REQUEST FOR PROPOSAL (RFP)

for

Selection of Master System Integrator (MSI) for Establishment of Haridwar Kumbh Mela 'Integrated Command & Control Center' (HKICCC) and Integration with Dehradun ICCC

for

HARIDWAR KUMBH MELA 2021

RFP Ref No.: 01/DSCL/19-20/NCB/HKICCC

Volume 2 – Scope of Work

DEHRADUN SMART CITY LTD.

INVITED BY

DEHRADUN SMART CITY LIMITED

Government of Uttarakhand

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Definitions/Acronyms

Terms	Meanings
ABD	Area Based Development
AMC	Annual Maintenance Contract
ANPR	Automatic Number Plate Recognition
ATCS	Adaptive Traffic Control System
BOM	Bill of Material
CCTV	Closed Circuit Television
COTS	Commercial Off-The-Shelf
CSP	Cloud Service Provider
DC	Data Centre
DMS	Document Management System
DRC	Disaster Recovery Centre
ECB	Emergency Call Box
EMD	Earnest Money Deposit
FMS	Facility Management Services
GIS	Geographical Information System
GPS	Global Positioning System
GSM	Global System for Mobile Communication
GST	Goods and Services Tax
DICCC	Doon Integrated Command and Control Centre
ICT	Information and Communication Technology
IP	Internet Protocol
IPF	Information Processing Facility
ISO	International Organization for Standardization
ISWM	Integrated Solid Waste Management
IT	Information Technology
ITDP	Institute for Transportation and Development Policy
ITMS	Intelligent Traffic Management System
KPI	Key Performance Indicator
LOA	Letter of Acceptance
MIS	Management Information System
MSI	Master System Integrator
NIT	Notice Inviting Tender

OEM	Original Equipment Manufacture
OFC	Optical Fiber Cable
PA	Public Address
PoP	Point of Presence
PTZ	Pan Tilt Zoom
RFP	Request for Proposal
RACI	Responsible, Accountable, Confirm, Inform
RLVD	Red Light Violation Detection
DSCL	Dehradun Smart City Limited
SCM	Smart City Mission
SCP	Smart City Proposal
SDC	State Data Centre
SLA	Service Level Agreement
SOP	Standard Operating Procedures
SPV	Special Purpose Vehicle
SVD	Speed Violation Detection
TCV	Total Contract Value
TDS	Tax Deducted at Source
TPA	Third Party Auditor
UAT	User Acceptance Testing
UPS	Uninterrupted Power Supply
VAT	Value Added Tax
VM	Virtual Machine
VMS	Variable Message Sign
VA	Video Analytics
HKICCC	Haridwar Kumbh Mela Integrated Command & Control Center

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1 Introduction

1.1 Project Objectives

Haridwar is an ancient and holy city in the State of Uttarakhand. The River Ganga, after flowing for 253 kilometers from its source at Gaumukh, enters the Gangetic Plain for the first time at Haridwar. Every 12 years, Kumbh Mela is celebrated at Haridwar. As per provisional reports of Census India, population of Haridwar in 2011 was 228,832; its urban / metropolitan population was 310,796. However during the Kumbh Mela, millions of pilgrims, devotees, and tourists congregate in Haridwar to perform ritualistic bathing on the banks of the river Ganges. Last time Haridwar hosted Kumbh Mela from 14th January 2010 to 28th April 2010. On 14 April 2010, alone approximately 10 million people bathed in the Ganges river and by mid-April about 40 million people had bathed since 14 January 2010. Hundreds of foreigners joined Indian pilgrims in the festival which is thought to be the largest religious gathering in the world.

Government of Uttarakhand has been taking multiple steps to accommodate, provide safety and convenience to the large number of pilgrims who visit the Kumbh Mela. Next Kumbh Mela is scheduled to be hosted at Haridwar in 2021. **Dehradun Smart City Limited** would be managing the Integrated Command and control center along with the other smart elements as explained in this document.

Security, safety and efficient crowd management of the pilgrims visiting Kumbh Mela 2021 is on top most priority of DSCL. The objective of this project is to develop and deliver a scalable system that can enables DSCL to effectively prepare for upcoming Kumbh Mela and provide safety, security, required advisory information related to parking areas, train schedules, sanitation, near-by locations, cultural tourist spots etc. along with effective crowd management to the pilgrims visiting Haridwar Kumbh Mela.

Following are the systems/solutions envisaged to be implemented as part of Haridwar Kumbh Mela Integrated Command & Control Center (HKICCC) project for Haridwar Kumbh Mela:

1. Integrated Command and Control Center acting as unified platform for management of Haridwar Kumbh Mela operations
    a. Creation of Tenant in existing Dehradun ICCC (DICCC)
    b. Video Walls displays
    c. Desktops
    d. Contact/Call Center
    e. War Room
2. Variable Message Display boards across to display important real time messages, warnings, traffic advices, emergency messages
3. Intelligent Surveillance System with Centralized monitoring of all critical places including but not limited to Kumbh Mela areas, Snan Ghats, entry/exit points, traffic junctions, roads/corridors approaching Kumbh Mela area, market areas, bus stands, railway stations, parking areas, key religious places, temples etc.
    a. Beaming live images for Monitoring at Kumbh ICCC
    b. Face Recognition System

    c. Artificial Intelligence for crowd management and early warning system
    d. Integration with existing Dehradun ICCC and Dehradun Smart City Smart Systems being implemented
    e. Surveillance – during nights as well
    f. Automatic number plate recognition
    g. Smart Parking System using cameras
4. Creation of Mobile Incident Reporting Facility for Lost and found
5. Implementation of Dispatch and Live Monitoring of Emergency Vehicles
6. Solid Waste Management
7. Development & implementation of Standard Operating Procedures (SoPs) for ICCC, Kumbh Mela operations and other stakeholder/government departments
8. Development & implementation of innovative, cross-functional use-cases for ICCC, Kumbh Mela operations and other stakeholder/government departments
9. Integration with Haridwar City other ICT Initiatives

1.2 Purpose of this RFP

The purpose of this RFP is for the Dehradun Smart City Limited (DSCL) to enter into a contract with a qualified firm for the Supply, Installation, configuration, Integration, Commissioning, Operations and Maintenance of integrated solutions to support the command and control centre initiative for Kumbh Mela 2021 initiative of DSCL. DSCL is looking to engage a Master Service Integrator –

- Who brings strong technology experience in smart city implementation, integration and operations through integrated and multi-agency coordination platform
- Who can develop Standard Operating Procedures for the various components of the project and link with uses cases prepared by them
- Who has a quality control plan in place to demonstrate that all equipment is tested and passed prior to shipping
- Who can provide high quality installations of the project equipment
- Who is capable of maintaining and operating the complex Kumbh Mela Systems to provide maximum decision-making support and performance of the systems
- Who brings forth expertise for incident and emergency management
- Who has experience implementing city-wide ICT and surveillance system coupled with using the said systems efficiently through data analytics
- Who will strongly build capacity of various stakeholders for efficient operations and management of the proposed solutions

This RFP is designed to provide interested bidders with sufficient basic information to submit proposals meeting minimum requirements but is not intended to limit a proposal's content or exclude any relevant or essential data.

If any of the Technical Requirements mentioned in the RFP are restrictive, MSI shall submit a self-certification mentioning its restrictive nature in its technical bid for which burden of proof shall lie on MSI and MSI may propose equivalent/better product for its solution meeting the functional and SLA requirement. If during the technical evaluation, it is found that the certificate submitted by the MSI is not correct, the EMD shall be forfeited and necessary action may be taken. MSI will be required to adhere to the solution proposed in its technical proposal, presentation and POC during the bidding process for the complete duration of the project. If the Authority requires any addition/deletion in the proposed solution, same shall be mutually discussed and finalized during the contract negotiation. Bidders are at liberty and are encouraged to expand upon the specifications to evidence superior bid understanding and service capability.

