobile speed detection system & may procure some interceptor vehicles in future, the selected MSI need to integrate those vehicles and systems in the new environment without any preconditions for ease & single point of operation. It is also to be noted that, the challan generation will be same also after integration. All the functionalities of the centralized software mentioned in this RFP, should be accessible vide the client version software installed in the command control Centre.
The office of the Transport Commissioner will facilitate the required information and tools for integration. However, the successful integration will be the responsibility of MSI.

It is also to be noted that the software application developed by the selected MSI must be certified by STQC/ CERT-IN authority prior Go-Live and the certificate needs to be submitted to the Office of the Transport Commissioner authority during the User Acceptance Test/Go Live of the application.

3.2.15 Project Management Services

- Manage entire project from conceptualization to operationalization and maintenance as well as subsequent transfer of infrastructure/ applications and handholding for the duration of this contract.

- Within the defined timelines, MSI shall prepare a comprehensive project plan for entire project covering detailed tasks which are to be carried out as a part of this project along with delivery schedule and key milestones.
- MSI should setup a project management information system which will enable sharing of project plan, regular status updates, issue register with all stakeholders involved.
- MSI should define the project governance structure detailing and highlighting roles and responsibilities for all stakeholders involved from MSI's team, Board, other stakeholders.
- MSI is expected to detail the project implementation approach, phases involved, highlighting dependencies.
- Project plan should necessarily cover areas of time, scope, quality, and risk management for the entire project. Plan should also include a work breakdown structure detailing various components expected as outcomes which need to be mutually agreed with the Office of the Transport Commissioner.
- In addition, MSI should also provide timelines for sharing of supplementary plans such as development schedule, user testing plan, pilot release plan, deployment plan, etc.
- Considering that the project involves a major transformational change within the Office of the Transport Commissioner, MSI will be expected to detail out a comprehensive change and communications management strategy and plan. The project plan will be revised within mutually decided timeline and shared with all stakeholders.
- On a monthly basis, MSI will provide a project status report which will necessarily highlight milestones achieved / missed, milestones currently in execution, deviations observed, changes made to project plan, issues raised and resolved/pending. The format for status report will be mutually agreed with the Office of the Transport Commissioner.
- MSI along with the Office of the Transport Commissioner's consent will define a change control procedure to monitor implementation of any changes in the contract subject to conditions as laid out in this RFP. No change will be accepted without approval of the Office of the Transport Commissioner and defined as a part of project governance structure.
- The MSI shall deploy following minimum project management resources for implementation phase till Go-Live of the project.

Sr. No.	Role of Resource	Quantity	Requirements
1.	Project Manager	1 No	A) Educational Qualification: BE/B. Tech/MCA/M. Tech with MBA or equivalent C) 12 Years of Work experience in the capacity of Project/Program Manager in ICT implementation Projects D) At least 3 similar Project/Program management Experience in ICT implementation Project (Command Control Centre/Intelligent/Integrated

Sr. No.	Role of Resource	Quantity	Requirements
			Traffic Management System/Adaptive Traffic Management System)
2.	Solution Architect	1 No	A) Educational Qualification: BE / B. Tech with master's in science with Specialization in Computer Science/M. Tech. or equivalent B) 7 years of Work experience in the capacity of Solution Architect
3.	Cloud Hosting Expert	1 No	A) Educational Qualification: BE / B. Tech with MS/M. Tech. or equivalent B) 7 years of Work experience in the capacity of Solution Architect and DC/DR management
4.	Technology Expert	1 No	A) Educational Qualification: B.E./ B. Tech with MBA / MCA/ Post-Graduation in IT or equivalent B) 7 Years of Work experience as IEMS/ ATCS / Transportation expert

Sr. No.	Role of Resource	Quantity	Requirements
5.	Network Expert	1 No	A) Educational Qualification: BE / B. Tech and/or MS/M. Tech. or equivalent B) Certification: Any in Network Administration C) 7 Years of Work experience in the capacity of Network Expert

3.2.16 Training & Capacity Building

- Training & Capacity Building is an important aspect of this project, the Office of the Transport Commissioner expects the MSI to undertake training in a very professional manner.
- MSI shall conduct a proper training need analysis of all the concerned staff and draw up a systematic training plan in line with the overall Project plan.
- For all these training programs the MSI shall provide necessary course material and reference manuals (user/maintenance/ administration) along with training schedules for all phases. The training shall be held at various office/department locations as finalized by the Office of the Transport Commissioner.
- This training shall focus on the functional use of the IEMS implemented to end users. This training shall enable the end users to know about all operations of the IEMS. Post Training end users shall be able to implement the overall process defined by the Office of the Transport Commissioner.
- Additional Training requirements will be assessed by the Office of the Transport Commissioner and Police Department along with MSI when such requirements arise.
- Other requirements to be fulfilled by the MSI with respect to training are as follows:
    - Prepare the training material in consultation with the Office of the Transport Commissioner and Police Department & its authorized committees. Detailed training manuals would be prepared by the MSI prior to the start of the training. Master copies of all training material should be submitted to the Authority for approval.
    - One Hard Copy & One Soft Copy of the training material shall be given by the MSI to all the trainees. The location for the Administrative & Sr. Management Training will be decided subsequently.
    - The MSI shall ensure that the knowledge transfer to the Office of the Transport Commissioner and Police Department staff happens effectively post training.

3.2.17 Provision for Storage & Recording Services till Go-Live

- It is proposed that the storage solution should be modular enough to ensure compliance to the changes in storage / recording policy, to be evolved upon initial deployment of the system.
- MSI shall consider minimum storage requirements till Go-Live.

3.3 Hardware Components – Technical Specifications

The MSI will be responsible for the compliance for each of the items and corresponding to the defined features mentioned herewith during procurement process.

3.3.1 ANPR Cameras

#	Feature	Technical specification	Compliance (Yes/No)
1.	Image Sensor	1/2.8” Progressive scan CMOS Global Shutter	
2.	Maximum Resolution	4112 x 2176/ 3840 x 2160 (8 MP) or better	
3.	Lens Type	Fix or Full focus focal	
4.	Focal Length	22 / 32 / 50mm option to suit application. Lens must focus visible and infrared light at the same depth.	
5.	Aperture	F1.8 or better	
6.	Day/Night	Removable or fixed IR-cut filter for day & night function	
7.	Mono/Color	Color	
8.	Effective Sensor Diagonal	9.1 mm or better	
9.	Ingress Protection	Weather-proof IP66-rated housing or better Vandal-proof	
10.	Shutter Time	1/1000 to 1/10,000 sec. or better	
11.	Capture Range	35 meters or better	
12.	Power Input	DC 12V to 24V or PoE	
13.	Operating Temperature	0°C ~ 60°C suitable for Odisha weather conditions	
14.	Interface	MJPEG / H.264 / H.265 or better	
15.	Synchronization	Fast Ethernet (100 Mbit/s) or better	
16.	Exposure Time Control	Via hardware trigger Via software trigger Via free run Via hardware trigger Programmable via the camera API	
17.	Presence in India	Any globally reputed Manufacturer presence in India for more than 5 years.	

3.3.2 Speed Violation Detection Radar

#	Feature	Technical specification	Compliance (Yes/No)
1.	Technology	Object tracking (range, angle, speed) with UHD resolution independent discrimination of multiple targets at same speed and range	
2.	Speed Range	5 Km/H to minimum 180 Km/H	
3.	Field of view	+/- 9 Degree (LRR), +/- 45 Degree (MRR),	
4.	Frequency	76-81 GHz integrated CMOS transceiver or any other band allowed by Government of India. The bidder shall provide certificate from WPC, Ministry of Communication (Dept of Telecommunication) for operating in license exempted bands permitted in India. The Radar Sensor proposed should be fully compliant to all frequency norms in India.	
5.	Interface	Ethernet/CAN/RS485	
6.	Housing	IP66/67	
7.	Simultaneous Tracking of Objects	256 or more	
8.	Max. speed Detection Range	250 Mtr or more	
9.	Operation Mode	Approaching Object detection	
10.	Accuracy	98% or better	
11.	Refresh Time	75msec or better, Multi lane operation	
12.	Certificates	Valid certification from any NABL accredited laboratory / ARAI/ICAT/VRDE/GARC certificate of Government of India or Indian testing agencies in accordance Section 167A and rule 126 of the Central Motor Vehicle Rules (CMVR) 1989. FCC, IEC 60068-2-31	
13.	Output Format	Track object list	
14.	Trigger	Range, Speed and Class based triggers (Remotely Configurable)	
15.	Classification	4 Vehicle classes (Further upgradable to 6)	
16.	Ghost object removal	Yes	
17.	Presence in India	Any globally reputed Manufacturer presence in India for more than 5 years.	

3.3.3 Video Analytical Camera for Traffic Violation detection

#	Features	Technical specification	Compliance (Yes/No)
1.	Sensor	1/2.8" or better	
2.	Sensor type	Progressive scan CMOS Global shutter	

#	Features	Technical specification	Compliance (Yes/No)
3.	Resolution (H x V Pixels)	2560 × 1440 or better	
4.	Resolution	4 MP or better	
5.	Effective Sensor Diagonal	8.9 mm or better	
6.	Frame Rate (at Default Settings)	Mainstream (2560 × 1440@25/30fps) or better Sub stream (1920 × 1080@50/60fps) or better	
7.	Mono / Color	Color	
8.	Day/Night	Yes, IR Cut Filter	
9.	Image Data Interface	Fast Ethernet (100 Mbit/s)	
10.	Synchronization	Via hardware trigger Via software trigger Via free run	
11.	Exposure Time Control	Via hardware trigger Programmable via the camera API	
12.	I/O Lines	1 opto-coupled input line 1 opto-coupled output line 1 general purpose I/O (GPIO) line	
13.	Lens Mount	C-mount	
14.	Video Compression	MJPEG / H.264 / H.265 or better	
15.	Interface	Fast Ethernet (100 Mbit/s) or better	
16.	Operating Temperature	0°C ~ 60°C suitable for Odisha weather conditions	
17.	Presence in India	Any globally reputed Manufacturer presence in India for more than 5 years.	

3.3.4 Pole Security Camera

The Pole Security Camera shall be installed & integrated with AI (by software module) to detect any unwanted activity near IEMS locations and trigger alert to the UCCC. Moreover, if any node is disconnected, the system shall raise an alert to the UCCC & appropriate action shall be taken by MSI to rectify the same. The Alerts will also be transmitted to RTO offices & police stations nearer to the location on need basis. A monitoring station will be provided at RTO offices & police stations nearer to the location.

#	Feature	Technical specification	Compliance (Yes/No)
1.	Camera Type	Varifocal Bullet Camera	
2.	Image Sensor	1/2.8 inch CMOS or better	
3.	Resolution	2 MP, Min. 1920 × 1080 at 30 FPS or better	
4.	Video Compression	MJPEG / H.264 / H.265 or better	

#	Feature	Technical specification	Compliance (Yes/No)
5.	Audio Compression	G.711ulaw/G.711alaw/G.722.1/G.726/MP2L2/PCM/MP3/MJPEG, should support Environment Noise Filtering	
6.	Streaming	Min. three compressed stream (Individually Configurable)	
7.	ID/Password	Multi-level user ID/Password	
8.	Simultaneous Live View	Up to 6 channels	
9.	Physical Layer	1 RJ45 10M/100M self-adaptive Ethernet port	
10.	Security	Password protection, complicated password, HTTPS encryption, Stateful IP address filter	
11.	Protocol	TCP/IP, ICMP, HTTP, HTTPS, FTP, DHCP, DNS, DDNS, RTP, RTSP, NTP, UPnP, SMTP, IGMP, 802.1X, QoS, IPv4, IPv6, UDP, SSL/TLS, PPPoE, ARP	
12.	Lens Type	2.7 to 13.5 mm	
13.	Alarm	1 inputs, 1 output	
14.	Audio	1 inputs, 1 output	
15.	Image Enhancement	BLC, HLC, 3D DNR	
16.	Image Parameters Switch	Yes	
17.	Image Settings	Rotate mode, saturation, brightness, contrast, sharpness, gain, white balance adjustable by client software or web browser	
18.	Target Cropping	Optional	
19.	Illumination	Color: 0.002 Lux or better at (F1.4, AGC ON), 0 Lux with IR	
20.	Minimum Illumination	0.001 Lux | 0 Lux with IR	
21.	IR Distance	60 mtrs. or better	
22.	Privacy Mask	Yes	
23.	Electronic Shutter	1/3 s to 1/100,000 s with slow shutter support	
24.	Wide Dynamic Range	120dB	
25.	Day and Night	Day, Night, Auto, Schedule	
26.	Edge Storage	MicroSD / microSD HC / microSD XC slot supporting memory card for min. 256 GB (Min. Class 6 or higher, Card to be included)	
27.	Operating Temperature	0°C ~ 60°C suitable for Odisha weather conditions Humidity 95% or less (non-condensing)	
28.	Housing	IP67, IK10	
29.	Basic Events	Video tampering, Motion Detection. The system focuses on human and vehicle targets, vastly improving alarm efficiency and effectiveness	
30.	Power Source	12 VDC, PoE: 802.3at/af	
31.	Presence in India	Any globally reputed Manufacturer presence in India for more than 5 years.	

3.3.5 Junction box

#	Item	Technical Specification	Compliance (Yes/No)
1.	Sensor Specification	The sensor should be a 4-wired connection with tamper loop, up to 15 mm gap functionality with NC output. Contact Rating – 10W, 12/24 V DC. 0.5 A	
2.	Sensor solution detail	Sensor should sense any unauthorized access to Junction box and at the same time it will integrate with IEMS. An audio-Visual alarm should be generated at CCC for further action.	
3.	Alarm / Hooter	The junction box should have Alarm / Hooter for any unwanted tampering event. The hooter must create loud alert sound.	
4.	IP Rating	IP 65 or better	

3.3.6 Surge Protector

#	Feature	Technical Specification	Compliance (Yes / No)
1	Surge Suppression	Energy Dissipation (Data and Power lines): 2.1 Joules Ethernet Maximum Common Mode Voltage: 75 V Ethernet Maximum Common Mode Current: 200 A DC Power Line Maximum Common Mode Voltage: 93 V DC Power Line Maximum Common Mode Current: 16 A	
2	Environmental	IP54 or better	
3	Temperature	Operating Temperature: 0°C to +60°C or better	
4	Physical Connections	2 x RJ-45	
5	Presence in India	Any globally reputed Manufacturer presence in India for more than 5 years.	

3.3.7 Local Processing Unit (LPU)

#	Feature	Technical specification	Compliance (Yes/No)
1.	Processor and Memory	Intel i5 or better processor RAM 16GB or higher DDR4 2133MHz SODIMM, up to 32 GB	
2.	USB	3 X USB 2.0 or better	

#	Feature	Technical specification	Compliance (Yes/No)
3.	Network Connectivity	2 RJ 245 GigaLAN ports 1 Onboard RTL8111 Gigabit Ethernet NIC Or higher BaseT LAN support for 100Mbps or better to be present.	
4.	Storage	128 GB SSD SATA or better	
5.	Display Port	Display Port: HDMI, VGA interface, HDMI1.4 or higher.	
6.	Audio	Audio support through MIC and Speaker	
7.	IP Rating	IP65 or higher rated.	
8.	Graphics	Yes	
9.	Input DC Supply	12V/ DC 5A	
10.	Dimension	Deleted	
11.	Certifications	FCC, CE, RoHS and BIS.	
12.	Operating Conditions	0°C to +60°C or better relative humidity(RH) of 10~90% @30 degree centigrade(non-condensing)	
13.	OS	Linux or Windows OS.	
14.	Serial communication	2 or more RS232 serial ports.	
15.	Chassis /Enclosure	Rack Mountable / Junction Box Mountable	
16.	Presence in India	Any globally reputed Manufacturer presence in India for more than 5 years.	
17.		Next Generation Anti-virus and Endpoint Security shall be considered.	