2 Project Overview and Components

Key foundation components for Haridwar Kumbh Mela ICCC (HKICCC) considered for this RFP are as follows for implementation:

S. No.	Component	Geographical Scope
1.	Command & Control Centre	Primary at Dehradun with extension at Haridwar
2.	Data Centre and DR Site	Existing Doon integrated command & control center DC (at ITDA) to be utilized, with only mandatory hardware at small Server room in Haridwar (for Video Data). No DR for Video Data being generated at Haridwar. DR will be on cloud.
3.	Enterprise GIS	Doon integrated command & control center DC (at ITDA), with scope as defined later in this document.
4.	Intelligent Surveillance System	Location list shall be shared with successful bidder
5.	Wi-Fi	Location list shall be shared with successful bidder
6.	Garbage Detection System	Using AI on Cameras at strategic Locations
7.	VMD Boards	Location list Shall be shared with successful bidder
8.	Mobile Incident Reporting Facility	50 Mobile Users
9.	Fire Services – Incident Reporting, Dispatch and Monitor	Haridwar Integrated CCC, and Mobile app on existing mobiles of Fire Vehicles drivers
10.	Smart Parking	Location list shall be shared with successful bidder
11.	Solid Waste Management	Locations to be shared with successful bidder
12.	QR Codes for Smart Toilets	Haridwar – Kumbh Mela Areas
13.	IP based Public Announcement	Locations to be shared with successful bidder

2.1 Components & Services Scope Overview

The selected MSI shall ensure the successful implementation of the proposed HKICCC solutions as well as provide capacity building support to city authorities as per the scope

of services described below. Any functionality not expressly stated in this document but required to meet the needs of the DSCL to ensure successful operations of the system shall essentially be under the scope of MSI and for that no extra charges shall be admissible. MSI shall implement and deliver the systems and components which are described in this RFP. MSI's scope of work shall include but will not be limited to the following broad areas. Details of each of these broad areas have also been outlined in Annexures:

1. **Assessment, Scoping and Survey Study**: Conduct a detailed assessment, survey, gap analysis, scoping study and develop a comprehensive project plan, including:
a) Assess existing ICT systems, Network connectivity within the city and the greenfield site for the scope items mentioned in this Volume of the RFP
b) Conduct site survey for finalization of detailed technical architecture, g a p analysis, final Bill of Quantities and project implementation plan
c) Conduct site surveys to identify the need for site preparation activities
d) Obtain site clearance obligations & other relevant permissions with the support of DSCL

2. Design, Supply, Configuration, Installation, Implementation, Testing and Commissioning of the following primary components:
a) Haridwar Integrated Command and Control Centre (Another tenant in DICCC)
b) Server, Storage Hardware required for Haridwar ICCC Tenant and other software proposed
c) Cameras for Surveillance, VMS, VA & AI Software
d) Enterprise GIS Portal
e) Wi-Fi Hotspots
f) Solid Waste Management

The detailed requirements of the above would be delineated within the subsequent sections.

3. Integration with existing and proposed system ICT systems within DSCL ICT landscape (maximum 10 use cases)

4. **Data Centre:** Provisioning of Hardware, Network and Software Infrastructure, which includes design, supply, installation and commissioning of ICT Infrastructure at the Command and Control Centre; Haridwar Server Room. This scope consist of:
a) Site preparation services
b) IT Infrastructure including server, storage, other required hardware, application portfolio, licenses
c) Command Centre infrastructure including operator Video Walls, workstations, IP phones, etc.
d) Application integration services with the above identified applications

NOTE for DC at ITDA: It is envisaged that Planned Server Room at Haridwar Mela Control Room would have only the Server, Storage & Security infrastructure for Video data (including VA, AI). All other services shall be provided from ITDA DC. Existing Infrastructure at ITDA being implemented for DICCC project shall be utilized for any compute, storage and associated requirements for services being augmented/provided from ITDA DC. MSI has to provide detailed compute and storage requirement in terms of VCPU/RAM/HDD etc.. in their technical bid to DSCL.

Following shall be provided by DSCL:

- Bandwidth for following (bidder shall provide the requirement in their technical bid)
    - All field locations to HKICCC and DICCC
    - Between DC at DICCC to Server Room at HKICCC
    - Between DC and DR
    - Internet at both DC and at DR
- Telephone Connections including Tollfree or helpline numbers as required for the solution
- Electricity Charges including Connection charges and recurring charges

5. Capacity Building for DSCL and any other department which includes preparation of operational manuals, training documents and capacity building support, including:

a) Training of city authorities, operators and other stakeholders on operationalization of the system

b) Support during execution of acceptance testing

c) Preparation and implementation of the information security policy, including policies on backup and redundancy plan

d) Preparation of revised KPIs for performance monitoring of various urban utilities monitored through the system envisaged to be implemented.

e) To improve the operations and accountability of the proposed solutions they will be mapped with their KPIs.

f) Developing standard operating procedures for operations management and other services to be rendered by DICCC

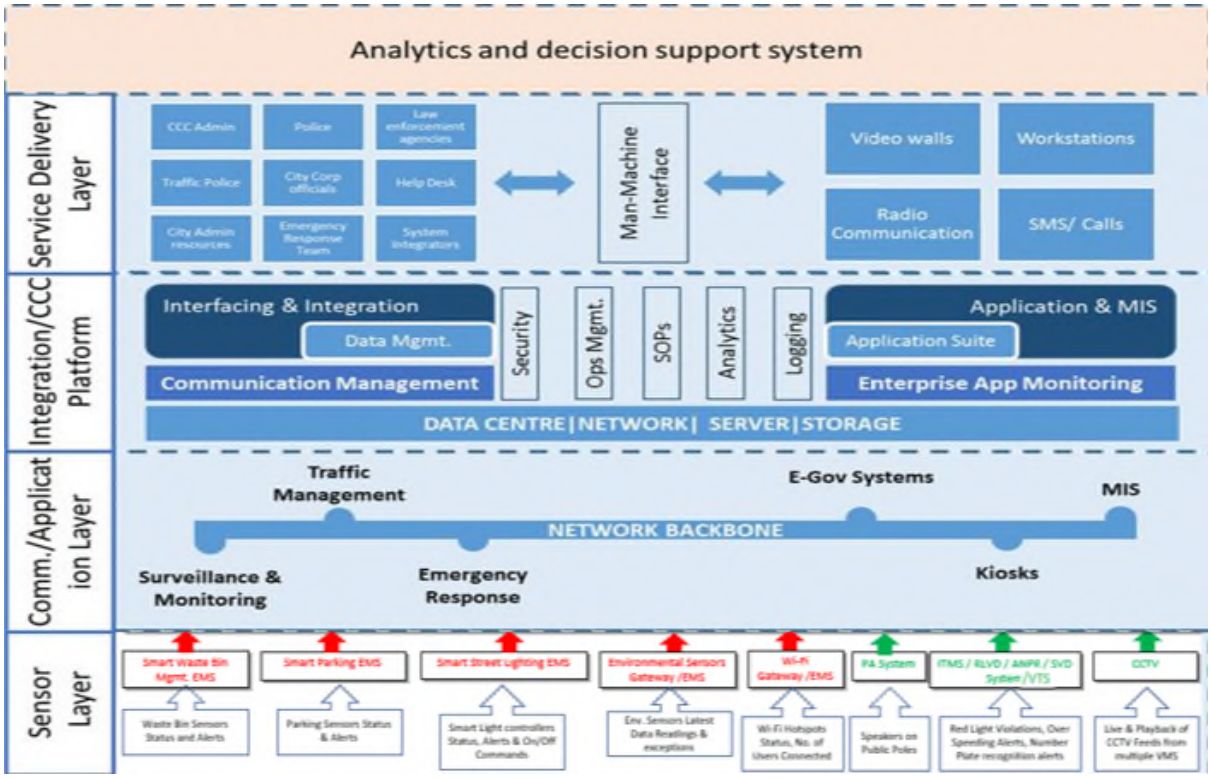
g) Preparation of system documents, user manuals, performance manuals, Operation manual etc.

6. Operations and Maintenance

The O&M shall be for a period of 1 year from the Go-Live date of implemented solutions in an efficient and effective manner.

2.2 Component Architecture

Indicative Framework of the solution envisaged under the ““Doon Integrated Command and Control Centre” is as given below (currently being implemented at Dehradun by the MSI selected after tendering process).



2.3 Survey, Deign Consideration for finalization of detailed technical architecture and project plan.

After signing of contract, the Systems Integrator needs to deploy team for the project and ensure that a Project Inception Report is submitted to DSCL which should cover following aspects:

1. Names of the Project Team members, their roles & responsibilities and deliverables.

2. Approach and methodology to be adopted to implement the Project (which should be in line with what has been proposed during bidding stage, but may have value additions / leaning in the interest of the project).

3. Responsibility assignment matrix for all stakeholders.

4. Risks that MSI anticipates and the plans they have towards their mitigation.

5. Detailed project plan specifying dependencies between various project activities / sub- activities and their timelines.

6. Installation locations for field devices geo mapped to visually identify the geographical area.

MSI shall conduct a comprehensive study of the existing system and infrastructure. The report shall also include the expected measurable improvements against each KPI in 'As-

Is' study after implementation of smart solutions under this project. The benchmarking data should also be developed to track current situation and desired state.

Additionally, MSI should provide a detailed To-Be designs specifying the followings:

1. High Level Design (including but not limited to) Application architecture, Logical and physical database design, Data dictionary and data definitions, ER diagrams and other data modelling documents and Physical infrastructure design for devices on the field
2. Application component design including component deployment views, control flows, etc.
3. Low Level Design (including but not limited to) Application flows and logic including pseudo code, GUI design (screen design, navigation, etc.), Database architecture, including defining data structure, data dictionary as per standards laid-down by Government of India.
4. Height and foundation of Poles for field devices.
5. Location of Junction Boxes, Wi-Fi Access Points.

Field equipment installed through this Project would become an important public asset. During the contract period of the Project the MSI shall be required to repair / replace any equipment if stolen / damaged/faulty. Appropriate insurance cover must be provided to all the equipment's supplied under this project.

- The systems implemented for project should be highly secure, considering that it is intended to handle sensitive data relating to the city and residents of the city. The overarching security considerations are already being implemented at ITDA, Dehradun under Dehradun Smart City Project. However, only the infrastructure required for video data shall be implemented at Haridwar. Pair of Firewall with UTM functionality shall be implemented at Haridwar to provide cyber threat protection.

- The message exchange between various applications in the smart city should be fully encrypted and authenticated. Any application outside the Data Centre (DC) should talk to the applications hosted in the data center through predefined APIs only.

- APIs should be published and the IT systems be running on standard protocols like JSON / XML or REST etc.

- From a network security perspective all information that flows on the network should be encrypted to ensure safety and privacy of confidential data. The devices at each endpoint of the network should be authenticated (using mechanisms based on attributes one of which could use passwords). The authentication system so used on these endpoint devices should ensure that only authorized users are sending data over the network, and there is no rogue data that is sent to the control systems to generate false alarms or sabotage the systems.

- All IoT sensors deployed as part of Kumbh Mela system should talk only to the authorized wireless network, and do not hook on to the rogue networks. The guidelines to secure Wi-Fi networks as published by Department of Telecom must be followed.

- All traffic from the sensors in the Haridwar City to the application servers should be encrypted Secure Socket Layer (SSL) and authenticated prior to sending any information. The data at rest and in transit must be encrypted.

- Authentication of sensors deployed should happen at the time of provisioning the sensors, and adding them into the system, and should be based on physical characteristics of the sensors like MAC ID, Device ID etc.

- Sensors deployed in solutions to set up Kumbh Mela initiatives should be hardened devices with the ability to be upgraded remotely for firmware through encrypted image files.

- The Sensors or edge device deployed in Kumbh Mela should not have any physical interface for administration. Monitoring of systems and networks should be undertaken remotely.

- All the sensors should connect to a completely separate network.

- Sustainable & Scalable Solution - Important technical components of the architecture must support scalability to provide continuous growth to meet the growing demand of the city. 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 cameras, data centre equipment's or other smart city components. Main technology components requiring scalability are storage, bandwidth, computing performance (IT Infrastructure).

The architecture should be scalable (cater to increasing load of internal and external users and their transactions) and capable of delivering high performance till the system is operational. In this context, it is required that the application and deployment architecture should provide for Scale-Up and Scale out on the Application and Web Servers, Database Servers and all other solution components The expectation is that the system should sustain at least 10 years from GO-Live. There must not be any system imposed restrictions on the upward scalability in number of field devices.

- Availability - Components of the architecture must provide redundancy and ensure that are no single point of failures in the key project 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 need to be configured to mask and recover with minimum outage. MSI shall make the provision for high availability for all the services of the system. Redundancy has to be considered at the core/data center components level and offering system High Availability and failover. The solution should meet the minimum of following availability requirements.

•Load Balanced across two or more Web Server avoiding single point of failure.

•Deployment of multiple application instances should be possible.

•Distributed or load balanced implementation of application to ensure that availability of services is not compromised at any failure instance.

•Comply with the published e-Governance standards, frameworks, policies and guidelines available on http://egovstandards.gov.in (updated from time-to-time)

•Provide analytic tools build into the system that shall support automatic detection of anomalies and their quick mitigation.

- 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 scalability of the system.

- Interoperability - Keeping in view the evolving needs of interoperability, especially the possibility that the solution shall become the focal point of delivery of services, and may also involve cross-functionality with the e-Government projects of other departments / businesses in future, the solution should be built on Open Standards. The SI shall ensure that the application developed is easily integrated with the existing applications. The code does not build a dependency on any proprietary software, particularly, through the use of proprietary 'stored procedures' belonging to a specific database product. The standards should:

(a) At least comply with the published e-Governance standards, frameworks, policies and guidelines available on http://egovstandards.gov.in (updated from time-to-time).

(b) Be of leading industry standards and as per standards.

All the personnel working on the Project and having access to the Servers / Data Center should be on direct payroll of the SI/OEM/Consortium partner. The SI would not be allowed to sub-contract work, except for following:

- Passive networking & civil work during implementation and O&M period.
- Viewing manpower at Command/ viewing centres & Mobile Vans during post-implementation.
- FMS staff for non- IT support during post-implementation.
- Non Critical Manpower (Not having Admin Rights to any server/ data center)

However, even if the work is sub-contracted, the sole responsibility of the work shall lie with the MSI. The MSI shall be held responsible for any delay/error/non-compliance/penalties etc. of its sub-contracted vendor. The details of the sub-contracting

agreements (if any) between both the parties would be required to be submitted to city and approved by the Authority before resource mobilisation.

- GIS Integration - MSI shall undertake detail assessment for integration of the Smart Governance, Surveillance System and all other components with the Geographical Information System (GIS). MSI is required to carry out the seamless integration to ensure ease of use of GIS in the Dashboards in Command Control Center. If this requires field survey, it needs to be done by MSI. If such a data is already available with city, it shall facilitate to provide the same. MSI is to check the availability of such data and it's suitability for the project.MSI is required to update GIS maps from time to time.

- SMS Gateway Integration - MSI shall carry out SMS Integration with the Kumbh Mela System and develop necessary applications to send mass SMS to groups/individuals. Any external/third party SMS gateway can be used, but this needs to be specified in the Technical Bid, and approved during Bid evaluation. Bidder should consider 200 million messages for 1 year and 20 million messages per year for remaining period of contract.

Application Architecture

I. The applications designed and developed for the departments concerned must follow best practice and industry standards. In order to achieve the high level of stability and robustness of the application, the system development life cycle must be carried out using the industry standard best practices and adopting the security constraints for access and control rights. The various modules / application should have a common Exception Manager to handle any kind of exception arising due to internal/ external factors. The standards should (a) at least comply with the published e-Governance standards, frameworks, policies and guidelines available on http://egovstandards.gov.in (updated from time-to-time); and (b) be of leading industry standards and as per standards.

II. The modules of the application are to be supported by the Session and Transaction Manager for the completeness of the request and response of the client request. The system should have a module exclusively to record the activities/ create the log of activities happening within the system/ application to avoid any kind of irregularities within the system by any User / Application.

MSI shall design and develop the Kumbh Mela System as per the Functional and System requirement specifications finalized.

(a) The Modules specified will be developed afresh based on approved requirement.
(b) Apart from this, if some services are already developed/under development phase by the specific department, such services will be integrated with the Kumbh Mela System. However total services/components in this RFP including fresh development and existing/new services would be 10. These service will be processed through department specific Application in backend.

(c) For monitoring of uptime and performance of IT and non IT infrastructure deployed, the SI shall have to provision for monitoring and measurement tools, licenses, etc. required for this purpose.
(d) The Smart City Application should have roadmap to integrate with key initiatives of State namely Portal Services, Citizen Contact Centre and Certifying Authority etc.

2.4 Commencement of Works

Site Clearance obligations & other relevant permissions –

Prior to starting the site clearance, MSI shall carry out survey of field locations as specified in RFP, for buildings, structures, fences, trees, existing installations, etc. The DSCL shall be fully informed of the results of the survey and the amount and extent of the demolition and site clearance shall then be agreed with the DSCL before executing the plan.

2.5 Electrical works and power supply

MSI on behalf of DSCL shall interact with electricity board for provision of mains power supply at all desired locations for field solution. MSI shall be responsible to submit the electricity bill including connection charge, meter charge, recurring charges etc. to DSCL so that necessary payments can be made by DSCL to the electricity board directly.

2.6 Lightning-proof measures

MSI shall comply with lightning-protection and anti –interference measures for system structure, equipment type selection, equipment earthing, power, signal cables laying. MSI shall describe the planned lightning-protection and anti –interference measures in the As-Is report. Corresponding lightning arrester shall be erected for the entrance cables of power line, video line, data transmission cables. All crates shall have firm, durable shell. Shell shall have dustproof, antifouling, waterproof function & should be capable to bear certain mechanical external force. Signal separation of low and high frequency; equipment's protective field shall be connected with its own public equal power bodies; small size/equipment signal lightning arrester shall be erected before the earthling.