3.3.8 Integrated Power Rack

#	Technical Requirement	Compliance (Yes/No)
1	System:	
2	Rack should be designed to provide Compatible, Secure, Monitored, Manageable, simplifying infrastructure deployment in Edge Environment.	
3	Rack should be self-Contained with proper air circulation.	
4	Rack should be designed so that it is compatible with latest converged and hyper-converged IT System.	
5	The Enclosure solution should be - 15U 600W 800 D enclosure upto 1000 mm (Overall) in height with 850 mm Width and 600 mm Depth for Server & Networking application.	
6	Power supply input: Single Feed AC 230V +/-10% /1P/50-60Hz.	
7	Country of Origin: India	
8	Physical Requirement:	
9	Doors: The Rack Front door shall have Metel Plain door and rear shall be closed.	
10	Doors shall be reversible with capability to install hinges on left or right position	

#	Technical Requirement	Compliance (Yes/No)
11	Mechanical swing handle with 3-point locking provision.	
12	The Rack should have one pair of full side panels, Top & Bottom, grounding and bonding accessories pre-installed by the OEM.	
13	Installation type: Floor mount	
14	The overall Rack height shall be inclusive of 100mm bottom plinth	
15	Equipment Access & Installation	
16	Space inside the cabinet to be suitably designed for optimum use of available space inside cabinet. The Rack should have minimum 15U available usable Space.	
17	The Rack should have 4 Nos. 19” verticals equipment mounting angles with 'U' marking, screen printed.	
18	The front door should be easily detachable and openable for ease of accessing.	
19	Material Requirements	
20	19” equipment mounting angle should be 2MM.	
21	All sheet metal parts should be Pre-Treated and powder coated.	
22	Certifications, Environmental and Safety Requirements	
23	Racks should be manufactured by ISO9001:2008, ISO14001:2004, ISO 45001:2018 & ISO 50001:2018 Certified company and should have proper EHS Policy.	
24	Manufacturing process shall comply with ROHS and REACH standards.	
25	The rack shall be IP55 certified from an accredited lab.	
26	Cable Management	
27	The Rack shall have dedicated cable management.	
28	Cabinet Interior Lightning:	
29	Front LED Lights to be provided.	
30	Remote Monitoring	
31	The Rack shall include a RS232 / RJ45 / RS485 interface port	
32	Power subsystem:	
33	Should have PDU 1U 6 X 5/15Amp Octagonal angular Socket with 16Amp MCB.	
34	Delivery & Installation	
35	The unit should be shipped fully assembled as one orderable Unit including enclosure, and smart power distribution panel	

3.3.9 Industrial Managed PoE + Switch

#	Technical Specifications	Compliance (Yes / No)
1.	L2 Managed Industrial Switch with 16x10/100/1000Base-T(X) P.O.E., 2xGigabit combo P.S.E. and 2x100/1000Base-X, SFP socket	

#	Technical Specifications	Compliance (Yes / No)
2.	Should support PoE as per IEEE 802.3af and 802.3at with PoE budget of 240W or better.	
3.	Should have Minimum 20Gbps switching bandwidth and Min. 14Mbps Switch- forwarding rate	
4.	Layer 2 Features: Should support STP, RSTP, MSTP, IGMP v1/v2/v3 snooping, loop protection, 8k MAC Table or more, IEEE 802.1Q (4000 VLAN IDs), IEEE 802.3, IEEE 802.3u, IEEE 802.3ab, IEEE 802.3ad, IEEE 802.1p, IEEE 802.1Q, IEEE 802.1AB, Jumbo Frame Up to 9.6K Bytes or more,	
5.	Resiliency: Should support recovery time < 30ms over 250 units of connection. Standard redundancy protocols like RSTP/MSTP & MRP.	
6.	Security: Support ACL, TACACS+ and 802.1x User Authentication for security, DHCP (Server, Relay and Client, Authentication (MAC, Web and IEEE 802.1x), Device Binding security feature, Enable/disable ports, MAC based port security, Should have DOS/DDOS Auto Prevention.	
7.	Qos: Support application-based QoS management.	
8.	Management: Web-based,Telnet, Console (CLI), and Windows utility (Open-Vision) configuration, Support SNMP v1/v2c/v3 & RMON & 802.1Q VLAN Network Management, Provided HTTPS/SSH protocol to enhance network security.	
9.	The switch should support IEEE 802.3az Energy-Efficient Ethernet technology.	
10.	Should support Ipv4 and Ipv6 new internet protocol version.	
11.	Should inherently support operating temperature range of 0°C to 60°C or Better.	
12.	Switch Certifications: UL, EN, FCC, IEC60068-2-27 and IEC60068-2-6	
13.	Deleted	
14.	Any globally reputed Manufacturer should have 5 years of prior presence in India	

3.3.10 Online UPS

The MSI shall provide an online uninterruptible power supply (UPS), which will provide continuous, clean, and reliable electrical power to filed equipment mounted on gantry/cantilever in the event of power disruptions or failures. Its primary function is to ensure that critical devices and systems remain operational even when the conventional power supply experiences problems.

The MSI shall be responsible for providing redundant power and maintain SLA as defined in the RFP. Redundant power may be solar power arrangement for unreliable power locations integrated with UPS or a continuous power source.

The online UPS shall have provision for scaling up by adding external battery packs for extended runtime if necessary.

The MSI shall provide UPS with upto 4 hours of backup with uninterrupted power supply. The proposed system shall incorporate redundant power integration along with traditional power, ensuring an eco-friendly and renewable energy source.

MSI shall ensure the system is equipped with remote monitoring capabilities to facilitate efficient tracking and maintenance.

#	Technical Requirement	Compliance (Yes/No)
	Uninterruptible Power Supply (UPS) System	
1.	Should be appliance-based solution with purpose-built hardware with real-time analytics dashboard of the same OEM from day one.	
2.	Single Phase in and Single Phase Out, 4 Hours Backup on system load of each gantry/cantilever, Minimum 3000VA for 4 hours of Backup	
3.	UPS shall be with double conversion, IGBT rectifiers for all above type of loads.	
4.	The UPS utilizes double conversion online topology designed to protect electronic equipment by supplying reliable, network-grade power featuring extremely tight voltage and frequency regulation.	
5.	The UPS should feature an internal bypass and input power factor correction.	
6.	Scope of Supply	
7.	The scope of supply for the Uninterrupted Power System shall include but not limited to the following: UPS shall be used as secondary source of power supply. Further, MSI shall make provision of Solar based electric supply wherever required. UPS shall be used as a secondary source of power supply. Further, MSI shall make provision of Solar based electric supply wherever required.	
8.	Scope of Work.	
9.	The scope covers supply, installation, testing and commissioning of new UPS systems.	
10.	Supply, installation, testing and commissioning of Battery banks with battery mounting racks/ cabinets for new UPS system.	
11.	Supply, installation, testing and commissioning of cables and inter connection between battery banks and battery switchgear and UPS system.	
12.	Necessary filters to reduce the THD levels (as specified in data sheet).	
13.	Performance, Design, and Configurations:	
14.	The UPS and associated equipment operate in conjunction with a primary power supply and an output distribution system to provide quality uninterrupted power for a mission-critical, electronic equipment load.	
15.	This specification describes the performance, functionality, and design of the UPS, external battery packs, and connectivity solutions.	
16.	All programming and miscellaneous components for a fully operational system as described in this specification are available as part of the UPS.	
17.	Input	
18.	Input voltage : 220/230/240 Vac (PH-N)	
19.	Input voltage Range : 160 – 285V	
20.	Input frequency : 50 Hz / 60 Hz	
21.	Input frequency tolerance : 40 – 70 Hz auto-selecting	
22.	Input Power factor at nominal voltage and full load : ≥ 0.95	
23.	Input Connections : IEC 60320 C20	

#	Technical Requirement	Compliance (Yes/No)
24.	Input Circuit Breaker : Yes	
25.	Rectifier Circuit- IGBT Type : IGBT Type	
26.	Input phase to Output Phase : 1:1	
27.	Output	
28.	Rated voltage : 220/230/240 Vac	
29.	Output power factor : 0.9	
30.	AC output static voltage regulation: +/-1%.	
31.	Output Frequency : 50/60 +/- 3 Hz	
32.	Output Frequency Regulation: : Nominal +/- 0.1 Hz	
33.	Crest Factor :3:1	
34.	Output Voltage Distortion – Online Mode : 3% max. for full linear load.	
35.	Output Voltage Distortion – Battery Mode : 6% max. for full RCD load (100% VA, 0.9 PF)	
36.	Output Connections : (4) India 6A , (1) Terminal 24A	
37.	Overload Condition :	
38.	< 105% Continuous.	
39.	Up to 125% For 2 minutes.	
40.	140% for 30 secs.	
41.	Overload Capability (In battery mode)	
42.	< 105% Continuous.	
43.	Up to 120% For 1 minute.	
44.	Inverter Circuit : IGBT Type	
45.	Emergency Power Off (EPO) : All UPS Should have Integrated Emergency Power Off (EPO) terminal with normally closed (NC) contacts	
46.	Efficiency: Double-conversion mode : 90% @ 100% Load	
47.	Efficiency: ECO mode : 96% @ 100% Load	
48.	Heat dissipation : To be filled by the Bidder	
49.	STATIC BYPASS	
50.	Internal Static Switch Provided- Yes/No : To be filled by the Bidder	
51.	DC CHARACTERISTICS	
52.	Battery type : Lithium Ion Battery	
53.	Battery nominal voltage : Minimum 24V DC	
54.	Max Charging Current : To be filled by the Bidder	
55.	Charging method : Constant Current-Constant Voltage	
56.	Backup requirement: Minimum 3000VA for 4 hours of Backup	
57.	Cold start Required	
58.	Max Battery Support Required	
59.	CONTROLS	
60.	POWER ON/OFF button : Required	
61.	Mute / Escape button: Required	
62.	ENTER button : Required	

#	Technical Requirement	Compliance (Yes/No)
63.	Navigation buttons : Required	
64.	INDICATIONS (ALARMS)	
65.	Inverter Failure : Required	
66.	Overload (if load exceeds 100%) : Required	
67.	Overload shutdown : Required	
68.	Emergency shutdown : Required	
69.	Equipment over temperature : Required	
70.	Bypass ON : Required	
71.	DC over voltage : Required	
72.	Low battery : Required	
73.	Battery circuit breaker open : Required	
74.	Battery on load :Required	
75.	Mains failure :Required	
76.	Load on bypass :Required	
77.	UPS in Fault State : Required	
78.	Output voltage error : Required	
79.	MECHANICAL	
80.	Weight of UPS – Kg : To be filled by the Bidder	
81.	Dimension of UPS (W x H x D) in mm : To be filled by the Bidder	
82.	Ventilation : Forced air cooling required	
83.	Rail Kit Accessory :To be filled by the Bidder	
84.	ENVIRONMENTAL AND GENERAL CHARACTERISTICS	
85.	Operating temperature: 0 to 40 °C without capacity deration	
86.	Relative humidity: 0% to 95% non-condensing	
87.	Operating Altitude: 0 to 2000 meters without capacity deration	
88.	Storage Altitude :0 to15,000 meters	
89.	Storage temp.: -20°C to 50°C	
90.	Maximum No. of systems can be paralleled: To be filled by the Bidder	
91.	Cable entry - Top / Bottom: To be filled by the Bidder	
92.	Degree of Protection: Minimum IP 20	
93.	Conformal coated PCBAs: Required	
94.	Acoustic Noise Level: <50dBA	
95.	Compliances: IEC 62040-1, IS 16242 (Part 1), BIS, IEC 62040-2: 2016	
96.	Standard warranty: 3 Years on UPS and battery.	
97.	COMMUNICATION INTERFERENCE	
98.	Interface ports: Integrated Serial RS-232, USB (Type B), Intelligent Slot, SNMP	
99.	MODES OF OPERATION	

#	Technical Requirement	Compliance (Yes/No)
100.	Normal: The UPS output power stage (inverter) should constantly recreate the UPS output voltage waveform by converting the DC bus voltage to AC voltage through a set of IGBT switches. In both online operation and battery operation, the output power stage (inverter) should create an output voltage waveform independent of the mains input voltage waveform. Input voltage anomalies such as brown-outs, spikes, surges, sags, and outages should not affect the amplitude or sinusoidal nature of the recreated output voltage sine wave of the output power stage (inverter). The input PFC power stage and the output power stage (inverter) shall operate in an on-line manner to continuously regulate power to the critical load. The input PFC stage shall be capable of full battery recharge while simultaneously providing regulated power to the load for all line and load conditions within the range of the UPS specifications.	
101.	Battery: Upon failure of the AC input source, the critical load should be continued being supplied by the output inverter, which would derive its power from the battery system. There is no interruption in power to the critical load during both transfers to battery operation and retransfers from battery to normal operation.	
102.	Bypass: The system automatic bypass shall provide a transfer of the critical load from the Inverter output to the automatic bypass input source during times when the inverter cannot support the load. Such times may be due to prolonged or severe overloads or to UPS failure. The UPS should constantly monitor the output current as well as the bypass source voltage and inhibit potentially unsuccessful transfers to automatic bypass from taking place.	
103.	Automatic Transfers: An automatic transfer of load to bypass shall take place whenever the load on the critical bus exceeds the overload rating of the UPS. Automatic transfers of the critical load from bypass back to normal operation shall take place when the overload condition is removed from the critical bus output of the system. Automatic transfers of load to bypass shall also take place if for any reason the UPS cannot support the critical bus.	
104.	Manual Transfers: Manually initiated transfers to and from bypass may be initiated by the user display interface.	
105.	UPS Should be able to compatible with Solar System.	
106.	UPS monitoring Software: Centralized monitoring via SNMP v1, v3 or modbus TCP or physical server via Redfish protocols, User Management Secure outbound connections: Standard 2048-bit RSA certificate Accessible through Web or VPN based -- Cloud Based option with features like Device Search, Data Collection, Device Configuration, UPS Health Monitoring and interfacing with external systems through API.	

3.3.11 Solar Power Unit (New Addition)

Sr.	Features	Technical Specifications	Compliance (Yes/No)
1	Solar Panels	3 Kva,48 v Mppt Solar PCU	
2	Solar Module	40 w half-cut mono solar PV module or better	
3	Battery Capacity	150~200Ah Battery	
4	Output power	3000 W or better	
5	MPPT voltage range	100~490VDC	
6	Number of MPP trackers	2 or better	
7	Efficiency	98% or better	
8	Display	LCD or better	
9	Inverter Type	Hybrid with Battery Storage	
10	Mounting Structure	Non-corrosive	
11	Operating temperature range	As per Odisha Climatic Condition	
12	Certification	BIS	
13	Protection Rating	IP 65 or better	

3.3.12 Storage System (New Addition)

#	Parameters	Descriptions	Compliance (Yes/No)
1	CPU	Intel® Xeon® E E-2136 6-core / 12-thread processor	
2	CPU Architecture	64-bit x86	
3	Encryption Engine	Yes Option should be available to support FIPS 1402 certified self-encrypting drives (SEDs) Or encryption at controller level with license	
4	System Memory	16 GB UDIMM DDR4 ECC (2 x 8GB), scalable upto 64 GB	
5	Memory Slot	4 x UDIMM DDR4	
6	Flash Memory	5GB (Dual boot OS protection)	
7	Drive Bay	24 x 3.5-inch SATA 6Gb/s, 3Gb/s	
8	Drive Compatibility	3.5-inch bays:	
		3.5-inch SATA hard disk drives	
		2.5-inch SATA solid state drives	
9	Hot-swappable	Yes	
10	GPU pass-through	Yes	
11	Gigabit Ethernet Port	4	
12	10 Gigabit Ethernet Port	2 x 10GbE SFP+ Smart NIC port	
13	PCIe Slot	Minimum 5	
14		2 x Type-C USB 3.2 Gen 2 10Gbps	

#	Parameters	Descriptions	Compliance (Yes/No)
	USB 3 Gen 2 (10Gbps) Port	4 x Type-A USB 3.2 Gen 2 10Gbps	
15	Operating Temperature	0 - 40 °C (32°F - 104°F)	
16	Power Supply Unit	800W(x2), 100-240V	
17	System Warning	Buzzer	
18	Client Operating Systems	must be certified to support current versions of OS like Microsoft Windows Server, Red Hat Linux, VMware, Native files, Block Protocols, etc.	
19	Storage Pool	Yes	
20	Pool size	10 PB (Scalable up to 15 PB)	
21	RAID Support	The storage should support industry standard RAID levels like RAID 0, 1, 5, 6, RAID 10 or better; The storage should support combination of multiple RAID Levels in a single array.	
22	Storage Pool Expansion (by adding RAID Group)	Yes	
23	Internet protocol	IPv4, IPv6	
24	Network access protection with auto-blocking	SSH, Telnet, HTTP(S), FTP, CIFS/SMB, and AFP	
25	2-step verification	Yes	
26	Allow/Deny List	Yes	
27	Access Protection	Yes	
28	Service binding	Yes	
29	Firewall	Yes	
30	SAN/NAS Switch	Yes	
31	Warranty Support	5 Years (extendable up to 7 years)	
32	Scalability	Offered storage should support scale up for future capacity and performance enhancements	

3.3.13 Variable Messaging Display Board (VMD)/Speed Display

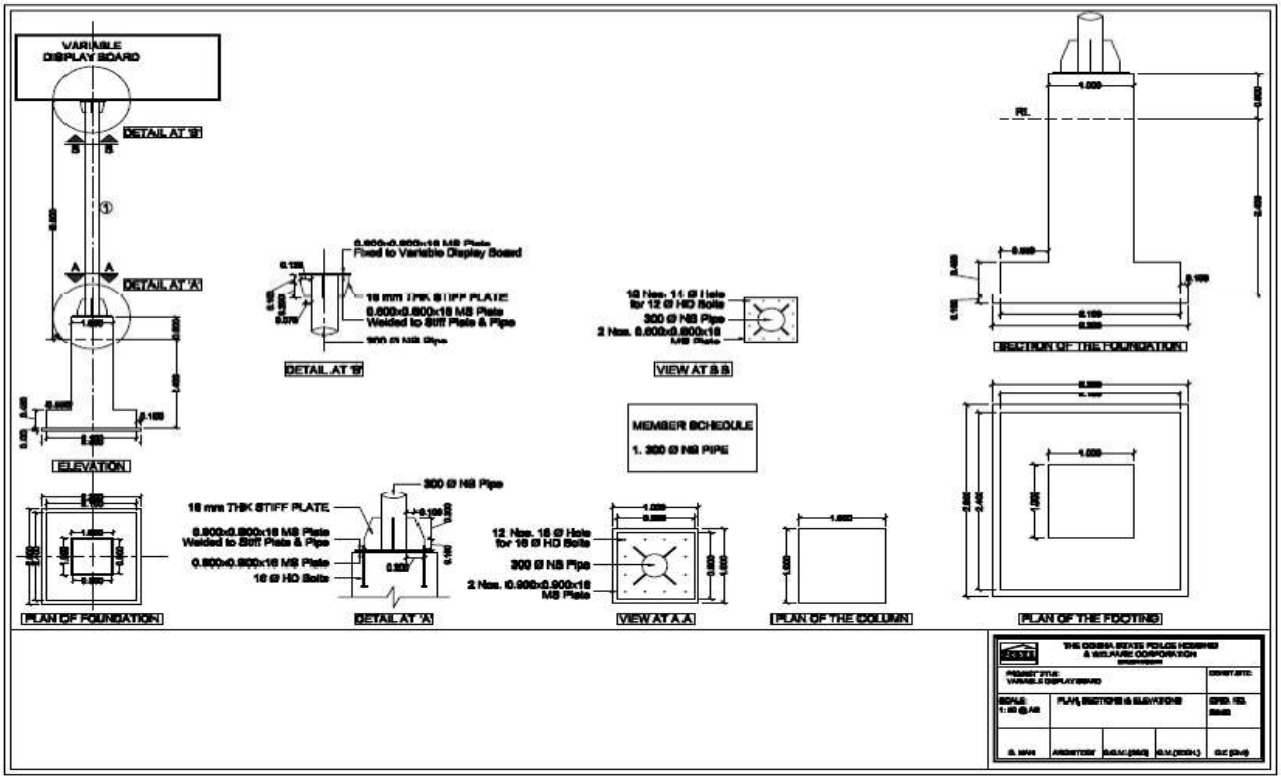
- The MSI shall install IP based VMD boards on strategic locations across the highways as per the requirement of the Office of the Transport Commissioner.
- VMD board displays shall be managed from UCCC remotely as well as at location locally. The contents will be provided by the Office of the Transport Commissioner. The purpose of the VMD boards is to display information about traffic rules and road safety or any other event-based content to create public awareness.
- The system should be capable of displaying warnings, traffic advice, route guidance and emergency messages to motorists from the Control Room in real time.
- The VMD shall display multicolour text, pictograms and info-graphic messages using Light Emitting Diode (LED) arrays.
- The casing of the VMD should IP 57 or better.
- The system should be able to display failure status of any VMD on dashboard hosted at UCCC.
- The system should support multilingual characters (English, Hindi, Odia & Regional Languages of Odisha in true type fonts and adjustable based on the requirement.
- The System shall be capable of setting an individual VMD or group of VMDs to display either one of the pre-set messages or content as desired by the Office of the Transport Commissioner.
- The central control computer shall perform regular tests (pre-set basis) for each individual VMD. Data communication shall be provided with sufficient security checks to avoid unauthorized access. The System shall be able to generate log reports and content runtime reports from UCCC.

#	Features	Technical Specification	Compliance (Yes/No)
1.	Model	To be specified	
2.	LED Type	SMD	
3.	Estimated LED lifespan (Hours)	100000 hrs.	
Module			
4.	Pixel Pitch (mm)	10	
5.	Pixel	1R1G1B	
6.	Module Resolution (W x H)	32 X 16 pixels (320 X 160 mm)	
7.	Module pixels	512 dots	
8.	Pixel density	10000 dots/m2	

#	Features	Technical Specification	Compliance (Yes/No)
9.	Module quantity	9 X 11 = 99 nos.	
	Cabinet		
1.	Size (W x H) mm	3080 x 1960 mm	
2.	Material	MS CRCA Sheet of suitable thickness	
3.	Weight (Kg)	450 kg approx.	
	VMS Display		
1.	VMS screen size (W x H) mm	2880 x 1760 mm	
2.	VMS screen resolution	288 x 176 pixels	
3.	Viewing angle	120^{o}	
4.	Brightness	5500 nits	
5.	Minimum Viewing distance	≥ 10 m	
6.	Colour	Full Colour	
7.	Protection Level	IP65 Front / IP54 Rear & sides	
8.	EMI/RFI Protection	Via line filter	
9.	Refresh rate	≥ 1920 Hz	
10.	Ambient Temperature	-10℃ to +55℃	
11.	Ambient Relative Humidity	10% ~ 95%	
12.	Power Supply	230VAC, 1 Ph, 50 Hz	
13.	Maintenance/ Servicing	Rear	
14.	Power Consumption (Max) (Watt)	4500	
	Control System for VMS:		
1.	Display Control	Asynchronous control system	
2.	Display language	English/ Devanagari/ Regional Languages	
3.	Display Capacity	Text, Pictograms, & Images	

#	Features	Technical Specification	Compliance (Yes/No)
4.	Luminance control & auto dimming	Manual luminance controllable / Automatic brightness Control.	
5.	Communication Interface & Protocol	RJ45 / Ethernet /TCP IP	
6.	Sensors	Temperature, Brightness & door switches	
7.	Operating Windows	Windows OS	
8.	Certifications	CE, UL, FCC, RoHS, BIS and IP65.	

3.3.13.1 Design for Variable Display Messaging Board



3.3.13.2 VMD: BOQ Indicative

SL	DESCRIPTION	QUANTITY	UNITS
1	Earth Work in hard soil or gravelly soil within 50m. Initial Lead and 1.5m. Initial Lift including rough dressing and breaking clods to maximum 5cm to 5cm And laying and layers not exceeding 0.3m in depth.	15.85	CUM
	GROUND FLOOR		
2	Filling sand in foundation and plinth watering, ramming, consolidating, and dressing labours tools, taxes etc. all complete as per specification and direction of E.I.C.	7.88	CUM
	GROUND FLOOR		
3	Providing and Laying plain cement concrete 1: 4: 8(1 cement: 4 sand: 8 stone Aggregate 40mm nominal size) As levelling course in foundation and plinth etc. complete all depth and height	0.6	CUM
	GROUND FLOOR		
4	Providing and Laying reinforced cement concrete M-20 Grade20 mm nominal size HBG chips including cost all materials, labours, T & P, curing etc. complete (excluding the cost of reinforcement) and direction of Engineer-in-charge	4.82	CUM
	GROUND FLOOR		
5	Cutting, bending, binding and placing in position of uncoated HYSD bar reinforcement as per drawing for R.C.C work including the cost of binding wire, steel, labour tools and taxes etc.	6.5	QNTL
	GROUND FLOOR		
6	Rigid and smooth centering and shuttering false, levelled works and dismantling, then after casting including cost of materials complete for plinth band and column footing.	4.05	SQM
	GROUND FLOOR		
7	Rigid and smooth centering and shuttering of RCC works including false works girders, beam, column including removal of form work at all depth and heights.	10.2	SQM
	GROUND FLOOR		

SL	DESCRIPTION	QUANTITY	UNITS
8	6mm thick cement plaster in cement mortar 1:4 to RCC surfaces finished smooth including closed deep chipping and slurry treatment with necessary scaffolding, curing etc. all complete.	3.4	SQM
	GROUND FLOOR		
8	Cement washing one coat including scaffolding and cleaning the surface before application	3.4	SQM
	GROUND FLOOR		
9	Providing and applying priming one coat with any approved primer on new work to give an even shade including scaffolding and cleaning the surface before application etc. complete,	3.4	SQM
	GROUND FLOOR		
10	Painting two coats of Anti-fugal weather coat water proofing paint including scaffolding and cleaning the surface before application.	3.4	SQM
	GROUND FLOOR		
11	One coat of priming with approved primer over now woodwork. including cost of all labour, materials, brushes, putty etc.	15.52	SQM
	GROUND FLOOR		
12	Supplying, fitting, fixing and hoisting joists & M.S trusses and placing in position including cost of labour materials transportation etc.	1032.05	KG
	GROUND FLOOR		
13	Painting two coat of Aluminium Paint over iron work	1032.05	KG
14	Errection, Fitting, Fixing, Installation of M.S Pipe & Truss Etc.	15.52	SQM

3.3.14 Radar Based Speed Display System

The MSI shall provide pole mounted Doppler Radar along with 3 digit LED Display system powered through Solar Power.

The Display system shall display the speed of the vehicle passing through it irrespective of the lane.

The main functionality of the system is creating awareness among the drivers.

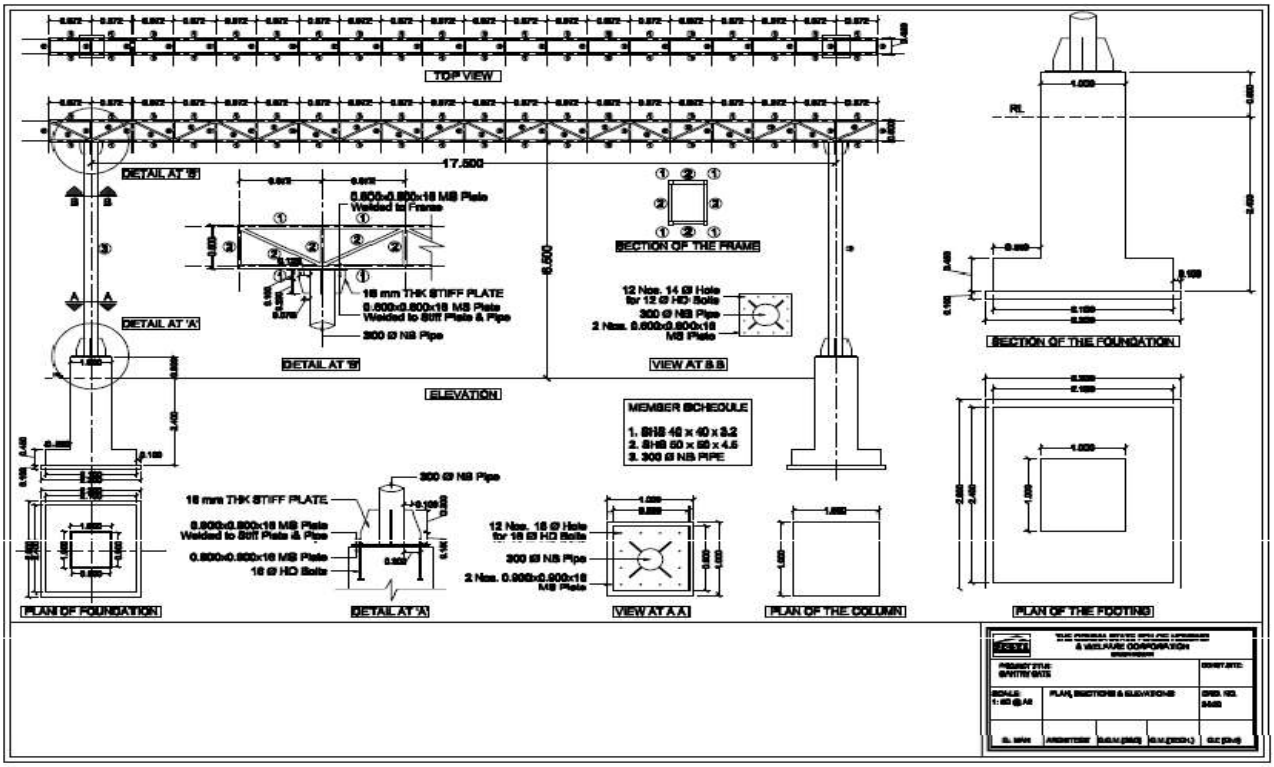
Primary source of supply should be electrical supply through agency, however, MSI shall make provision of UPS and Solar based electric supply wherever required.