2.7 Earthing System

All electrical components are to be earthen by connecting two earth tapes from the frame of the component ring and will be connected via several earth electrodes. The cable arm will be earthen through the cable glands. The entire applicable IT infrastructure i.e. signal junction or command centre shall have adequate earthing. Further, earthling should be done as per Local state national standard in relevance with IS standard.

1. Earthing should be done for the entire power system and provisioning should be there to earth UPS systems, Power distribution units, AC units, etc. so as to avoid a ground differential. DSCL shall provide the necessary space required to prepare the earthing pits.

2. All metallic objects on the premises that are likely to be energized by electric

currents should be effectively grounded.

3. There should be enough space between data and power cabling and there should not be any cross wiring of the two, in order to avoid any interference, or corruption of data.

4. The earth connections shall be properly made.

5. A complete copper mesh earthing grid needs to be installed for the server farm area, every rack need to be connected to this earthing grid. A separate earthing pit needs to be in place for this copper mesh.

6. Provide separate Earthing pits for Servers, & UPS as per the standards.

7. The metallic housing of electronic equipment/junction box/panel shall be connected to the earthing system.

8. The active electronic parts of an electronic equipment system shall be connected to the earthing system.

2.8 Junction Box, Poles and Cantilever

1. MSI shall provide the Junction Boxes, posts and cantilever to mount the field sensors like the cameras, VMD Board, WiFi and power backup (UPS) at all field locations, as per the specifications given in the RFP. MSI is encouraged to utilize poles, UPS, Switches for multiple initiatives and also use existing poles if any.

2. Bidder may propose solar based solutions to power the equipment. In this case, raw power can be used as backup supply whenever solar power is not able to meet the requirement.

2.9 Cabling Infrastructure

1. MSI shall provide standardized cabling for all devices and subsystems.

2. 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 the cables shall be routed down the inside of the pole.

3. All cables shall be clearly labeled with indelible indications that can clearly be identified by maintenance personnel. The proposed cables shall meet the valid directives and standards.

4. In case any underground cabling/digging is done, bidder should lay **HDPE Pipe** and cables should be routed through HDPE Pipe.

5. LAN Cabling infrastructure for outdoor should be **Armored Twisted Pair**.

2.10 Haridwar Kumbh Mela Integrated Command & Control Centre (HKICCC)

The objective of 'Doon Integrated Command and Control Center (DICCC)' being implemented at ITDA, Dehradun is to have an integrated view of all the smart initiatives

undertaken by DSCL with the focus to serve as a decision support engine for city administrators in day-to-day operations or during exigency situations. It involves leveraging on the information provided by various departments and providing a comprehensive response mechanism for the day-to-day challenges across the city. It is envisaged as fully integrated solution that provides seamless traffic management, incident – response management, collaboration and geo-spatial display. This platform is integrating with various urban services devices at the street layer so that urban services applications can be developed on top of this platform independent of the technology that is used in the devices. The platform is able to integrate with any type of sensor platform being used for the urban services irrespective of the technology used.

The platform normalizes the data coming from different devices of same type (i.e. Different lighting sensor from different OEMs, different energy meters from different OEMs etc.) and provide secure access to that data using data API(s) to application developers.

HKICCC would be a new tenant for Haridwar to be created by MSI in DICCC. This shall facilitate the viewing and controlling mechanism for the selected field locations in a fully automated environment for optimized monitoring, regulation and enforcement of services. The Haridwar Kumbh operations center shall be accessible by operators and concerned authorized entities with necessary authentication credentials. Various smart elements are able to use the data and intelligence gathered from operations of other elements so that civic services are delivered lot more efficiently and in an informed fashion.

MSI has to integrate all smart components of the project at Command and Control Centre with an integrated operations and dashboard application that will integrate various Haridwar City components implemented in this project and in future.

As part of this RFP, MSI shall ensure that redundancy and fault tolerance is considered at the HKICCC components level in the actual deployment.

Kumbh Mela operation platform should be able to cater to following requirements;

1. Urban Services and Data APIs:

a. Live data and visual feed: from diverse sensors should be connected to the platform.

b. Normalized APIs: for listed domain (Parking, Outdoor Lighting, Traffic, Environment, Urban mobility etc.) to monitor, control sensor and/or actuators functionality.

i. For example Lighting APIs: Vendor agnostic APIs to control Lighting functionality.

c. Cross APIs Integration: Enabling contextual information (API-API Bi-directional) and correlation across domains and verticals (Multiple vendor and Multi-sensor in future).

2. Platform functionality:

a. API management and gateway: Provides secure API lifecycle, monitoring mechanism for available APIs.

b. User and subscription management: Provides different tier of user categorization, authentication, authorization, and services based on the subscriptions.

c. Application management: Provides role-based access view to applications.

d. Enabling analytics: Time shifted and real-time data available for big data and analytics.

e. Domain and/or Insight reports

i. Parking occupancy, energy reports, AQI report (environmental pollution).

2.11 Disaster Recovery Centre

- The DR for the data centre shall be on cloud on empanelled service providers by MeiTY. The cloud provider should be MEITY empanelled as well as STQC certified Govt. community cloud (GCC).
- Various ICT equipment to be provisioned and maintained by MSI at the Data Centre is given below.
- The DR should be replicated for 30 days. The backup storage should be active-active.
- All equipment in DC & Server Room should be in HA.
- DR should be on cloud as a service and 99.5 % uptime.

3 Expectation from MSI

1. MSI shall engage early in active consultations with the Authority, City Police and other key stakeholders to establish a clear and comprehensive project plan in line with the priorities of all project stakeholders and the project objectives.
2. MSI shall assess existing infrastructure's current ability to support the entire solution and integrate the same with the proposed solution wherever applicable and possible
3. MSI shall judiciously evaluate the resources and time planned for undertaking the current state assessment, given the overall timelines and milestones of the project.
4. Validate / Assess the re-use of the existing infrastructure if any with Authority site
5. Supply, Installation, and Commissioning of entire solution at all the locations.
6. MSI shall be responsible for planning and design of the access network architecture (access controllers, backhaul connectivity, routers, switches, etc.) to meet the technical, capacity and service requirements for all smart city initiatives.
7. MSI shall ensure that the infrastructure provided under the project shall not have an end of life within 24 months from the date of bidding.
8. MSI shall ensure that the end of support is not reached during the concurrency of the contract.
9. MSI shall ensure compliance to all mandatory government regulations as amended from time to time.
10. The MSI shall ensure that all the peripherals, accessories, sub-components required for the functionality and completeness of the solution, including but not limited to devices, equipment, accessories, patch cords (fiber), cables, software, licenses, tools, etc. are provided according to the requirements of the solution.
11. Authority shall not be responsible if the MSI has not provisioned some components, sub-components, assemblies, sub-assemblies as part of Bill of Materials in the RFP. The MSI shall have to provision these & other similar things to meet the solution requirements at no additional cost and time implications to Authority.
12. All the software licenses that the SI proposes shall be perpetual software licenses along with maintenance and updates for the currency of the contract. The software licenses shall not be restricted based on location and Authority shall have the flexibility to use the software licenses for other requirements if required.
13. The SI shall ensure there is a 24x7 comprehensive onsite support for duration of the contract for respective components to meet SLA requirement. The SI shall ensure that all the OEMs have an understanding of the service levels required by Authority. SI is required to provide the necessary MAF (Manufacturer Authorization Form) as per the format provided in the RFP in support of OEMs active support in the project.
14. Considering the criticality of the infrastructure, SI is expected to design the solution considering the RFP requirement of no single point of failure with high level of redundancy and resilience to meet the network uptime requirements.

15. MSI shall be responsible for setting up / building / renovating the necessary physical infrastructure including provisioning for network, power, rack, etc. at all the locations.
16. MSI is expected to provide following services, including but not limited to:

    i. Provisioning hardware and network components of the solution, in line with the proposed authority's requirements as specified in BoM given in this RFP.

    ii. Size the WAN bandwidth requirements across all locations considering the application performance, data transfer, DR and other requirements for smart city initiatives.

    iii. Liaise with service providers for commissioning and maintenance of the links.

    iv. Furnish a schedule of delivery of all IT/Non-IT Infrastructure items.

    v. All equipment proposed as part of this RFP shall be rack mountable.

    vi. Authority may at its sole discretion evaluate the hardware sizing document proposed by the MSI. The MSI needs to provide necessary explanation for sizing to the Authority.

    vii. Complete hardware sizing for the complete scope with provision for upgrade.

    viii. Specifying the number and configuration of the racks (size, power, etc.) that shall be required at all the locations.

    ix. The MSI shall provide for all required features like support for multiple routing protocols, congestion management mechanisms and Quality of Service support.

    x. The MSI shall ensure that all active equipment (components) are Simple Network Management Protocol (SNMP) V3 compliant and are available for maintenance/ management through SNMP from the date of installation by a Network Monitoring System.

Note:

1) The functionality and specifications for different solutions provided in this RFP are indicative and carry guiding rule. The MSI is free to offer products and solutions which meet requirements of the RFP focusing on the outcome, future scalability, security, reliability and adherence to specified SLA under this RFP, in line with applicable standards & best practices adopted in the industry) The MSI is encouraged to design an Optimized solution which is technically superior, innovative, proven, better in terms of functionality and is cost effective. Any specified parameters mentioned in the scope/technical requirement in the RFP may be considered if it is required for meeting current & future requirements during the contract period. The MSI is fully responsible for the specified outcome to be achieved

3.2 Inception Phase

MSI will be responsible for preparation of detailed project plan. The plan shall address at the minimum the following:

i. Define an organized set of activities for the project and identify the interdependence between them.

ii. Resource planning and loading for each phase/activity. This must also indicate where each resource would be based during that phase, i.e. onsite at the DSCL office or off site at MSI premises.

iii. Establish and measure resource assignments and responsibilities

iv. Highlight the milestones and associated risks

v. Communicate the project plan to stakeholders with meaningful reports.

vi. Measure project deadlines and performance objectives.

vii. Project Progress Reporting. During the implementation of the project, MSI should present weekly reports. This report will be presented to the committee formed by DSCL. The report should contain at the minimum the under mentioned:

   a. Results accomplished during the period (weekly).

   b. Cumulative deviations from the schedule date as specified in the finalized Project Plan.

   c. Corrective actions to be taken to return to planned schedule of progress.

   d. Plan for the next week.

   e. Proposed revision to planned schedule provided such revision is necessitated by reasons beyond the control of MSI.

   f. Support needed.

   g. Highlights/lowlights.

   h. Issues/Concerns.

   i. Risks/Show stoppers along with mitigation.

viii. Identify the activities that require the participation of client personnel (including DSCL, the Program Management Unit etc.) and communicate their time requirements and schedule early enough to ensure their full participation at the required time.

3.1 Requirement Phase

MSI must perform the detailed assessment of the business requirements and IT Solution requirements as mentioned in this RFP. Based on the understanding and its own individual assessment, MSI shall develop & finalize the System Requirement Specifications (SRS) in consultation with DSCL and its representatives. While doing so, MSI at least is expected to do following:

a. MSI shall conduct a detailed survey and prepare a gap analysis report, detailed survey report of the physical and field infrastructure requirements. MSI shall duly assist the department in preparing an action plan to address the gaps.

b. MSI shall study and revalidate the requirements given in the RFP with DSCL and submit as an exhaustive FRS document. MSI shall develop the FRS and SRS documents.

c. MSI shall develop and follow standardized template for requirements capturing and system documentation.

d. MSI must maintain traceability matrix from SRS stage for the entire implementation.

e. MSI must get the sign off from user groups formed by DSCL.

f. For all the discussion with DSCL team, MSI shall be required to be present at DSCL office with the requisite team members.

g. Prior to starting the site clearance, MSI shall carry out survey of field locations as specified in RFP for buildings, structures, fences, trees, existing installations, etc.

h. The existing infrastructure (poles, electricity, etc.) at locations and other ICT infrastructure may be used for mounting field initiatives (if in good shape) or dismantled and replaced with the new systems which are proposed and required under the scope of the project. The infrastructure such as poles, cantilevers, cabling, aspects etc. should be reused to derive economies for the project with prior approval of DSCL. The dismantled infrastructure shall be delivered at the DSCL designated location without damage at no extra cost.

i. MSI shall directly interact with electricity boards for provision of mains power supply at all desired locations for field solution. DSCL shall facilitate the same. The recurring electricity charges will be borne by DSCL as per actual consumption.

3.2 Design Phase

MSI shall build the solution as per the Design Considerations detailed in this document. The solution proposed by MSI should comply with the design considerations requirements as mentioned therein.

3.3 Development Phase

MSI shall carefully consider the scope of work and provide a solution that best meets the project's requirements. Considering the scope set in this RFP, MSI shall carefully consider the solutions it proposes and explicitly mention the same in the technical proposal. The implementation of the application software will follow the procedure mentioned below:

a. Software Products (Configuration and Customization): In case MSI proposes software products the following need to be adhered:

    i. MSI will be responsible for supplying the application and licenses of related software products and installing the same so as to meet project requirements.

ii. MSI shall have provision for procurement of licenses in a staggered manner as per the actual requirement of the project.

ii. MSI shall perform periodic audits to measure license compliance against the number of valid End User software licenses consistent with the terms and conditions of license agreements, volume purchase agreements, and other mutually agreed upon licensed software terms and conditions. MSI shall report any exceptions to license terms and conditions at the right time to DSCL. However, the responsibility of license compliance solely lies with MSI. Any financial penalty imposed on DSCL during the contract period due to license non-compliance shall be borne by MSI.

iii. As per requirement of complex solution implementation MSI has to put requirement that OEM own resource & MSI best technical resources are deployed in this project.

iv. The OEM (of important software components) should provide the specific Designing (OEM Low Level Design, Core Implementation) support expertise to make sure that their supplied technology & products work as per the design objectives.

v. MSI to design and implement the complete security policy and workflow as per industry best practice in consultation with Customer to meet their Business requirements.

vi. MSI should provide the overall program management and to ensure that the solution which may include multiple technologies from various OEM, to work together seamlessly as per the design goals. The seamless integration with all devices would be SI responsibility for the respective products offered.

vii. System Documentation: System Documentation both in hard copy and soft copy to be supplied along with licenses and shall include but not limited to following. Documentation to be maintained, updated and submitted to DSCL regularly:

- Functional Requirement Specification (FRS)
- High level design of whole system
- Low Level design for whole system / Module design level
- System Requirements Specifications (SyRS)
- Any other explanatory notes about system
- Traceability matrix
- RACI Matrix
- Technical and product related manuals
- Installation guides
- User manuals
- System administrator manuals
- Toolkit guides and troubleshooting guides

- Other documents as prescribed by DSCL
- Quality assurance procedures
- Change management histories
- Version control data
- SOPs, procedures, policies, processes, etc. developed for DSCL
- Programs :
    - Entire source codes as applicable
    - All programs must have explanatory notes for understanding
    - Version control mechanism
    - All old versions to be maintained
    - Test Environment :
    - Detailed Test methodology document
    - Module level testing
    - Overall System Testing
    - Acceptance test cases

(These documents need to be updated after each phase of project and to be maintained updated during entire project duration. The entire documentation will be the property of DSCL.)

3.4 Testing Phase

MSI shall provide the testing strategy including traceability matrix, test cases and shall conduct the testing of various components of the software developed/customized and the solution as a whole. The testing should be comprehensive and should be done at each stage of development and implementation.to enable city for batter decision management and planning

3.5 Go-Live Preparedness and Go-Live

- MSI shall prepare and agree with DSCL, the detailed plan for Go-Live (in-line with DSCL's implementation plan as mentioned in RFP).
- MSI shall define and agree with DSCL, the criteria for Go-Live.
- MSI shall ensure that all the data migration is done from existing systems.
- MSI shall submit signed-off UAT report (issue closure report) ensuring all issues raised during UAT are being resolved prior to Go-Live.
- MSI shall ensure that Go –Live criteria as mentioned in User acceptance testing of Project is met and MSI needs to take approval from DSCL team on the same.
- Go-live of the application shall be done as per the finalized and agreed upon Go-Live plan.