#	Feature	Technical Specification	Compliance (Yes/No)
1.	Speed Digits	Height: 11 Inches, Display: 7 Segment	
2.	LEDs	Ultra-bright Polycarbonate coated ,3-row thick, tricolor: Amber, Green and Red	
3.	Led Angle	22° cone angle, auto-dimming	
4.	Power Consumption	Ultra-low power consumption. Average <SW	
5.			
6.	Doppler Radar	Dual direction, K-Band, 24.125 GHz (FCC part 15 compliant)	
7.	Accuracy	+ / - Mph, 99% accuracy	
8.	Beam Width	12° Horizontal – 25° Vertical	
9.	Speed Detection	5 to 180 Kmph	
10.	Detection Range	Minimum 150 Meters	
11.	External Integration	Siren Can be Integrated, if needed	
12.	Material	Aluminum	
13.	Waterproof Rating	Nema 4R / IP67	
14.	Temperature Resistance	-15°C to +60° (Operational in extreme weather conditions)	

#	Feature	Technical Specification	Compliance (Yes/No)
15.	Electrical Safety	Two fuses (Internal & External), internal pressure safety valve	
16.	Communication	Ethernet / RS232 / RS 485 and GSM	
17.	Speed	Average and maximum speed, 85th percentile, distribution per speed group	
18.	Count	Estimated vehicle count	
19.	Type	Time-stamped data for both directions of the road	
20.	Memory Storage	Up to 1 million vehicles	
21.	Format	Charts and graphs in Excel and/or Pdf form, for easy report printing	
22.	“SOLAR” (solar-powered)	Internal solar regulator, solar panel, 2 batteries	
23.	SOLAR PANEL	32” X 37”, 80-watt solar panel	
24.	BATTERIES	12V/22AH batteries	

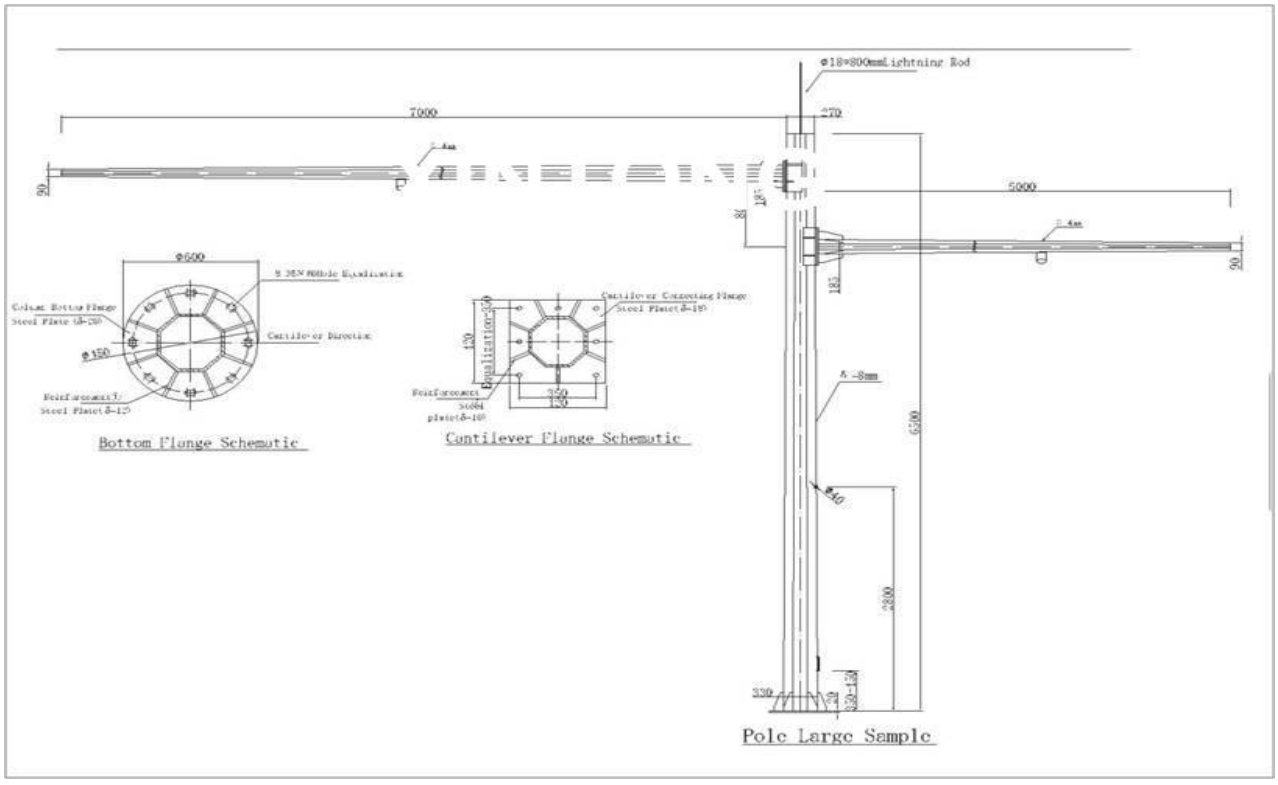
3.4 Civil Infrastructure

3.4.1 Gantry & Cantilever Indicative Design



The MSI shall design and install Gantry & Cantilever to meet SLA parameters and to withstand wind speed of minimum 200 kms per hour.

Cantilever Design:



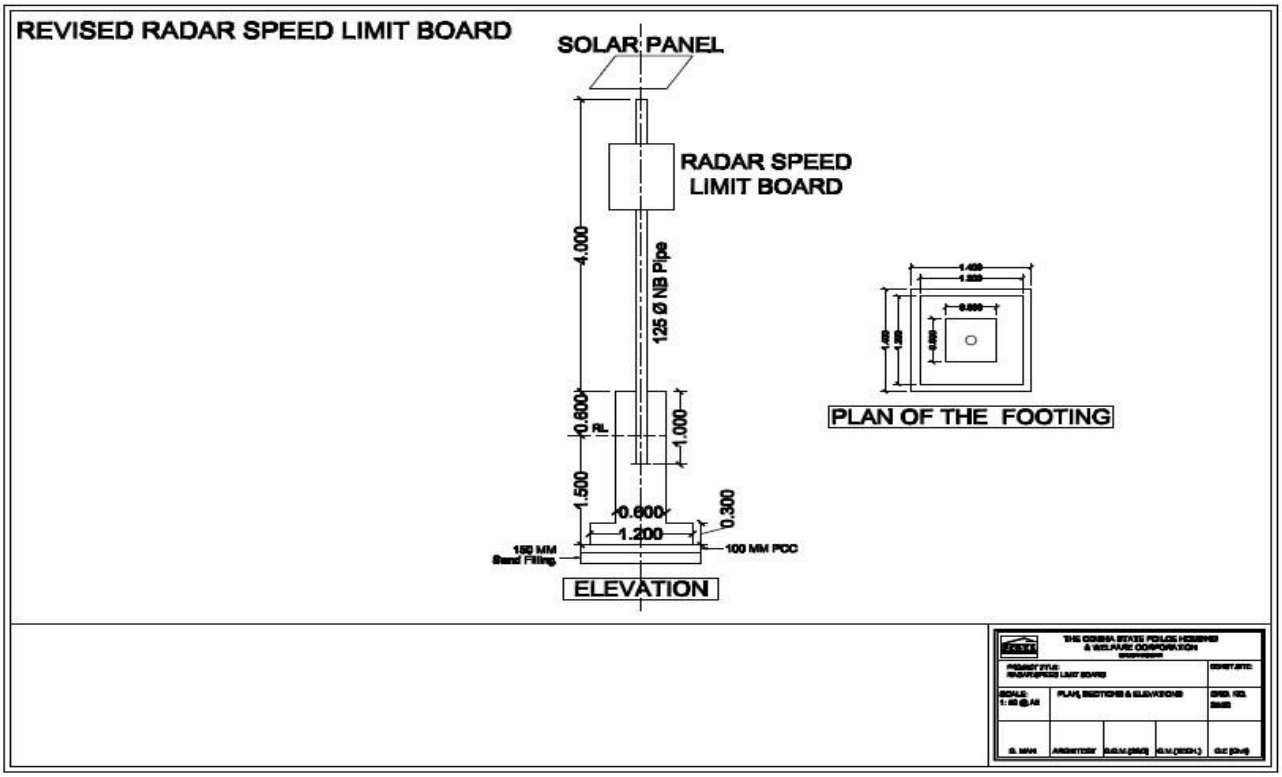
3.4.1.1 Gantry: BOQ Indicative

SL	DESCRIPTION	QUANTITY	UNITS
1	Earth Work in hard soil or gravelly soil within 50m. Initial Lead and 1.5m. Initial Lift including rough dressing and breaking clods to maximum 5cm to 5cm and laying and layers not exceeding 0.3m in depth.	31.69	CUM
	GROUND FLOOR		
2	Filling sand in foundation and plinth watering, ramming, consolidating and dressing labours tools, taxes etc. all complete as per specification and direction of E.I.C.	20.85	CUM
	GROUND FLOOR		
3	Providing and Laying plain cement concrete 1: 4: 8(1 coment: 4 sand : 8 stone Aggregate 40mm nominal size) As levelling course in foundation and plinth etc. complete all depth and height	1.2	CUM
	GROUND FLOOR		
4	Providing and laying reinforced cement concrete M-20 Grade20 mm nominal size HBG chips including cost all materials, labours, T & P, curing etc. complete (excluding the cost of reinforcement) and direction of Engineer-in-charge	9.64	CUM
	GROUND FLOOR		
5	Cutting, bending, binding and placing in position of uncoated HYSD bar reinforcement as per drawing for R.C.C work including the cost of binding wire, steel, labour tool and taxes etc.	13	QNTL
	GROUND FLOOR		
6	Rigid and smooth centering and shuttering false, levelled works and dismantling, then after casting including cost of materials complete for plinth band and cloumn footing.	8.1	SQM
	GROUND FLOOR		
7	Rigid and smooth centering and shuttering of RCC works including false works girders, beame, column including removal of form work at all depth and heights.	20.4	SQM
	GROUND FLOOR		

SL	DESCRIPTION	QUANTITY	UNITS
8	6mm thick cement plaster in cement mortar 1:4 to RCC surfaces finished smooth including closed deep chiping and slurry treatment with necessary scaffolding, curring etc all complete.	6.8	SQM
	GROUND FLOOR		
9	Cement washing one coat including scaffolding and cleaning the surface before application	6.8	SQM
	GROUND FLOOR		
10	Providing and applying priming one coat with any approved primer on new work to give an even shade including scaffolding and cleaning the surface before application etc. complete,	6.8	SQM
	GROUND FLOOR		
11	Painting two coats of Anti-fugal weather coat water proofing paint including scaffolding and cleaning the surface before application.	6.8	SQM
	GROUND FLOOR		
12	One coat of priming with approved primer over now wood work. including cost of labor, materials, brushes, putty etc.	80.27	SQM
	GROUND FLOOR		
13	Supplying, fitting, fixing and hoisting joists & M.S trusses and placing in position including cost of labour materials transportation etc.	2356.5	KG
	GROUND FLOOR		
14	Painting two coat of Aluminium Paint over iron work	80.27	SQM
15	Erecting, Fitting, Fixing, Installation of M.S Pipe & Truss Etc.	2356.5	KG

Note: The MSI shall design and install Gantry & Cantilever to meet SLA parameters and to withstand wind speed of minimum 200 kms per hour.

3.4.2 Poles for Security Camera & Speed Display with Radar



3.4.3 Civil Infrastructure and Cabling

- The MSI shall provide Gantries and Cantilever Poles, Poles for VMD Board mounting, Poles for overview surveillance at nodes or junctions.
- The civil construction along with the required structure for equipment mounting brackets to be provided by the MSI. The design of poles, gantries and cantilever structures must be approved from reputed institutions like IIT-Bhubaneswar, CET-Bhubaneswar, or state government agencies like Odisha Police Housing & Welfare Corporation, Odisha Bridge & Construction Corporation Limited and State PWD, etc.
- The system should be designed in such a way that in any case of temporary failure of the network, the data shall be stored in the local device & as and when the network is restored, the data shall be synced to the server.
- The MSI shall provide standardized cabling as per requirement for all devices and subsystems in the field and Unified Command & Control Centre.
- The MSI shall ensure the installation of all necessary cables and connectors between the field sensors /devices assembly, outstation junction box, for pole mounted field sensors /devices.
- All cables shall be clearly labelled with indelible indications that can clearly be identified by maintenance personnel. The proposed cables shall meet the valid directives and standards.
- Cabling must be carried out as per relevant BIS standards. All cabling shall be documented in a cable plan by the MSI.

- Prior to starting the site clearance, the MSI shall carry out surveys of field locations for buildings, structures, fences, trees, existing installations, and inform Office of the Transport Commissioner regarding non feasibility of the any sites.
- All electrical components are to be earthen by connecting two earth tapes from the frame of the component ring and shall be connected via several earth electrodes. The cable arm shall be earthen through the cable glands. The entire applicable IT infrastructure i.e. field locations shall have adequate earthing. Further, earthing should be done as per Local state national standard in relevance with IS standard.
- All electrical systems/components shall have adequate earthing and should be done as per Local state national standard in relevance with IS standard.
- The MSI shall provide standardized cabling for all devices and subsystems in the schools.
- All cables shall be clearly labelled with indelible indications that can clearly be identified by maintenance personnel. The proposed cables shall meet the valid directives and standards.
- The cabling must be carried out per relevant BIS standards. All cabling shall be documented in a cable plan by the MSI.
- The Right of Way (RoW) charges (If any) shall be borne by the Office of the Transport Commissioner. The MSI shall obtain necessary approval from the Office of the Transport Commissioner prior to commencement of the work. MSI need not consider the RoW and restoration/Reinstatement charges in their bid price. If there are any delays due to the permission/approvals from Employer/Other Govt. agencies pertaining to RoW & Restoration/Reinstatement, the MSI shall not be levied any penalty for such delay and time extension shall be provided accordingly.

Detailed design drawings and structural calculations for each type of pole, gantry, or cantilever (including foundations) used to mount IEMS equipment shall be submitted to the Office of the Transport Commissioner and/or the nominated representative for approval after due certification by a Licensed Structural Engineer using state of the art software. The design calculations shall be carried out in accordance with relevant MoRTH/IRC/Govt. of Odisha or as per the directions issued by Office of the Transport Commissioner, Odisha from time to time, standards where applicable. The drawings shall show materials specification and finishes for each item of equipment proposed for use. All weld types and sizes shall be identified on the design and construction drawings.

3.5 Networking Components

3.5.1 Seamless connectivity via 5-scale connectivity matrix

To ensure unyielding and seamless data delivery, MSI shall implement a 5-Scale Connectivity Matrix for the project as follows:

- Point-to-Point Radio Links: Customizable Radio Towers shall be incorporated within gantries/cantilevers, adjustable up to 40 meters to facilitate smooth communication even in challenging terrains.
- 5G Dual SIM Redundancy: The mechanism shall guarantee consistent data transmission. In case one link fails, the other shall remain operative, ensuring uninterrupted data flow.
- SIM Bonding Hardware: The hardware shall enhance bandwidth through the aggregation of multiple 5G SIMs, ensuring robust and fast data relay.

- Advanced Link Aggregator: Link Aggregator shall the consistency of point-to-point leased lines with the speed and redundancy of 5G multi-SIMs. This high-end technology promotes bandwidth bonding while endorsing top-tier data encryption.
- Failover Mechanism: Should a link encounter issues, the system has provisions to prevent data packet loss, ensuring the integrity and continuity of data.

Furthermore, to ensure uninterrupted data flow, the deployment will feature cutting-edge link aggregator technology, which combines the reliability of point-to-point leased lines and the speed and redundancy of 5G multi-SIMs. This technology enables bandwidth bonding while ensuring high-end encryption. Should any link experience downtime, the system is designed to prevent packet termination, ensuring data integrity and continuous flow.

Leveraging a renowned hub engine technology, the system ensures that data packets from various gantries are encrypted and securely transmitted to the central hub. This hub acts as a consolidation point, where the secured data from various points is gathered, further encrypted, and then securely relayed to the designated servers for efficient processing and storage.