3.6 Handholding and Training

In order to strengthen the staff, structured capacity building programmes shall be undertaken for identified resources of DSCL, Corporation, Police, UD&HD and stakeholder departments. These officers shall be handling emergency situations with very minimal turnaround time. The actual number of trainees will be provided at design stage.

a) MSI shall prepare and submit detailed Training Plan and Training Manuals to DSCL for review and approval.
b) Appropriate training shall be carried out as per the User Training Plan prepared in detail stating the number of training sessions to be held per batch of trainees, course work for the training program, coursework delivery methodologies and evaluation methodologies in detail.
c) MSI shall also be responsible for full capacity building. Training and capacity building shall be provided for all individual modules along with their respective integrations.
d) MSI shall be responsible for necessary demonstration environment setup including setup of cameras, Wi-Fi, sensors and application solutions to conduct end user training. End user training shall include all the equipment including but not limited to all the applications and infrastructure at CCC, DC, field locations etc. End user training shall be conducted at a centralized location or any other location as identified by DSCL with inputs from the MSI.
e) MSI shall conduct end user training and ensure that the training module holistically covers all the details around hardware and system applications expected to be used on a daily basis to run the system.
f) MSI shall impart operational and technical training to internal users on solutions being implemented to allow them to effectively and efficiently use the HKICCC system.
g) MSI shall prepare the solution specific training manuals and submit the same to DSCL for review and approval. Training Manuals, operation procedures, visual help-kit etc. shall be provided in Hindi & English language.
h) MSI shall provide training to selected officers of the purchaser covering functional, technical aspects, usage and implementation of the products and solutions.
i) MSI shall ensure that all concerned personnel receive regular training sessions, from time to time, as and when required. Refresher training sessions shall be conducted on a regular basis.
j) An annual training calendar shall be clearly chalked out and shared with the DSCL along with complete details of content of training, target audience for each year etc.
k) MSI shall update training manuals, procedures manual, deployment/Installation guides etc. on a regular basis (Quarterly/ Biannual) to reflect the latest changes to the solutions implemented and new developments.

l) MSI shall ensure that training is a continuous process for the users. Basic intermediate and advanced application usage modules shall be identified by the MSI.

m) Systematic training shall be imparted to the designated trainees that shall help them to understand the concept of solution, the day-to-day operations of overall solution and maintenance and updating of the system to some extent. This shall be done under complete guidance of the trainers provided by the MSI.

n) Time Schedule and detailed program shall be prepared in consultation with DSCL and respective authorized entity. In addition to the above, while designing the training courses and manuals, MSI shall take care to impart training on the key system components that are best suited for enabling the personnel to start working on the system in the shortest possible time.

o) MSI is required to deploy a Master Trainer who shall be responsible for planning, designing and conducting continuous training sessions.

p) The master trainers shall demonstrate a thorough knowledge of the material covered in the courses, familiarity with the training materials used in the courses, and the ability to effectively lead the staff in a classroom setting. If at any stage of training, the DSCL feels that on-field sessions are required, the same shall be conducted by the MSI.

q) If any trainer is considered unsuitable by DSCL, either before or during the training, MSI shall provide a suitable replacement without disrupting the training plan.

r) Training sessions and workshops shall comprise of presentations, demonstrations and hands-on mandatorily for the application modules.

s) DSCL shall be responsible for identifying and nominating users for the training. However, SI shall be responsible for facilitating and coordinating this entire process.

t) MSI has to ensure that training sessions are effective and the attendees shall be able to carry on with their work efficiently. For this purpose, it is necessary that effectiveness of the training session is measured through a comprehensive feedback mechanism. MSI shall be responsible for making the feedback available for the DSCL/authorized entity to review and track the progress, In case, after feedback, more than 40% of the respondents suggest that the training provided to them was unsatisfactory or less than satisfactory then the SI shall re-conduct the same training at no extra cost.

Types of Trainings: Following training needs identified for all the project stakeholders:

I. Functional Training

- ✓ Basic IT skills
- ✓ Web portal, Mobile App, Enterprise GIS, ITMS, Wi-Fi, environmental sensors, Data Analytics, ANPR, smart solutions etc.
- ✓ Software Applications (Command and Control Centre)
- ✓ Networking, Hardware Installation
- ✓ Centralized Helpdesk
- ✓ Feed monitoring

II. Administrative Training

- ✓ System Administration Helpdesk, BMS Administration etc.
- ✓ Master trainer assistance and handling helpdesk requests etc.

III. Senior Management Training

- ✓ Usage of all the proposed systems for monitoring, tracking and reporting.
- ✓ MIS reports, accessing various exception reports.

IV. Post-Implementation Training

- ✓ Refresher Trainings for senior officials
- ✓ Functional/Operational training and IT basics for new operators
- ✓ Refresher courses on System Administration
- ✓ Change Management programs

3.7 Operations and Maintenance

MSI will operate and maintain all the components of the proposed System for a period of one (1) year after Go-Live date. During O&M phase, MSI shall ensure that service levels are monitored on continuous basis; service levels are met and are reported to DSCL. After Go-Live, if any system/sub-system/appliance that is deployed during the O&M phase must be added in the System only after proper induction procedures are followed including hardening and security testing. MSI needs to implement suitable Performance Improvement Process (PIP) in the project.

PIP program applies to all the processes of HKICCC project. MSI need to submit its detailed approach for PIP in its technical proposal. Every process and procedure implemented in this project must be reviewed and updated by MSI at least on annual basis from the Go-Live Date. All the manpower engaged for O&M support of the project should be citizens of India. MSI will ensure that at no time shall any data of HKICCC System be ported outside the geographical limits of the country. Some broad details of O&M activities are mentioned at later sections.

Regular auditing is an inspection or examination of infrastructure to evaluate or improve its appropriateness, safety and efficiency. Audits usually provide a report that points out weaknesses/ vulnerabilities and proposes remedial actions.

3.8 Applications Support and Maintenance

Application support includes, but not limited to, production monitoring, troubleshooting and addressing the functionality, availability and performance issues, implementing the system change requests etc. The MSI shall keep the application software in good working order; perform changes and upgrades to applications as requested by the DSCL team. All tickets related to any issue/complaint/observation about the system shall be maintained in an ITIL compliant comprehensive ticketing solution. Key activities to be performed by MSI in the application support phase are as follows:

a. Compliance to SLA

MSI shall ensure compliance to SLAs as indicated in this RFP and any upgrades/major

changes to the software shall be accordingly planned by MSI ensuring the SLA requirements are met at no additional cost to the DSCL.

b. Annual Technology Support

MSI shall be responsible for arranging for annual technology support for the OEM products to DSCL provided by respective OEMs during the entire O&M phase.

c. Application Software Maintenance

i. MSI shall provide unlimited support through onsite team/telephone/Fax/E-mail/Video Conferencing/installation visit as required.

ii. MSI shall address all the errors/bugs/gaps in the functionality in the solution implemented by the MSI (vis-à-vis the FRS, BRS and SRS signed off) at no additional cost during the O&M phase.

iii. All patches and upgrades from OEMs shall be implemented by the MSI ensuring customization done in the solution as per the DSCL's requirements are applied. Technical upgrade of the installation to the new version, as and when required, shall be done by the MSI. Any version upgrade of the software / tool / appliance by MSI to be done after taking prior approval of DSCL and after submitting impact assessment of such upgrade.

iv. Any changes/upgrades to the software performed during the support phase shall subject to the comprehensive and integrated testing by the MSI to ensure that the changes implemented in the system meets the specified requirements and doesn't impact any other function of the system. Release management for application software will also require DSCL's approval. A detailed process in this regard will be finalized by MSI in consultation with DSCL.

v. Issue log for the errors and bugs identified in the solution and any change done in the solution shall be maintained by the MSI and periodically submitted to the DSCL.

vi. MSI, at least on a monthly basis, will inform DSCL about any new updates/upgrades available for all software components of the solution along with a detailed action report.

vii. In case of critical security patches/alerts, the MSI shall inform about the same immediately along with his recommendations. The report shall contain MSI's recommendations on update/upgrade, benefits, impact analysis etc. The MSI shall need to execute updates/upgrades though formal change management process and update all documentations and Knowledge databases etc. For updates and upgrades, MSI will carry it out free of cost by following

defined process.

d. Problem identification and Resolution

i. Errors and bugs that persist for a long time, impact a wider range of users and is difficult to resolve becomes a problem. MSI shall identify and resolve all the application problems in the identified solution (e.g. system malfunctions, performance problems and data corruption etc.).

ii. Monthly report on problem identified and resolved would be submitted to DSCL along with the recommended resolution.

e. Change and Version Control

All planned or emergency changes to any component of the system shall be through the approved Change Management process. The MSI needs to follow all such processes (based on industry ITSM framework). For any change, MSI shall ensure:

i. Detailed impact analysis.

ii. Change plan with Roll back plans.

iii. Appropriate communication on change required has taken place.

iv. Proper approvals have been received.

v. Schedules have been adjusted to minimize impact on the production environment

vi. All associated documentations are updated post stabilization of the change.

vii. Version control maintained for software changes.

The MSI shall define the Software Change Management and Version control process. For any changes to the solution, MSI has to prepare detailed documentation including proposed changes, impact to the system in terms of functional outcomes/additional features added to the system etc. MSI shall ensure that software and hardware version control is done for entire duration of MSI's contract.

f. Maintain configuration information

MSI shall maintain version control and configuration information for application software and any system documentation.

g. Training

MSI shall provide training to DSCL personnel whenever there is any change in the functionality. Training plan has to be mutually decided with DSCL.

h. Maintain System documentation

MSI shall maintain at least the following minimum documents with respect to the DICCC System:

i. High level design of whole system

ii. Low Level design for whole system / Module design level

iii. System requirements Specifications (SRS)

iv. Any other explanatory notes about system

v. Traceability matrix

vi. Compilation environment

MSI shall also ensure updating of documentation of software system ensuring that:

i. Source code is documented

ii. Functional specifications are documented

iii. Application documentation is updated to reflect on-going maintenance and

iv. enhancements including FRS and SRS, in accordance with the defined standards

v. User manuals and training manuals are updated to reflect on-going

vi. changes/enhancements

vii. Standard practices are adopted and followed in respect of version control and management.

i. All the project documents need to follow version control mechanism. MSI will be required to keep all project documentation updated and should ensure in case of any change, the project documents are updated and submitted to DSCL by the end of next quarter.

j. For application support MSI shall keep dedicated software support team to be based at MSI location that will single point of contact for resolution of all application related issues. This team will receive all the application related tickets/incidents and will resolve them. In its technical proposal MSI need to provide the proposed team structure of application support including number of team members proposed to be deployed along with roles and skills of each such member. Application support team shall be employees of MSI.

k. Any software changes required due to problems/bugs in the developed software/application will not be considered under change control. The MSI will have to modify the software/application free of cost. This may lead to enhancements/customizations and the same needs to be implemented by the MSI at no extra cost.

l. Any additional changes required would follow the Change Control Procedure. DSCL may engage an independent agency to validate the estimates submitted by the MSI. The inputs of such an agency would be taken as the final estimate for efforts required. MSI to propose the cost of such changes in terms of man month

rate basis and in terms of Function point/Work Breakdown Structure (WBS) basis in the proposal.

3.8.1 ICT Infrastructure Support and Maintenance

ICT infrastructure includes servers, storages, networking, security equipment, operating systems, database, enterprise management system, help desk system and other related ICT infra required for running and operating the envisaged system. MSI shall define, develop, implement and adhere to IT Service Management (ITSM) processes aligned to ITIL framework for all the IT Services defined and managed as part of this project.

3.8.2 Warranty support

a. MSI shall provide comprehensive and on-site warranty for 1 year from the date of Go-Live for the infrastructure deployed on the project. MSI need to have OEM support for these components and documentation in this regard need to be submitted to DSCL on annual basis.

b. MSI shall provide the comprehensive & onsite manufacturer's warranty in respect of proper design, quality and workmanship of all hardware, equipment, accessories etc. covered by the RFP. MSI must warrant all hardware, equipment, accessories, spare parts, software etc. procured and implemented as per this RFP against any manufacturing defects during the warranty period.

c. MSI shall provide the performance warranty in respect of performance of the installed hardware and software to meet the performance requirements and service levels in the RFP.

d. MSI is responsible for sizing and procuring the necessary hardware and software licenses as per the performance requirements provided in the RFP. During the warranty period MSI shall replace or augment or procure higher-level new equipment or additional licenses/hardware at no additional cost to the DSCL in case the procured hardware or software is not enough or is undersized to meet the service levels and the project requirements.

e. During the warranty period MSI shall maintain the systems and repair/replace at the installed site, at no charge to DSCL, all defective components that are brought to the MSI's notice.

f. The MSI shall carry out Preventive Maintenance (PM) of all hardware and testing for virus, if any, and should maintain proper records at each site for such PM. The PM should be carried out at least once in six months as per checklist and for components agreed with DSCL.

g. The MSI shall carry out Corrective Maintenance for maintenance/troubleshooting of supplied hardware/ software and support infrastructure problem including network (active/passive) equipment, security and rectification of the same. The MSI shall also maintain complete documentation of problems, isolation, cause and rectification procedures for building knowledge base for the known problems in

centralized repository, accessible to DSCL team as well.

h. MSI shall monitor warranties to check adherence to preventive and repair maintenance terms and conditions.

i. There should not be any restriction on no. of OEM Software support incidents.

j. OEM Shall have defined product roadmap for at least five years.

k. Software OEM shall be present in India and should have Support Center also in India.

l. The MSI shall ensure that the warranty complies with the agreed technical standards, security requirements, operating procedures, and recovery procedures.

   i. MSI shall have to stock and provide adequate onsite and offsite spare parts and spare component to ensure that the uptime commitment as per SLA is met.

   ii. Any component that is reported to be down on a given date should be either fully repaired or replaced by temporary substitute (of equivalent configuration) within the time frame indicated in the Service Level Agreement (SLA).

   iii. The MSI shall introduce a comprehensive Assets Management process & appropriate tool to manage the entire lifecycle of every component of HKICCC system.

3.8.3 Maintenance of ICT Infrastructure at the DC and DICCC

a. <u>Management of HKICCC</u>

MSI need to deploy requisite mix of L1, L2 and L3 resources (please refer manpower requirement) for management of entire proposed System including ICT infrastructure deployed under this project. All resources deployed in the project should be employees of MSI and be Indian citizens. All the L1 and L2 resources proposed for the project need to be dedicated for the project. Any change in the team once deployed will require approval from DSCL. It is expected that resources have proven track record and reliability. Considering the criticality of the project, DSCL may ask for security verification (Police verification) of every resource deployed on the project and MSI need to comply the same before deployment of the resource at the project. At all times, the MSI need to maintain the details of resources deployed for the project to DSCL and keep the same updated. A detailed process in this regard will be finalized between DSCL and MSI. The MSI shall maintain an attendance register for the resources deployed Attendance details of the resources deployed also need to be shared with DSCL on monthly basis. DSCL reserves the right to interview resources deployed for Operations and maintenance and assess the suitability of the resource for the role. In case a resource is not found suitable, MSI will change the resource on request of DSCL. MSI shall comply with this.

The scope of work for infrastructure and maintenance includes the following:

i. Ensure compliance to relevant SLA's

ii. 24x7 monitoring & management of availability & security of the infrastructure and assets

iii. Perform regular hardening, patch management, testing and installation of software updates issued by OEM/vendors from time to time after following agreed process

iv. Preventive maintenance plan for every quarter

v. Performance tuning of system as required

vi. Design and maintain Policies and Standard Operating Procedures

vii. Other activities as defined/to meet the project objectives

viii. Updating of all Documentation.

b. System Maintenance and Management

i. MSI shall be responsible for tasks including but not limited to setting up servers, configuring and apportioning storage space, account management, performing periodic backup of data and automating reporting tasks, and executing hardware and software updates when necessary. It shall be noted that the activities performed by the MSI may also be reviewed by DSCL.

ii. MSI shall provision skilled and experienced manpower resources to administer and manage the entire system at the Data Center.

iii. On an ongoing basis, MSI shall be responsible for troubleshooting issues in the IT infrastructure solution to determine the areas where fixes are required and ensuring resolution of the same.

iv. MSI shall be responsible for identification, diagnosis and resolution of problem areas pertaining to the IT Infrastructure and maintaining the defined SLA levels.

v. MSI shall implement and maintain standard operating procedures for the maintenance of the IT infrastructure based on the policies formulated in discussion with DSCL and based on the industry best practices/frameworks. MSI shall also create and maintain adequate documentation/checklists for the same.

vi. MSI shall be responsible for managing the user names, roles and passwords of all the relevant subsystems, including, but not limited to servers, other devices, etc. MSI shall be required to set up the directory server. Logs relating to access of system by administrators shall also be kept and shall be made available to DSCL on need basis.

vii. MSI shall implement a password change mechanism in accordance with the security policy formulated in discussion with DSCL and based on the industry best practices/frameworks like ISO 27001, ISO 20000 etc.

viii. The administrators shall also be required to have experience in latest technologies so as to provision the existing and applicable infrastructure on a requirement-based scenario.

c. System Administration

i. 24*7*365 monitoring and management of the servers in the DC.

ii. MSI shall also ensure proper configuration of server parameters and performance tuning on regular basis. MSI shall be the single point of accountability for all hardware maintenance and support the ICT infrastructure. It should be noted that the activities performed by the MSI may be reviewed by DSCL.

iii. MSI shall be responsible for operating system administration, including but not limited to management of users, processes, preventive maintenance and management of upgrades including updates, upgrades and patches to ensure that the system is properly updated.

iv. MSI shall also be responsible for installation and re-installation of the hardware(s) as well as the software(s) in the event of system crash/failures.

v. MSI shall also be responsible for proactive monitoring of the applications hosted.