3.5.2 Hybrid WAN Link aggregator (Inbound / Outbound)

#	Specifications	Description
1.	Hardware	Should be appliance-based solution with purpose built hardware for high performance ILL/MPLS/SDWAN Load balancing with link aggregation and NMS module along with real-time dashboard of the same OEM
		Ability to support up to 3/4 (GbE) WAN/LAN ports with one USB WAN port along with two inbuilt 4G LTE sim port for bandwidth bonding
		The appliance should have inbuilt wifi modem from day one with flex module for additional 5G sim slot on demand
		The LAN port should support to work as a VLAN trunk port for multiple LANs
		Each VLAN should support own interface IP address and DHCP server
		Capability of communicating with other VLANs
		Should support OSPF and RIPv2 dynamic routing protocols
		Support at least 900 Mbps bandwidth throughput
2.	Traffic Management	Support at least 6 Internet connections
		Support using an USB 3G/4G/LTE/5G/eSIM/ Fusion SIM modem as WAN to deliver seamless services if all WAN link goes down.
		Ability to load balance among multiple connections along with 4G/LTE/5G connection on active mode
		Ability to fail over to another connection automatically in case of a link problem detected
		Support the following WAN connection methods:

#	Specifications	Description
		• Static IP • DHCP • PPPoE
		Ability to create policy rules to handle different types of outbound traffic
		Support the following outbound load balancing algorithms: • Distribute traffic according to a specified link ratio • Route traffic using the same link persistently • Route specified type of traffic using only the chosen link • Route traffic according to a specified link priority • Route traffic using the same link unless it gets saturated • Route traffic using the link that is most available • Route traffic using the link that has the lowest latency
		Ability to perform many to one, one to one NAT Mappings
		Ability to define local DNS records to lookup local host names
		Support SIP ALG
		Support H.323 ALG
		Ability to set monthly allowance limit for bandwidth usage on each WAN
		Ability to load balance inbound traffic
		Ability to act as an authoritative DNS server and support the following records: • SOA • NS • MX • CNAME • A • TXT • SRV • PTR
		Ability to set monthly allowance limit for bandwidth usage on each WAN
		Should support Out of Band Management for LAN/WAN to gain access to all remote devices connected to the LLB through the NMS Module
3.	VPN	Ability to establish site-to-site VPN over dynamic IP
		Support site-to-site VPN traversing through NAT'd WAN connection
		Support IPsec VPN for Site-to-Site VPN
		Support PPTP / L2TP VPN for remote access
		Ability to authenticate PPTP and Captive Portal client by third party RADIUS or LDAP
		Support X.509 certificates as a means of authentication for VPNs

#	Specifications	Description
4.	QoS	Ability to prioritize SIP traffic
		Ability for Web Filtering Blacklist
		Ability to prioritize traffic for any application by specifying its protocol and port
5.	Health Monitoring	Support monitoring the health for each WAN connection against an Internet host
		Support the following mechanisms for health monitoring • Ping • DNS lookup • HTTP
		Ability to adjust health check interval and frequency
		Ability to adjust the number of consecutive unsuccessful/successful checks to determine the connection as link down/up
6.	Reporting	Ability to post traffic data and other information to a reporting server to generate detailed usage reports of the device
		Ability to use SNMP protocol and MIB for device monitoring
		Show real-time data of transferring upload/download throughputs
7.	Security	Ability to block specific website (http only)
		Ability to classify traffic in order to allow or deny packets according to pre-defined rules • IP, Protocol, and Port filtering Ability to classify traffic in order to allow or deny packets according to pre-defined rules • IP, Protocol, and Port filtering
		Captive Portal support for Wired and Wireless LAN Clients
		Should support Built-in Customizable Splash Page
8.	Device Management	Device is managed by web-based management (HTTP/HTTPS)
		Support Authentication of admin security using RADIUS
		Support access to device status with Command Line Interface
		Support installation of two firmware versions for rollback
		Ability to send out warning and error messages by email
		Ability to configure remote SYSLOG server to log events of the device
		Ability to configure whether a port can reply to ICMP Ping requests
		Device date and time is automatically synchronized through NTP server
9.	Certifications	Device should have below certifications: • FCC • CE • RoHS

3.5.3 Hybrid WAN Link aggregator (Inbound / Outbound) Hub Unit

#	Specifications	Description
1.	Hardware	Should be appliance-based solution with purpose built hardware on HA for high performance ILL/MPLS/SDWAN Link aggregation & Load balancing, LTE-4G/5G-Sim Link aggregation and Inbuilt module to support multiple sim cards simultaneously on demand, WAN smoothing, Hot Fail over and multi access NMS module along with real-time analytics dashboard of the same OEM
		Ability to support up to 12 (GbE) WAN ports and expandable slot on demand with bandwidth bonding license from day one
		Ability to operate in tough conditions and high temperature scenarios. The appliance must support an operating temperature range of 0° to 40°C
		The LAN port should support to work as a VLAN trunk port for multiple LANs
		Each VLAN should support own interface IP address and DHCP server
		Capability of communicating with other VLANs
		Should support OSPF and RIPv2 dynamic routing protocols
		Support at least 20 Gbps bandwidth throughput
		Support at least 2 USB Ports as WAN
		Support Edge Computing with hot-swappable power supplies
		Device needs to be 1U rack mountable
		Should have VRRP support for High Availability
2.	Traffic Management	Support upto 12 Internet connections on active mode
		Support using an USB 3G/4G/LTE modem as WAN from day one and 5G on demand using same hardware to deliver seamless services if all WAN link goes down.
		Ability to load balance among multiple connections with Speed fusion
		Ability to fail over to another connection automatically in case of a link problem detected
		Support the following WAN connection methods: • Static IP • DHCP • PPPoE

#	Specifications	Description
		Ability to create policy rules to handle different types of outbound traffic
		Support the following outbound load balancing algorithms: • Distribute traffic according to a specified link ratio • Route traffic using the same link persistently • Route specified type of traffic using only the chosen link • Route traffic according to a specified link priority • Route traffic using the same link unless it gets saturated • Route traffic using the link that is most available • Route traffic using the link that has the lowest latency
		Ability to perform many to one, one to one NAT Mappings
		Ability to define local DNS records to lookup local host names
		Support SIP ALG
		Support H.323 ALG, ANPR & VMD
		Ability to load balance inbound traffic
		Ability to act as an authoritative DNS server and support the following records: • SOA • NS • MX • CNAME • A • TXT • SRV • PTR
		Ability to set monthly allowance limit for bandwidth usage on each WAN
		Should support Out of Band Management for LAN/WAN to gain access to all remote devices connected to the LLB through the NMS Module
3.	VPN	Ability to establish site-to-site VPN over dynamic IP
		Support site-to-site VPN traversing through NAT'd WAN connection
		Support IPsec VPN for Site-to-Site VPN
		Support PPTP VPN for remote access
		Ability to authenticate PPTP and Captive Portal client by third party RADIUS or LDAP
		Support X.509 certificates as a means of authentication for VPNs
4.	QoS	Ability to prioritize SIP traffic
		Ability to prioritize traffic for any application by specifying its protocol and port

#	Specifications	Description
5.	Health Monitoring	Support monitoring the health for each WAN connection against an Internet host
		Support the following mechanisms for health monitoring • Ping • DNS lookup • HTTP
		Ability to adjust health check interval and frequency
		Ability to adjust the number of consecutive unsuccessful/successful checks to determine the connection as link down/up
6.	Reporting	Ability to post traffic data and other information to a reporting server to generate detailed usage reports of the device
		Ability to use SNMP protocol and MIB for device monitoring
		Show real-time data of transferring upload/download throughputs
7.	Security	Ability to block specific website (http only)
		Ability to classify traffic in order to allow or deny packets according to pre-defined rules IP, Protocol, and Port filtering
		Captive Portal support for Wired and Wireless LAN Clients
		Should support Built-in Customizable Splash Page
8.	Device Management	Device is managed by web-based management (HTTP/HTTPS)
		Support Authentication of admin security using RADIUS
		Support access to device status with Command Line Interface
		Support installation of two firmware versions for rollback
		Ability to send out warning and error messages by email
		Ability to configure remote SYSLOG server to log events of the device
		Ability to configure whether a port can reply to ICMP Ping requests
		Device date and time is automatically synchronized through NTP server
		Ability to name clients
9.	Certifications	Device should have below certifications: • FCC

#	Specifications	Description
		• CE • RoHS

3.5.4 Backbone Engine for Secured Network

#	Specifications	Description	Compliance (Yes/No)
1.	General requirements	Device should have a modular architecture. Minimal performance degradation when running advanced services such as stateful firewall, NAT, and IPSec.	
2.	Hardware and interface requirements	Device should have at least 8 x 10/100/1000BaseT and 4 x 1G SFP ports out of which 4 x 10/100/1000BaseT and 4 x 1G SFP should support WAN protocols. Above ports should be available after deployment of high availability if required. 2 SFP ports must be loaded with single mode transceiver.	
		The Router should have 4GB RAM and 4GB internal Flash	
		Device should have at least 3 free LAN/WAN slots	
		Device should support LAN and WAN connectivity options including Gigabit Ethernet, T1/E1, 4G-LTE interface modules.	
		The Router should have internal redundant Power Supply.	
3.	Performance requirements	The Device should have a minimum routing performance of 700Kpps	
4.	Quality of Service (QoS) requirements	Devices should support Class-based queuing with prioritization	
		It should be possible to configure maximum bandwidth and guaranteed bandwidth	
		Devices should support Queuing based on VLAN, DLCI, interface, bundles, or filters	
		Devices should support Marking, policing, and shaping	
		Deleted	
5.	Routing protocol support	The Device should support IPv4 and IPv6 routing	

#	Specifications	Description	Compliance (Yes/No)
		The Device should support VRRP	
		The Device should support Static Routes	
		The Device should support RIPv1 & RIPv2	
		Deleted	
		The Device should support Policy Based Routing	
		Deleted	
6.	Multicast Features	Multicast Listener Discovery (MLD)	
		IGMP v1/v2/v3	
		Support Open Standard	
7.	Security features	Devices should support LDAP/RADIUS/TACAS	
		Devices should support Packet Filters	
		Devices should have Stateful Firewalling	
		Devices should support Tunnels (GRE, IP-in-IP, IPSec)	
		Devices should have DES (56-bit), 3DES (168-bit), AES (256-bit) encryption	
		Devices should support MD5 and SHA-1 authentication	
		Devices should have role-based access mechanisms.	
		Devices should support Network address translation (NAT).	
8.	Management and Troubleshooting	Device should have Console, Telnet and Web for management	
		Devices should support Software upgrades through Web	
		Devices should support SNMPv2 and SNMPv3	
		Extensive debugs on all protocols	
		Real-time traffic-interface/sub interface statistics.	
9.	Certifications	CE/FCC Certified	
		The router should be FIPS 140-2 or EAL 3/NDPP or ICSA Lab Certified	
10.	Warranty & Other	The router should be provided with hardware replacement warranty and ongoing software upgrades for all major and minor releases for a period of 5 years.	

3.5.5 Network Intrusion Prevention System

The Master System Integrator shall provide a Network Intrusion Prevention System (NIPS) as a network security tool that continuously monitors a network for malicious activity and takes action to prevent it, including reporting, blocking, or dropping it, when it does occur.

#	Technical Specifications	Description	Compliance (Yes/No)
1.	Physical	Operating Temperature in range of 0° to 40° C	
		Operating Humidity should be 10% to 90% noncondensing	
		Should be rack mountable and provided with necessary kit for mounting	
2.	Interfaces and Modules	Should have minimum 4 numbers of 1/10G SFP+ ports	
		Should have 8 or more RJ45 10/100/1000 Base-T copper ports	
		In addition to above, should have two or more port for High Availability.	
		Should have one 1X1GbE Out-of-Band (OOB) management ports	
		Must have 1 console RJ-45 port	
		Minimum 1 USB port	
3.	System Performance	Should support stateful firewall performance of 20 Gbps or more	
		Should support IPsec VPN performance of 5 Gbps or more.	
		Should have IPS performance of 2 Gbps measured on HTTP traffic with 44 KB transaction size.	
		Routing table size should be minimum of 512 K (IPv4 and IPv6)	
		Should support minimum of 1000 VLANs	
		Should have minimum of 2 virtual / logical firewalls enabled from day-1.	
4.	Memory and Storage	System Memory (RAM) of 4 GB & Flash/SSD of 64 GB	
5.	Power	Should have redundant AC power supply	
6.	Management and Reporting	Should support SSH	
		Should support Telnet	
		Should support SNMP	
		Should have Web based GUI. Should support CLI access	
		Should support App based traffic steering with multiple overlay tech – IPSec, GRE with link monitoring	

#	Technical Specifications	Description	Compliance (Yes/No)
		Must support Python scripting	
		Should support sFlow/jflow/netflow or equivalent	
		Should support IP-Monitoring	
7.	Layer 2 Features	MAC address learning	
		Link aggregation and LACP	
		VLAN addressing support	
8.	IPS and other Features	IPS to prevent network reconnaissance attempts and prevent exploits hidden in network & application traffic	
		Application Security for ability to detects at least 4000 Layer 3-7 applications including Web 2.0, Filter out risky and unwanted applications, and Ensure priority to high-value business applications.	
		Security Intelligence to prevent Command and Control (C&C) attack, Block known malicious connections, and prevent lateral movement of security threats by identifying infected devices.	
		Should support Day-0 response to threat incidents, Discover and prevent new & unknown malwares	
		Capability of Policy enforcement based on GeoIP	
		Capability of Enhanced Web Filtering to identify web traffic by categories, block malicious & unwanted websites, and selectively decrypt	
		Should have capability to work as Gateway Antivirus solution to keep known malwares out of the network and prevent threat from installing on the internal devices.	
		Should support Anti-SPAM to prevent unsafe and annoying email out of the network and reduce the risk for email as an attack vector.	
		5 years subscription for Application visibility & security and IPS is to be included with the offer.	
9.	Routing Features	Should have IPv4, IPv6 Static Routes	
		Should have BGP, RIP v1/v2, OSPF, IS-IS protocols enabled	
		Should have virtual routers functionality	
		Policy-based routing/Source-based routing should be supported	
		Should support Multicast -IGMP v1/v2/v3, PIM-SM/PIM-DM	
		Should support MPLS, RSVP, LDP, L3VPN	
		Should support Traffic Engineering, FRR	
		Should support multicast VPN	
		Graceful protocol restart for BGP, IS-IS, OSPF	
10.		Should support VRRP/HSRP on both IPv4 and IPv6	
		Dual box clustering should be supported	

#	Technical Specifications	Description	Compliance (Yes/No)
	High Availability Features	Active/passive and Active/Active mode should be supported	
		Device and link detection should be available to monitor failure	
		Should support IP monitoring with route and interface failover	
		Should have modular operating system	
11.	Network Features	Should have Source NAT	
		Should have Port Address Translation (PAT)	
		Should have Bidirectional 1:1 static NAT	
		Should have Destination NAT	
		Should have Persistent NAT	
		Should have IPv6 address translation	
12.	VPN Features	Should support GRE, IP-IP Tunnels	
		Should support Data Encryption Standard (DES), triple DES (3DES), Advanced Encryption Standard (AES256), PKI	
13.	QoS Features	Must Support for 802.1p, Diff Serv code point (DSCP), EXP	
		Must Support Classification based on VLAN, interface or multifield filters	
		Must Support Marking, policing, and shaping	
		Must Support Weighted random early detection (WRED)	
		Must Support Guaranteed and maximum bandwidth	
		Must Support Ingress traffic policing	
14.	Application aware features	Should support application quality experience which enables to effectively prioritize, segregate, and route business-critical applications traffic without compromising performance or availability from Day 1.	
		Should support function to seamlessly diverts applications to an alternate path if the performance of the primary link is below acceptable levels as specified by the SLA	
15.	Warranty	5 years onsite support including next-business day hardware replacement in case of failure, 24x7 access to OEM technical assistance center using toll-free telephone service, all minor and major software and patch updates.	
16.	Certifications and Third-Party Validation	Safety certifications UL 60950-1	
		EMC certifications FCC Class A	
		The router or it's operating system should be FIPS 140-2 and EAL 3/NDPP or above, certified under Common Criteria.	

#	Technical Specifications	Description	Compliance (Yes/No)
		The security effectiveness of the proposed OEM against exploits, malware and malicious URLs should be proven and validated as the following: i. AAA rating by Cyber Rating ii. More than 99.5% measured by ICSA Labs	
		Deleted	

3.5.6 Network Management System

- The objective of this service is to ensure continuous operation and upkeep of the Network infrastructure of the project including all active and passive components. The MSI shall be responsible to coordinate with Network Service Provider for network related issues. The services to be provided for Network Management include:
    - Ensuring that the network is available 24x7x365 as per the prescribed SLAs for the 5 years of operations.
    - Attending to and resolving network failures and snags.
    - Support and maintain the overall network infrastructure including but not limited to LAN passive components, switches etc.
    - Configuration and backup of network devices including documentation of all configurations.
    - 24x7x365 monitoring of the network to spot the problems immediately.
    - Ensuring timely information to the office of the Transport Commissioner and other stakeholder departments/end users pertaining to issues of Network Backbone.

3.6 Managed Cloud Services

3.6.1 DC & DR on Managed Cloud Services

Solution shall be hosted on a cloud infrastructure with a primary data centre and DR site which complies with MEITY guidelines with full-time support at Solution shall be hosted on a cloud infrastructure with a primary data centre and DR site which complies with time support at the data centres on a 24 x 7 basis.

- The MSI shall provide hosting cloud infrastructure within geographical boundaries of India which complies with MEITY guidelines with full-time support at Solution shall be hosted on a

cloud infrastructure with a primary data centre and DR site which complies with time support at the data centres on a 24 x 7 basis.

- MSI needs to design the infrastructure so that it serves the purpose at one central location and 40 subsidiary locations.
- Network solution and Security systems (Firewall/ IPS) are to be identified, implemented and maintained. Network equipment, bandwidth allocation and appropriate type of connectivity at each location is mandatory.
- Sizing, Provisioning & Maintenance of the connectivity with DR location so that the objectives defined in business continuity policy of the office of the Transport commissioner is successfully achieved
- The MSI should be capable of allowing applications to self-service for compute, network, memory, and storage infrastructures automatically based on workload demand and flexible policies will be in place to maximize hardware utilization.
- MSI shall be single Point of Contact for managing DC and DR.
- The Cloud Infrastructure should have 99.99% uptime per year for the storage Infrastructure. Along with this availability also should be higher 99.99%.
- Cloud Platform shall have built in robust self-service facility to monitor the infrastructure and scaling up and down the services as per the requirements.

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- The CSP should be certified in providing cloud services by having following certifications ISO 27001, ISO/IEC 27017, ISO 27018, ISO 20000
- The MSI should meet all the security requirements indicated in the IT Act 2000
- The MSI shall report (in writing) any information security breaches to the Office of the Transport Commissioner by unauthorized persons (including unauthorized persons who are employees of any Party) either to gain access to or interfere with the Project's Data, facilities or Confidential Information.
- MSI should make sure that the Office of the Transport Commissioner must be able to access and retrieve such data in a cloud service provider environment when reasonably demanded by the Office of the Transport Commissioner for audit purposes and inspections, etc.
- MSI shall not delete any data present on cloud at the end of the agreement without the express approval of the Office of the Transport Commissioner.
- MSI will be responsible for managing RTO (4 hours), RPO (1 hour), DR Drills for the entire solution
- The MSI would have to provide the necessary support in the operationalization of the DR solution.

- Solutions shall be hosted on cloud to provide flexibility and scalability in terms of compute and storage requirements of the solution.

- The DC and DR site proposed shall meet all criteria as specified under the MEITY empanelment.

- All services/requirements under the MeitY shall be provided by Cloud Service Provider.

- MSI shall set up, operate, and maintain Disaster Recovery Centre (DRC) for continuity of the Project in case of any stoppages of failure as per the functionalities specified within this RFP Cloud hosting for Data Centre and Disaster Recovery.
- MSI shall provide a Business Continuity Plan in case of any failure of the application that needs to continue operating during an unplanned event.

3.6.1.1 Cloud enabled DC Operations & Administration

- The Bidder shall provide comprehensive onsite support to Port on a 24 x 7 x 365 basis to ensure an uptime of 99.99% for the IT enabled solutions at the Cloud enabled Data Centre in accordance with the Service Level Agreement mentioned as part of this tender.
- The Bidder shall commit to provide all necessary manpower resources onsite to resolve any issues/incidents and carry out required changes, optimizations, and modification.
- The recovery Point Objective (RPO) of the system will be 4 Hours.
- Any breach of security or non-compliance on part of data centre vendor facilities should be immediately brought to the notice of Office of the Transport Commissioner.

3.6.2 Provision of Security Infrastructure

- The MSI shall provide dedicated Fire wall, IPS/ IDS, authentication modules, Web Single Sign on etc. as mentioned in Requirements for Cloud Service Provider on both DC and DR.

- The MSI would also be responsible for the creation & maintenance of the directory server integrated with security modules like Authentication, Authorization & Auditing capabilities, Web single sign on, OTP management for critical components and the usage of Digital signature to ensure web-based signage of documents. The MSI should also employ the usage of a log co-relator system to ensure centralized collection and analysis of log files.

- The MSI will ensure adequate data security mechanism in place by the usage of the database encryption and secured data back-up practice where the data being backed up would be encrypted and password protected.

3.6.3 Provision for Storage & Recording Services

It is proposed that the system shall be modular enough to ensure compliance to the changes in storage / recording policy, to be evolved upon initial deployment of the system. The system shall be scalable and secure as per industry standards.
MSI shall be responsible for storage and recording services for the operations and maintenance period of 5 Years.

The following storage requirements shall be fulfilled by the MSI as scope for the project:

- Traffic Violations Data shall be stored on Cloud.
- Primary storage shall store all data for 180 days, further the data will be transferred to secondary storage for 3 years.
- Data related to traffic offences shall be stored for a minimum of 3 years or conclusion of proceedings/appeals whichever is higher.
- Storage of surveillance camera feeds to be stored at UCCC.
    - Storage of all the traffic surveillance camera feeds to be stored at UCCC for 1 Year.
    - Further the data will be stored at secondary storage for 3 years.
- The live video surveillance feeds of Pole Security Camera, Video Analytics Cameras shall be stored at UCCC.
- Data on storage should be over-written automatically by newer data after the stipulated time period as defined in the RFP. If some data is flagged by designated personnel as important data / evidence data due to some reporting of accident in the area or due to court order or due to suspicious activity, it would need to be stored for longer duration, as per requirements of the office of the Transport Commissioner.
- The MSI shall be responsible for installation, configuration and management of Storage and Recording System and its accessories like switches, LAN cablings, power cabling, etc.
- The MSI shall prepare share Standard Operating Procedure (SOP) document for the Storage Administration and management.
- Data on storage would be over-written automatically by newer data after the stipulated time period. If some data is flagged by designated personnel as important data / evidence data due to some reporting of accident in the area or due to court order or due to suspicious activity, it would need to be stored for longer duration, as per requirements.
- Full audit trail of reports to be maintained for 3 Years.
- The bidder is expected to carry out the storage requirement estimation and supply as per the solution proposed.
- The MSI shall be responsible for management of storage environment to maintain performance at desired optimum levels.

Indicative minimum storage requirement is mentioned as follows:

#	Minimum Storage Requirement	TB
1	Primary Storage of Traffic surveillance camera feeds for 1 Year	3562 TB
2	Secondary Storage of Traffic surveillance camera feeds for next 2 Years	7124 TB

	Total Storage	10686 TB

Note:

- In case of compressed data, the actual storage size will be reduced.
- The live video surveillance feeds of Pole Security Camera, Video Analytics Camera to be stored at UCCC.

The bidder shall comply with the Archival and Retention Policy issued by MoRTH from time to time.

3.7 Operations and Maintenance of the IEMS Solution

Master System Integrator shall be responsible for end-to-end execution of the turnkey project from procurement of IEMS field devices, Software Solution, Installations, and commissioning and making necessary arrangement for feeding data from field devices and analysing the data through application and presenting the dashboard. Solution should also be capable of generating MIS reports in terms of numbers of enforcement cases, duration of the day, date wise etc.

The development and implementation of the application shall be completed and commissioned by MSI in 4 months from the date of signing of agreement contract with MSI and shall be ready for Go live across all the locations with all desired functionalities. The Go-Live will be conducted through User Acceptance Test by authorized officials/committee members provided by office of the Transport Commissioner. The O&M phase will commence from the date of “Go-Live” of IEMS solutions.

The MSI is required to depute a dedicated team of professionals to manage the Project and ensure adherence to the required SLAs. The MSI shall provide operations and maintenance services for the software, hardware and other IT and Non-IT infrastructure installed as part of IEMS project during the Contract Period.

During the Operations & Maintenance (O&M) Phase, the MSI shall carry out but not limited to the following major activities:

- Debugging, modification and updating in the Application as and when required.
- Hand holding and application training to the new end-users and system personnel.
- Tuning and code changes for optimal performance of the application.
- The MSI shall review the existing code and modify to increase the efficiency of the application.
- A detailed report of proposed changes and risk involved along with the implications shall be handed over to the office of the Transport Commissioner and approval will be sought before making necessary changes.
- Maintaining Change Management Log and activity log.
- The MSI must ensure that periodic calibrations of remote/field devices must be carried out half yearly and as and when required by the office of the Transport Commissioner.
- The MSI must ensure that after Go-Live, security audit and third-party audit must be carried out once in a year.
- Preparation of Risk Management and Mitigation Plan.
- Proper version control of the source code.

- Under enhancement of existing FRS and functionalities, it will be the responsibility of the MSI to make changes to the existing application for Improvements in different functions and networking integrations.
- Monitor the operation of IEMS and take suitable interventions as required.
- Monitor health of equipment and initiate immediate corrective action in any of any fault.
- Track specified vehicles (stolen vehicles or vehicles involved in crimes) based on ANPR data.
- Undertake configuration management for all systems.
- Undertake analytics of traffic data and generate various MIS and analytics reports.
- Undertake system admin, database admin, back up, archival, network admin activities.
- Comprehensive maintenance of all equipment/sub-system during Contract period.

3.7.1 Operations Support Resources

The MSI will deploy the Operations Support resources for accomplishing the IEMS scope of work and shall ensure successful generation of traffic challans. The deployed resources will be responsible for monitoring and evaluating the system and will provide period reports to the concerned authority for decision making.

Office of the Transport Commissioner reserves the right to add or decrease the deployed manpower as per the requirement basis and may extend their service period on project tenure basis subject to satisfactory performance.

The MSI shall deploy following manpower resources for implementation and O&M phase of the project.

Sr. No.	Role of Resource	Quantity	Requirements
1.	Project Manager	1 No	A) Educational Qualification: BE/B. Tech/MCA/M. Tech with MBA or equivalent C) 12 Years of Work experience in the capacity of Project/Program Manager in ICT implementation Projects D) At least 3 similar Project/Program management Experience in ICT implementation Project (Command Control Centre/Intelligent/Integrated Traffic Management System/Adaptive Traffic Management System)
2.	Technology Expert	1 No	A) Educational Qualification: B.E./ B. Tech with MBA / MCA/ Post-Graduation in IT or equivalent B) 7 Years of Work experience as IEMS/ ATCS / Transportation expert

Sr. No.	Role of Resource	Quantity	Requirements
3.	Site Engineer	1 No	A) Educational Qualification: BE/B. Tech in Civil or equivalent B) 3 Years of Work experience in civil construction Project C) At least 2 Civil construction Project & Project/Program management Experience (Command Control Centre/Intelligent Integrated Traffic Management System/Smart Parking Management System)
4.	Control Room Operators	5 Nos	A) Educational Qualification: Any Graduation or equivalent B) 2 Years of Work experience in the capacity of Helpdesk Management/Back End Tech. Support Projects.

3.7.2 Warranty & Maintenance

- The selected MSI shall provide 5 (five) years comprehensive warranty (onsite, offsite) on all items supplied by them or under their purview including battery and other accessories items including the items required for setting up the Command-and-Control Centre from the date of acceptance of whole system by the Office of the Transport Commissioner for which Office of the Transport Commissioner will not be paying any extra amount.
- After completion of warranty period, Office of the Transport Commissioner may decide to go for fresh AMC with the existing MSI for next 2 years and WO for the AMC may be given to the successful bidder (MSI) before or within period of completion of 5 years of Warranty Period. The Performance SLA during the 5 years AMC period will be communicated to MSI before or within O&M period of completion of 5 years of Warranty Period.
- The MSI shall be responsible for mainting the spares and mainting the SLA as provide in this RFP. In case the Office of the Transport Commissioner authority wants to extend the AMC further beyond the 5 years (2 years of AMC phase annually depending on the performance of the MSI), that to be mutually discussed and agreed by both the parties. In this regard the decision of office of the Transport Commissioner is final and binding upon the successful Bidder.
- The 7 (5 + 2) years comprehensive warranty is for support of all the active & passive components supplied under this project. During this period no components should be declared “End of Life”. In case it is declared “End of Life” during the first 5 years of comprehensive warranty period, the vendor must replace such equipment(s) (equivalent or higher technical specifications) at their own cost. A letter of Confirmation (i.e., Manufacturer Authorization Form (MAF) by OEM shall be mandatory during submission of the bid stating that the products/system/solution shall not be “End of Life” and “End of Support” for cumulative 5 years from date of acceptance (go-live). The

rate should be quoted inclusive of warranty. Warranty includes Hardware, System Software, Application Software, Network items and or any tangible assets utilized for successful execution of the project for onsite replacement and maintenance support.

- During the warranty period, the MSI shall provide the application software updates, patch upgrades, dashboard report modification, new report format creation, new forms etc.
- Before the completion of 5 years (after Go-Live), the Office of the Transport Commissioner will go for Annual Maintenance Contract (AMC) for the items for which the AMC price has been discovered during the submission of their bids in correspondence to AMC Financial Proposal, based on the satisfactory performance. The AMC quotation will be considered for Evaluation of the successful bidder and the rate/quotation mentioned needs to be valid for 5 years from the date of go-live or till the AMC decision has been conveyed to MSI by the Office of the Transport Commissioner.
- The Performance SLA including penalty clauses during the 5 years AMC period will be communicated to MSI before or within O&M period of completion of 5 years of Warranty Period and MSI needs to abide by the same.
- The AMC quotation needs to be valid for further 2 years of support after 5 years of Comprehensive O&M. However, the Office of the Transport Commissioner reserves the right to execute the AMC contract with the selected bidder or procure the same through external agencies if the performance of the bidder is not satisfactory. The AMC contract with the MSI may be extendable for each year after completion of 5 years of AMC period upon satisfactory performance, cost rationality and product availability through mutual discussion and agreement. Keeping the harsh climatic condition into consideration, MSI also need to conduct periodic preventive maintenance of the gantry/cantilever and pole mounted equipment's in every 2 months with due intimation to Office of the Transport Commissioner so that performance of the system remains satisfactory.
- The MSI must do calibration of field devices during the warranty & maintenance period on a yearly basis and as and when required by office of the Transport Commissioner, Odisha.

3.7.3 Insurance

- The Goods supplied under this Contract shall be comprehensively insured by MSI at their own cost, against any loss (including theft) or damage, for the entire period of the contract. MSI shall submit to the Office of the Transport Commissioner, documentary evidence issued by the insurance company, indicating that such insurance has been taken.
- MSI shall bear all the statutory levies and duties like customs, insurance, freight etc. applicable on the Goods and the charges like transportation charges etc. that may be applicable till the Goods are delivered at the respective sites of installation shall also be borne by MSI.
- MSI shall take out and maintain at its own cost, on terms and conditions approved by the Client, insurance against the risks, and for the coverages, as specified below:
    - At the Office of the Transport Commissioner's request, shall provide evidence to the Office of the Transport Commissioner showing that such insurance has been taken out and maintained and that the current premiums therefore have been paid.

- Employer's liability and workers' compensation insurance in respect of the Personnel of the Company, in accordance with the relevant provisions of the Applicable Law, as well as, with respect to such Personnel, any such life, health, accident, travel or other insurance as may be appropriate.
- Third-Party Liability Insurance on terms of whole project hardware during operation & maintenance period, covering bodily injury or death suffered by third parties (including the Client's personnel) and loss of or damage to property (including the Client's property and any Subsystems that have been accepted by the Office of the Transport Commissioner) occurring in connection with the supply and installation of the Information System.

- The Client shall be named as the co-insured under all insurance policies taken out by the MSI pursuant to this clause save and except for Third Party Liability. All insurer's right of subrogation against such co-insured for losses or claims arising out of the performance of the Contract shall be waived under such policies.
- Unless otherwise provided under the Contract, the MSI shall prepare and conduct all and any claims made under the policies effected by it pursuant to this Contract and all monies payable by any insurers shall be paid to the MSI. With respect to the insurance claims which the Office of the Transport Commissioner interest is involved, the MSI shall not give any release or make any compromise with the insurer without prior written consent of the Office of the Transport Commissioner.

3.8 Utility Services

3.8.1 Electrical Power Supply

- The MSI shall be responsible for electricity connection to each location through an aggregation point. Since this component has dependency on approval from local authorities, it is recommended that MSI plans this requirement well in advance & submits the application to the concerned electricity distribution agency on behalf of the Office of the Transport Commissioner with requisite fees, as applicable.
- The MSI shall carry out the electrical work required for powering all the components of IEMS System.
- Electrical installation and wiring shall conform to the electrical codes of India.
- The MSI shall ensure proper and adequate earthing at every location.
- The electricity meters, if any, should be placed inside a power cabinet.
- The MSI shall be responsible for liaising with power distribution company for getting the required power with necessary administrative support from the office of the Transport Commissioner.
- The office of the Transport Commissioner shall facilitate obtaining all the necessary administrative approvals.

- The MSI shall be responsible for providing redundant power and maintain SLA as defined in the RFP. Redundant power may be solar power arrangement for unreliable power locations integrated with UPS or a continuous power source.
- The MSI shall be responsible for securing electricity connections at every location within the stipulated timelines to manage SLA.
- The payment will be made as per the quarterly invoice raised by MSI or the actual invoice raised by the service provider, whichever is lower.

3.8.2 Network Connectivity

- The MSI shall provide a detailed network architecture of the overall IEMS solution, incorporating findings of detailed site survey. The network so envisaged should be able to provide real time data streams to the UCCC. All the components of the technical network architecture should be of industry best standard and assist in ensuring that all the connectivity SLAs are adhered to during the O&M phase.
- A combination of network technology including leased lines, OFC Network, Wireless broadband and Mobile Network technologies may be used to provide seamless connectivity to all field devices.
- Bidder shall be allowed to procure bandwidth related services from multiple Telecom Service Providers.
- The MSI is required to provide connectivity for all the components of IEMS including the following:
    - Connectivity for locations with IEMS system
    - Internet Leased line connectivity for UCCC
- The MSI shall consider the cost of installation of all the network equipment at all the field locations and UCCC.
- The MSI shall make payments to the Network Service Provider directly and get the payment from the Office of the Transport Commissioner through quarterly invoice.
- The MSI shall be required to submit a detailed installation report post installation of all the systems/components/equipment's of each location. The report shall be utilized during the acceptance testing period of the project to verify the actual quantity of the equipment supplied and commissioned under the project.
- Each location shall have a minimum of 25 Mbps bandwidth.

Lane Type	ANPR Camera	Video Analytics Camera	Minimum Bandwidth
2 Lane	2 X 6 Mbps	2 X 3 Mbps	18 Mbps
4 Lane	2 X 6 Mbps	4 X 3 Mbps	24 Mbps
6 Lane	2 X 6 Mbps	6 X 3 Mbps	30 Mbps

- UCCC: Minimum Bandwidth of 1:1 according to the number of field locations i.e. bandwidth requirement at each location multiplied by number of locations.
- The actual bandwidth requirement to cater the above mentioned bandwidth parameters and to meet SLAs would be calculated by the IEMS MSI and the same shall be clearly proposed in the technical proposal with detail calculations. The Office of the Transport Commissioner also requires the MSI to meet the parameters of video feed quality, security & performance and thus the Bidders should factor the same while designing the solution.
- The Office of the Transport Commissioner reserves the right to ask the MSI to increase the bandwidth if the provided bandwidth is not sufficient to give the functionality of the system mentioned in the RFP and adhere to the SLAs.

4 Roles and Responsibilities

General responsibilities of all stakeholders:

- Duly considering in depth project requirements before developing any component, installing any hardware or software, reports with respect to services, processes, technology.
- Participating without any preconditions in resolving any technical, system related issues.
- Active participation in all the phases of the project by dedicating time & resources.
- All phases of testing to be carried out appropriately with proper documentation and should be done in multiple iterations.
- Providing required support to other stakeholders as and when requested.

4.1 Master System Integrator

The MSI shall be responsible for entire application along with that MSI shall also be responsible for end-to-end execution of the project right from procurement of IT and Camera Items, any peripheral items (as mentioned in BOM, please refer BOM in relevant section for more details), Installations and making necessary arrangement for feeding data from these cameras and analysing the data through application and presenting the dashboard for easy decision making. The solution based and complying with the requirements should also be capable of generating MIS reports in terms of number of enforcement cases, duration of the day, date wise, operator wise etc. and other data field parameters. The MIS reports and dashboard will be accessed through any office locations or establishments under purview of the Office of the Transport Commissioner.

The scope of deliverables for the project by the bidder include complete design, engineering, supply, delivery, and storage at site, installation, testing, commissioning, cloud storage and maintenance of a fully functional and complete Intelligent Enforcement System along the designated stretch and locations. All accessories and fitting hardware such as brackets, poles, electrical wiring (including proper earthing compliance) together with associated masonry work are included in the scope of work for the bidder.

The overall roles and responsibilities of MSI, but not limited to is presented below for brief overview and all conclusions during the project execution phase will be arrived after due discussion with all stakeholders through mutual agreement.

- Preparation of Detailed Project Execution and Timeline Plan in line with the plan proposed in the RFP. The same should be prepared, submitted, and be approved in consultation with State Transport Authority.
- MSI must Plan, Define, Design, Build, Test and deploy the application, hardware and required network along with providing the required training, testing, support services etc. These are indicative services, which may change as per the requirement during the project tenure.
- Provide training, technical support and troubleshooting for all software, application, and hardware related issues to Office of the Transport Commissioner during operation phase after go-live.
- For command control centre, setting up of video wall, including minor civil works (Drill, Cementing, Holes, painting, partitioning, flooring, labour etc. to fit the Video Wall).
- Ensuring the SLAs for downtime of system, delivery of various services etc., as defined in detail in appropriate sections, are met.
- Report all the problems, issues, risks related to the Software Applications, Camera, IT Equipment to Office of the Transport Commissioner in the formats, which will be provided to MSI during and post- implementation phase.
- Training on application solution and assistance to the staff members of the RTO/Office of the Transport Commissioner and related officers (Approximately around 40 officials, however, numbers on officers and number of times will be ascertained after the solution is developed and deployed) as and where required. The Office of the Transport Commissioner will provide basic infra like Conf. Room, Projectors (if reqd.), Bidder need to carry supporting documents, files, leaflets, training material, laptop, pen drive etc. to conduct the training. Training is envisaged for Office of the Transport Commissioner-HO and 2-3 Locations namely Cuttack, BBSR.
- Management and quality control of all services
- To ensure that backups are being taken at regular intervals, so that data remains intact.
- To ensure safety and proper maintenance of the Hardware and other infrastructure at all the respective locations throughout the project lifecycle.
- To monitor the feedback from the stakeholders and introduce relevant changes in Application, Software, MIS, Reports, Dashboards View, UI / UX, Forms, Data Fields, Database without any preconditions during the entire engagement after approval from competent authority of Office of the Transport Commissioner.
- The bidder shall supply all the installation materials, accessories, consumables necessary for the installation, commissioning and running of the system.
- The bidder needs to provide the required networking terminal equipment for end-to-end connectivity to Location Cameras.
- Access Points shall be placed in such a way that they cover the entire location under surveillance. The bidder shall provide associated planning and diagram of the placement of the Access Points and get the same approved by Office of the Transport Commissioner and / or designated committee for installation and commissioning.
- The system thus proposed by the bidder should be scalable without changing the core software engine or any part thereof and have the capability of integration through existing or future systems and applications without any hassles.
- The successful bidder shall hand over the system within 5 months / 20 Weeks from date of issue of Work Order.
- Whitelisting (Stolen, Prohibited or any vehicles which are declared illegal in Law/Acts/Rules. The said vehicles Data will be provided for which vehicles to be traced.

- The MSI will be responsible for obtaining power & network services from service providers, the office of the transport commissioner will support and facilitate the required clearances. However, the MSI will be accountable for timely report of the service disruption and timely resolution. The MSI will be responsible for the timely payment of utility bills.

4.2 State Transport Authority – Office of the Transport Commissioner

- Request for Proposal (RFP) preparation and tendering process.
- Approval of project schedule & plan, resource deployment plan for the project.
- To create a Core User group of Steering Committee for monitoring and support the MSI until go-live and in O&M phase.
- To create a dedicated team for overall supervisory and Coordination for the project.
- Approval, Acceptance of application FRS & SRS prepared by MSI.
- To execute detailed Service Level Agreements with various stakeholders.
- To provide space, physical infrastructure (tables, chairs, electricity etc.) for Unified Command Control Centre (UCCC).
- To compile and address feedback on applications from various users.
- To facilitate the raw power and network connectivity along with any required clearance from respective departments etc. The MSI will be responsible for coordinating with the concerned service providers and paying the electricity bills. The cost of electricity bills will be reimbursed as per the quoted price in Financial bid or the actual bill raised by the service provider, whichever is lower.
- Decide on acceptance of change requests, additions, modification of application software.
- To monitor computation of penalties, SLAs, release of payments.
- To provide premises for setting up a new Integrated Command and Control Centre.

5 Testing

5.1 Factory Testing

Select MSI shall have to submit Factory Test Certificate for the below mentioned materials before the actual supply of the items.

- Cable
- Pole & mounting structures
- Signal Aspects

Authorized representative from Office of the Transport Commissioner will visit the manufacturing plant of the product subject to present in India. Authorized representative will check the testing process.

5.2 Acceptance Testing

The Office of the Transport Commissioner shall review and finalize the detailed acceptance test plan proposed by the MSI. The Office of the Transport Commissioner would also conduct audit of the process, plan and results of the Acceptance Test carried out by the MSI for both IT & non-IT components. The Office of the Transport Commissioner would issue certification of completion for which Office of the Transport Commissioner shall verify availability of all the defined services as per the contract signed between the MSI and Office of the Transport Commissioner. The MSI shall be required to demonstrate all the services, features, functionalities as mentioned in the agreement.

All acceptance testing, project review and monitoring shall be enabled through a Technical Support Agency nominated by the Office of the Transport Commissioner prior to certification by the Office of the Transport Commissioner.

Commissioning shall involve the completion of the site preparation, supply and installation of the required components and making the Project available to the Office of the Transport Commissioner for carrying out live Operations and getting the acceptance of the same from the Office of the Transport Commissioner Testing and Commissioning shall be carried out before the commencement of Operations.

5.3 Partial Acceptance Testing

Partial Acceptance Test shall involve scrutiny of documents for various IT / Non-IT components to verify if the specifications conform to the technical and functional requirements mentioned in the Tender and subsequent corrigendum. Office of the Transport Commissioner reserves right to conduct physical inspection of the equipment delivered to ensure that they arrive at the sites in good condition and are free from physical damage and incomplete shipments and shall return the products to the supplier at the supplier's expenses if required quality is not maintained. Physical inspection of hardware will also include physical checking and counting of the delivered

equipment in the presence of the Successful MSI. This equipment will only be acceptable as correct when each received item.
corresponds with the checklist that will be prepared by the Successful MSI prior to shipment. Any shortfalls in terms of the number of items received may render the delivered equipment incomplete.

5.4 Final Acceptance Testing

The final acceptance shall cover 100% of the IEMS Project, after successful testing by the Office of the Transport Commissioner or its Technical Support Agency/Consultants; a Final Acceptance Test Certificate (FAT) shall be issued by the Office of the Transport Commissioner and Police to the MSI.
Prerequisite for Carrying out FAT activity:

- Detailed test plan shall be developed by the MSI and approved by Office of the Transport Commissioner. This shall be submitted by MSI before FAT activity to be carried out.
- All documentation related to IEMS project and relevant acceptance test document (including IT Components, Non-IT Components etc.) should be completed & submitted before the final acceptance test to the Office of the Transport Commissioner.
- The training requirements as mentioned should be completed before the final acceptance test.
- Successful hosting of Application, NIPS and MIS Software.
- For both IT & Non-IT equipment's / software manuals / brochures / Data Sheets / CD / DVD / any media for all the IEMS Project supplied components.

The FAT shall include the following:

- All hardware and software items must be installed at respective sites as per the specification.
- The availability of all the defined services shall be verified.
- The MSI shall be required to demonstrate all the features / facilities / functionalities as mentioned in the RFP.
- The MSI shall arrange the test equipment required for performance verification and will also provide documented test results.
- The MSI shall be responsible for the security audit (if any) of the established IEMS system to be carried out by a certified third party as agreed by Office of the Transport Commissioner

Any delay by the MSI in the Final Acceptance Testing shall render him liable to the imposition of appropriate Penalties. However, delays identified beyond the control of MSI shall be considered appropriately and as per mutual agreement between the Office of the Transport Commissioner and MSI. In the event the MSI is not able to complete the installation due to non-availability of bandwidth from the bandwidth service providers, the Supplier and Office of the Transport Commissioner may mutually agree to redefine the Network so the MSI can complete installation and conduct the Final Acceptance Test within the specified time.

5.5 Integration Testing

This shall be a black box testing role primarily to ensure that the application to be deployed does not disrupt the any stakeholder's application like VAHAAN etc. operations and affect other

infrastructure in terms of performance and security of Office of the Transport Commissioner. The technical tasks to be carried out shall be as follows:

- Functional Testing: Ensuring that the application functionality as described by the Office of the Transport Commissioner works adequately. The functional testing of application will necessarily be minimal as this is a core responsibility of the Supplier.
- Performance Testing: Ensuring that the application meets expressed performance requirements on the Office of the Transport Commissioner IEMS servers by using performance test tools and performance monitoring tools.

- Security Testing: Testing for exploitable application security weaknesses that undermine the application security or the security of the infrastructure.

6 Service Level Agreement (SLA)

1. The service levels shall be established for the Services offered by the MSI to the Authority. The MSI shall monitor and maintain the stated service levels to provide quality service to the Authority.
2. The SLAs may be reviewed on quarterly basis as the Authority decides. All the changes shall be made by the Authority in consultation with the MSI.
3. In case of failure / delay to complete the work/supply in time the penalty shall be levied @ 0.50% per week or part thereof of the total Contract Value subject to maximum of 10% of the total Contract Value. If the total Penalty exceeds beyond 10%, it would be considered as non-performance to the Quality of Services and may lead to termination of the Contract and Authority may on their sole discretion cancel the order. Penalty will be recovered from the PBG amount.
4. The SLA parameters shall be monitored monthly as per the individual SLA parameter requirements. However, if the performance of the system/services is degraded significantly at any given point of time during the contract and if the immediate measures are not executed and issues are not rectified to the complete satisfaction of the Authority or authorised officer designated by office of the Transport Commissioner, then the Authority shall have the right to take appropriate punitive actions including termination of the contract.
5. Onsite comprehensive (including all Hardware, Software, network cabling & electrical power cabling for all types of defects and problems) maintenance services shall be provided by the Supplier / OEM during the period of warranty and Comprehensive Annual Maintenance Contract. In case the MSI fails to rectify the problem within SLA including holidays then OEM shall be required to provide second level support, service to rectify the problem or replace the faulty system or part thereof. The performance of the system shall be measured, and applicable penalties shall be calculated and imposed on the MSI, in case the performance is below the defined thresholds.
6. SLA defines the terms of the successful bidder's responsibility in ensuring the performance of the network based on the agreed performance indicators as detailed in the contract agreement. Successful bidder has to co-ordinate with Network Service Provider & Power Service Provider and get the complaint closed and has to produce documentary evidence regarding failure of services & not by equipment's.
7. If any of the SLA violations are repeated or more than two SLAs violated in two consecutive quarters, then the office of the Transport Commissioner may invoke termination of the contract agreement and PBG will be forfeited.

The table below summarizes the performance indicators for the services to be offered by the bidder-

6.1 SLA Terms

SLA Terms	Description
Network Backbone	'Network Backbone' refers to Internet Protocol (IP) based routing infrastructure at which, successful bidder has installed network devices for city Wide Area Network.
Uptime	'Uptime' refers to network backbone availability across various segments of project wide area network i.e. between UCCC and IEMS locations. "%Uptime" means ratio of 'up time' (in minutes) in a month to Total time (in minutes) in the month multiplied by 100.
Latency	'Latency' refers to the average time required for round-trip packet transfers between Selected IEMS locations on the selected portions of the network Backbone.
Packet Loss	'Packet Loss' refers to the average percentage of IP packets transmitted between Selected IEMS locations during a calendar month that are not successfully delivered.
Planned	'Planned Network Outage' refers to unavailability of network services due to infrastructure maintenance activities such as configuration changes, up-gradation or changes to any supporting infrastructure. Details related to such planned outage shall be approved by the Office of the Transport Commissioner or officer authorized by the Office of the Transport Commissioner and shall be notified to all the concerned stakeholder in advance (at least five working days). It is desirable that such outage shall be taken on Sundays or other Government holidays to the extent possible.
Unplanned Network Outage	'Unplanned Network Outage' refers to an instance in which no traffic can pass in or out through which users are connects to the network Backbone.
Project Management & Operations Support Services	If MSI does not deploy the required specified quality of resource support as per RFP or a resource deployed is not reporting to the duty, there would be a penalty per resource per day as defined in below table and will be deducted from the quarterly payment.
Accuracy of ANPR & Speed Detection System	The accuracy level as per the contract agreement.
Accuracy of Traffic Violation Detection System as mentioned below. • Using Mobile Phone while driving.	Office of the Transport Commissioner or the authorized officer by office of the Transport Commissioner shall visit the UCCC time to time to check the accuracy of the said systems on random basis and mark out the difference if found lower than the accuracy level as per the contract agreement. Each such instance of accuracy lower than the defined limit shall be counted as an "instance" for penalty calculation.

<table>
<tr><th>SLA Terms</th><th>Description</th></tr>
<tr><td>

- Driving against the flow of traffic.
- Driver and Passenger not wearing seat belt.
- Riding more than two persons on two-wheeler.
- Riding without helmet by both rider and pillion rider

</td><td></td></tr>
<tr><td>Incidence Resolution (Network)</td><td>The network outage, security or performance related issues impacting the network availability/performance and leading to unavailability of the services. Resolution of incidence as per below priority Levels:

L1 Level Severity: Impacting UCCC.
L2 Level Severity: Impacting one or more IEMS Locations.
L3 Level Severity: Impacting one or more field devices.

<table>
<tr><th>#</th><th>Severity</th><th>Initial Response Time</th><th>Issue Resolution Time</th></tr>
<tr><td>1</td><td>Level 1</td><td>15 Minutes</td><td>1 Hour</td></tr>
<tr><td>2</td><td>Level 2</td><td>30 Minutes</td><td>4 Hours</td></tr>
<tr><td>3</td><td>Level 3</td><td>60 Minutes</td><td>6 Hours</td></tr>
</table>
</td></tr>
<tr><td>Incidence Resolution (Power)</td><td>The power outage, or performance related issues impacting the power availability/performance and leading to unavailability of the services. Resolution of incidence as per below priority Levels:

L1 Level Severity: Impacting UCCC.
L2 Level Severity: Impacting one or more IEMS Locations.
L3 Level Severity: Impacting one or more field devices.

<table>
<tr><th>#</th><th>Severity</th><th>Initial Response Time</th><th>Issue Resolution Time</th></tr>
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<tr><td>3</td><td>Level 3</td><td>90 Minutes</td><td>8 Hour</td></tr>
</table>
</td></tr>
<tr><td>Incidence</td><td>Priority Level 1 Incident - Within 1 hr.</td></tr>
</table>

SLA Terms	Description
Resolution (Managed Cloud Services)	Priority Level 2 Incident - Within 12 hr. Priority Level 3 Incident - Within 24 hr. Note: Incidents will be logged in the Helpdesk and the O&M Agency will have to resolve the incident and provide necessary updates through the Help Desk Portal and co-ordinate with the stakeholders. Root Cause should be identified for all incidents; if root cause is not identified then additional penalties will be levied.
Security Breach	Detection of security Breach - within 30 minutes Mitigation of Security Breach - within 1 hr. from the time of Breach Note: The security breach will include but not limited to successful penetration of any Virus, trojan, malwares, zero-day attacks, intrusion, Denial of Service Attacks, etc., up to the server level. In case of any compromise of data due to the Security Breach then double penalty will be levied (this will not be counted within the maximum penalty cap limit).
Request Resolution (Managed Cloud Services)	Priority Level 1 Incident - Within 2 hr. Priority Level 2 Incident - Within 24 hr. Priority Level 3 Incident - Within 36 hr. Note: Requests (like password reset, port opening, hardening, etc.) will be logged in the Helpdesk and the successful bidder will have to resolve the request and provide necessary updates through the Help Desk Portal and co-ordinate with the stakeholders.

Appropriate Penalties will be recovered from the quarterly payment if successful bidder is not able to achieve required Service levels as mentioned below:

6.2 SLA during Implementation:

#	SLA	Target	Penalties
1	Delay in Delivery of Hardware	As per project timelines	0.5% of Contract value of undelivered / delayed Items (as per Financial BID) per week or part thereof for delay in delivery. Delay beyond 8 weeks, office of the Transport Commissioner may terminate the contract and Forfeit the PBG.
2	Delay in Implementation: Installation and Commissioning and FAT of hardware/software at Central and Site Location	As per Project timelines	0.75% of Contract value of delayed part (as per Financial BID) per week or part thereof for delay in implementation Delay Beyond 16 weeks office of the Transport Commissioner may terminate the contract and Forfeit the PBG)
The Overall Penalty for implementation stage shall be capped at 10 % of the contract value or			

20 % of the unpaid item, whichever is less. However maximum cap is 10 % of the contract value.

6.3 SLA during Operation and Maintenance:

#	SLA	Target	Penalties
1.	Network availability between UCCC and IEMS locations	99.99%	• 99.99% or Better = NIL • 99.50% to 99.98% = 0.25% of QP • 99.00 to 99.49% = 0.50% of QP • less than 99% = 0.75% of QP
2.	Availability/Uptime of Field Devices like Cameras / Radars / Switches / Racks / Display panels / Desktops etc.	99.00%	• 99.00% or Better= NIL • 98.50% to 98.99%=0.50% of QP • 98.00 to 99.49% = 1.00% of QP • less than 98% = 1.50% of QP
3.	Not keeping required Project Management & Operation Support Services	As per SLA	• Management level resources like Project Manager: 5000/- per day per person for un-sanctioned/ non-reporting • All other staffs other than computer operator: 1000/- per day per person for un-sanctioned/ non- reporting • Computer operator: Rs. 500/- per day per person for un-sanctioned/ non- reporting Above charges are in addition to deduction of actual wages for the period of absence based on the rate schedule.
4.	Accuracy of ANPR System	As per SLA	• 97.00% or Better= NIL • 95.00% to 96.99%=0.50% of QP • 90.00 to 94.99% = 1.00% of QP • less than 90% = 1.50% of QP
5.	Accuracy of Speed Detection System	As per SLA	• 99.00% or Better= NIL • 98.50% to 98.99%=0.50% of QP • 98.00 to 99.49% = 1.00% of QP • less than 98% = 1.50% of QP
6.	Accuracy of Traffic Violation Detection System	As per SLA	Rs. 10,000/- per “Instance” per month
7.	Delay in resolution of incidents for the devices installed at IEMS Location	As per SLA	• Level 1: 0.25% of QP for every 2 Hours Delay in resolution. • Level 2: 0.25% of QP for every 3 Hours delay in resolution.

			• Level 3: 0.50% of QP for every 6 Hours delay in resolution. • Level 4: 0.75% of QP for every 8 Hours delay in resolution.
8.	Timeline for Retrieval from the Storage	Maximum 4 Hours for per request is allowed	• 0.50 % of the QP for every instance of delay beyond 4-hours Note: Data Retrieval Request Through a Request Log Mechanism
9.	Security Breach	As per SLA	3% Of QP for every 30 Minutes delay in detection and additional 1% for every 1 hr. delay in the mitigation of security breach.
10.	Request Resolution (Managed Cloud Services)	As per SLA	Level 1 Incident 0.25% of QP for every 2 hours delay in resolution. Level 2 Incident 0.50% of QP for every 6 hours delay in resolution. Level 3 Incident 0.75% of QP for every 12 hours delay in resolution
11.	Incident Resolution (Managed Cloud Services)	As per SLA	Level 1 Incident 0.25% of QP for every 2 hours delay in resolution. Level 2 Incident 0.50% of QP for every 6 hours delay in resolution. Level 3 Incident 0.75% of QP for every 12 hours delay in resolution
12.	Incidence Resolution (Power)	As per SLA	Level 1 Incident 0.25% of QP for every hour delay in resolution. Level 2 Incident 0.50% of QP for every 2 hours delay in resolution. Level 3 Incident 0.75% of QP for every 6 hours delay in resolution.

6.4 SLAs for periodic maintenance of IEMS Field Locations:

Particulars	SLAs	Penalty
Periodic Maintenance of Gantry/Cantilever Structures.	• Comprehensive Periodic Maintenance will be carried out quarterly. • Weatherproof Painting of Structures twice a year. • Cleanliness of Foundation Base of the Gantry/Cantilever Structure	If MSI fails to submit Periodic Maintenance log reports and/or any deviation found in SLAs, then 5% penalty of the QP payable under the Agreement will be charged against MSI.

	and nearby Areas. • The MSI will submit Periodic Maintenance log reports.	
Periodic Maintenance of Junction Box, Its accessories and Cabling.	• Comprehensive Periodic Maintenance will be carried out quarterly. • Weatherproof Painting twice a year. • Cleanliness to be ensured inside and outside of the Junction Box, its accessories and cabling. • Application of Pest Control once a month to avoid risks like rodent attack. • The MSI will submit Periodic Maintenance log reports.	If MSI fails to submit Periodic Maintenance log reports and/or any deviation found in SLAs, then 5% penalty of the QP payable under the Agreement will be charged against MSI.

The MSI shall be paid Quarterly Payment (QP) as per the services provided to the office of the Transport Commissioner. The overall penalty would be generally capped at 10% of QP amount. If the cap of overall penalty is reached in two consecutive quarters, the penalty cap for the third quarter onwards, for each quarter will increase by 5% over the penalty cap for the preceding quarter till it reaches 25% of the QP. In addition to the applicable penalty and the provisions pertaining to termination of contract, the office of the Transport Commissioner shall be within its rights to undertake termination of contract if or anytime the penalty increases by 20 % of the QP. Once the penalty cap has increased beyond 10%, if the bidder through better performance delivery for any quarter, brings the leviable penalty below 10% then the computation of the 1st of the 2 consecutive quarters as referred above will reset and will begin afresh. Availability will be calculated on a quarterly basis.

Note: The above clause for penalties due to a delay in FAT shall only be applicable for the delay attributed solely to the lead bidder, delay due to other reasons shall not be considered.

7 Project Timeline & Payment Milestones

The mode of payments to be made in consideration of the work and deliverables to be performed by the bidder shall be as follows. The Payment will be made to prime bidder only after performance deductions (if any) and statutory deductions (if any).

The Office of the Transport Commissioner at its sole discretion and depending on project progress and under certain criteria may release part-payment against any milestone payment after due undertaking from the bidder for completion of the activity or deliverable within 1 month of such submission of request by the bidder. However, the decision for part payment is entirely dependent on the Office of the Transport Commissioner.

Milestones and Payment Schedules for Implementation Phase

D = Effective Date of Letter of Intent or Contract Agreement (whichever is earlier)

D1 = Effective Date of Issue of Work Order

Milestones	Payment Milestones for the Implementation Phase	Payment Schedule	Time Schedule	Deliverables (Post approval by Authorised officer)
M 1	Site Survey	5% of Work Order Value (Capex Cost)	D1 + 3 Weeks	Technical Design Documents (HLD, LLD, Network Diagram) SRS document, Drawings along with feasibility study report of IEMS (Location & CCC)
M 2	Delivery & Verification of Hardware and related accessories	20% of Work Order Value (Capex Cost)	D1 + 8 Weeks	Delivery Challan, Functional Study Report (Applications & Edge Devices), Inception Report, Project Plan.
M 3	Civil Work with Cabling, Installation, Testing, Commissioning Hardware of IEMS Location & verification	20 % of Work Order Value (Capex Cost)	D1 + 10 Weeks Equal payment for each location completion	Site Commissioning Report, Warranty Certificates for the items supplied.
M 4	Installation, configuration, and Software/Application deployment	20 % of Work Order Value	D1 + 14 Weeks	Deployment Report

Milestones	Payment Milestones for the Implementation Phase	Payment Schedule	Time Schedule	Deliverables (Post approval by Authorised officer)
		(Capex Cost)		
M 5	Acceptance Test for integration with UCCC Hardware & Application software	10% of Work Order Value (Capex Cost)	D1 + 16 Weeks	User Acceptance Report
M 6	Final Acceptance Test & Go-Live of the IEMS system	10% of Work Order Value (Capex Cost)	D1 + 22 Weeks	FAT Report Go-Live Report Security CERTIN Certificate
M 7	Completion of Training	5% of Work Order Value (Capex Cost)	D1 + 26 Weeks	Training Completion Report User Manual
M 8	30 Days of successful Go-Live	5% of Work Order Value (Capex Cost)	D1 + 30 Weeks	System Generated Stability reports for installed hardware/software. Completion of UAT and closure of observations report

Note:

The 5% of the of Capex for Software would be paid to the bidder/the lead bidder (in case of consortium) proportionately over the operation and maintenance period on Quarterly basis, Post Go-Live.

The Billing period of Hosting & maintenance Cost would begin after Go-Live.

Milestones	Payment Milestones for the Operations & Maintenance Phase	Payment Schedule	Time Schedule	Deliverable
M 9	Year 1 payment for O&M after Go-Live	20% of Work Order Value (Opex Cost)	Equal Quarterly	1. Detailed plan for monitoring of SLAs and

Milestones	Payment Milestones for the Operations & Maintenance Phase	Payment Schedule	Time Schedule	Deliverable
		And 1% of Work Order Value for IEMS Software Components with licenses & Services (Capex Cost)	Invoice Payments	performance of the overall system. 2. Quarterly Progress Report. 3. Weekly Progress Report. 4. Issues logging and resolution report. Note: Above deliverables would be required to be submitted post Go-Live during Operations & Maintenance Period
M 10	Year 2 payment for O&M	20% of Work Order Value (Opex Cost) And 1% of Work Order Value for IEMS Software Components with licenses & Services (Capex Cost)	Quarterly	
M 11	Year 3 payment for O&M	20% of Work Order Value (Opex Cost) And 1% of Work Order Value for IEMS Software Components with licenses & Services (Capex Cost)	Quarterly	
M 12	Year 4 payment for O&M	20% of Work Order Value (Opex Cost) And 1% of Work Order Value for IEMS Software Components with licenses & Services (Capex Cost)	Quarterly	

Milestones	Payment Milestones for the Operations & Maintenance Phase	Payment Schedule	Time Schedule	Deliverable
M 13	Year 5 payment for O&M	20% of Work Order Value (Opex Cost) And 1% of Work Order Value for IEMS Software Components with licenses & Services (Capex Cost)	Quarterly	

Note:

- *Payment of Operations and maintenance phase shall be made on quarterly basis based on the adherence to monthly SLA compliance.*
- *The MSI shall work under project monitoring and supervision of Technical Support Unit (TSU - M/s. Palladium Consulting India Pvt. Ltd.) during the entire contract period of IEMS Project.*
- *The bidder shall share deliverables with TSU for technical review during the entire contract period of IEMS implementation. On successful completion of the review by TSU, it will be submitted for approval of Authority.*
- *All payments to the MSI shall be made upon submission of invoices along with necessary approval certificates from concerned Authorities.*