vi. MSI shall appoint system administrators to regularly monitor and maintain a log of the monitoring of servers to ensure their availability to DSCL at all times.

vii. DSCL shall undertake regular analysis of events and logs generated in all the sub systems including but not limited to servers, operating systems etc. The system administrators shall undertake actions in accordance with the results of the log analysis. The system administrators shall also ensure that the logs are backed up and truncated at regular intervals. MSI shall refer to CERT-In Guidelines so as to ensure their alignment with the practices followed.

viii. The system administrators shall adopt a defined process for change and configuration management in the areas including, but not limited to, changes in servers, operating system, applying patches, etc.

ix. The system administrators shall provide hardening of servers in line with the defined security policies. Validation of hardening configuration will be carried out quarterly and deviations must be tracked through SLA reporting.

x. The system administrators shall provide integration and user support on all supported servers, data storage systems etc.

xi. The system administrators shall be required to trouble shoot problems with web services, application software, server relationship issues and overall aspects of a server environment like managing and monitoring server configuration, performance and activity of all servers.

xii. The system administrators should be responsible for documentation regarding configuration of all servers, IT Infrastructure etc.

xiii. The system administrators shall be responsible for managing the trouble tickets, diagnosis of the problems, reporting, managing escalation, and ensuring rectification of server problems as prescribed in Service Level Agreement.

xiv. The administrators will also be required to have experience in latest technologies so as to provision the existing and applicable infrastructure on a requirement based scenario.

d. Storage Administration

i. MSI shall be responsible for the management of the storage solution including, but not limited to, storage management policy, configuration and management of disk array, Storage fabric/switches, tape library, etc. It should be noted that the activities performed by the MSI may be reviewed by DSCL.

ii. MSI shall be responsible for storage management, including but not limited to management of space, SAN/NAS volumes, RAID configuration, LUN, zone, security, business continuity volumes, performance, etc.

iii. The storage administrator will be required to identify parameters including but not limited to key resources in the storage solution, interconnects between key resources in the storage solution, health of key resources, connectivity and access rights to storage volumes and the zones being enforced in the storage solution.

iv. The storage administrator will be required to create/delete, enable/disable zones in the storage solution.

v. The storage administrator will be required to create/delete/modify storage volumes in the storage solution.

vi. The storage administrator will be required to create/delete, enable/disable connectivity and access rights to storage volumes in the storage solution.

vii. To facilitate scalability of solution wherever required.

viii. The administrators will also be required to have experience in technologies such as virtualization and cloud computing so as to provision the existing and applicable infrastructure on a requirement based scenario.

e. Database Administration

i. MSI shall be responsible for monitoring database activity and performance, changing the database logical structure to embody the requirements of new and changed programs.

ii. MSI shall be responsible to perform physical administrative functions such as reorganizing the database to improve performance.

iii. MSI shall be responsible for tuning of the database, ensuring the integrity of the data and configuring the data dictionary.

iv. MSI will follow guidelines issued by DSCL in this regard from time to time including

access of data base by system administrators and guidelines relating to security of data base.

v. Database administration should follow the principle of segregation of duties to ensure no single DBA can update production tables/data singularly.

vi. In addition to restrictions on any direct change in Data by any administrator, the Databases shall have Auditing features enabled to capture all activities of administrators.

f. Backup/Restore/Archival

i. MSI shall be responsible for implementation of backup & archival policies as finalized with DSCL. The MSI is responsible for getting acquainted with the storage policies of DSCL before installation and configuration. It should be noted that the activities performed by the MSI may be reviewed by DSCL.

ii. MSI shall be responsible for monitoring and enhancing the performance of scheduled backups, scheduled regular testing of backups and ensuring adherence to related retention policies.

iii. MSI shall be responsible for prompt execution of on-demand backups of volumes and files whenever required by DSCL or in case of upgrades and configuration changes to the system.

iv. MSI shall be responsible for real-time monitoring, log maintenance and reporting of backup status on a regular basis. MSI shall appoint administrators to ensure prompt problem resolution in case of failures in the backup processes.

v. MSI shall undertake media management tasks, including, but not limited to, tagging, cross-referencing, storing, logging, testing, and vaulting in fire proof cabinets (onsite and offsite as per the detailed process finalized by during project implementation phase).

vi. MSI shall also provide a 24 x 7 support for file and volume restoration requests at the Data Centre.

g. Network monitoring

i. MSI shall provide services for management of network environment to maintain performance at optimum levels on a 24 x 7 basis. It should be noted that the activities performed by the MSI may be reviewed by DSCL.

ii. MSI shall be responsible for creating and modifying VLAN, assignment of ports to appropriate applications and segmentation of traffic.

iii. MSI shall also be responsible for break fix maintenance of the LAN cabling within HKICCC.

iv. MSI shall also provide network related support and will coordinate with connectivity service providers of DSCL/other agencies who are terminating their network at the HKICCC for access of system.

h. Security Management (To be done for components in scope of Haridwar Kumbh along with MSI for Dehradun Smart City for respective scope)

i. Regular hardening and patch management of components of the HKICCC System as agreed with DSCL

ii. Performing security services on the components that are part of the DSCL environment as per security policy finalized with DSCL

iii. IT Security Administration – Manage and monitor safety of information/data

iv. Reporting security incidents and resolution of the same

v. Proactively monitor, manage, maintain & administer all security devices and update engine, signatures, and patterns as applicable.

vi. Managing and monitoring of anti-virus, anti-malware, phishing and malware for managed resources.

vii. Ensuring 100 percent antivirus coverage with patterns not old more than period agreed on any given system.

viii. Reporting security incidents and co-ordinate resolution.

ix. Monitoring centralized pattern distribution (live update) and scan for deficiencies.

x. Maintaining secure domain policies.

xi. Performing firewall management and review of policies on at-least quarterly basis during first year of O&M and then after at-least on half-yearly basis.

xii. Resolution of calls for security notifications, system alerts, vulnerabilities in hardware/ software and alerting DSCL as appropriate.

xiii. Monthly reporting on security breaches and attempts plus the action taken to thwart the same and providing the same to DSCL.

xiv. Maintaining documentation of security component details including architecture diagram, policies and configurations.

xv. Performing periodic review of security configurations for inconsistencies and redundancies against security policy.

xvi. Performing periodic review of security policy and suggest improvements.

xvii. Reviewing logs daily of significance such as abnormal traffic, unauthorized penetration attempts, any sign of potential vulnerability. Security alerts and responses. Proactive measures in the event a problem is detected.

xviii. Policy management (firewall users, rules, hosts, access controls, daily adaptations).

xix. Modifying security policy, routing table and protocols.

xx. Sensitizing users to security issues through regular updates or alerts – periodic updates/ Help DSCL issuance of mailers in this regard.

xxi. Performing capacity management of security resources to meet business needs.

xxii. Rapidly resolving every incident/problem within mutually agreed timelines.

xxiii. Testing and implementation of patches and upgrades.

xxiv. Network/device hardening procedure as per security guidelines from DSCL.

xxv. Implementing and maintaining security rules.

xxvi. Performing any other day-to-day administration and support activities.

Other Activities

i. MSI shall ensure that it prepares configuration manual for OS, appliances, middleware, all tool, servers/devices and all equipment's and the same need to be submitted to DSCL, any changes in the configuration manual need to be approved by DSCL. Configuration manual to be updated periodically.

ii. MSI shall maintain data regarding entitlement for software upgrades, enhancements, refreshes, replacements and maintenance.

iii. If the Operating System or additional copies of Operating System are required to be installed/reinstalled/un-installed, the same should be done as part of O&M.

iv. MSI should carry out any requisite adjustments/changes in the configuration for implementing different versions of Application Software.

v. Updates/Upgrades/New releases/new versions: The MSI shall provide from time to time the Updates/Upgrades/new releases/new versions of the software and operating systems as required. The MSI should provide free upgrades, updates & patches of the software and tools to DSCL as and when released by OEM.

vi. MSI shall provide patches to the software as part of IT infrastructure, operating system, databases and other applications.

vii. All other activities required to meet the project requirements and service levels.

viii. It is responsibility of the MSI to scale up the Operations & Maintenance (O&M) team as and when required to ensure smooth project execution throughout the project duration. MSI may submit the change request to deploy additional manpower required for this purpose to DSCL for approval. For example during Mela time, more manpower may be required than normal.

3.8.4 Compliance to SLA

i. MSI shall ensure compliance to uptime and performance requirements of project solution as indicated in the SLA (as per Volume III of RFP) table of RFP and any upgrades/major changes to the HKICCC System shall be accordingly planned by MSI for ensuring the SLA requirements.

ii. MSI shall be responsible for measurement of the SLAs at the HKICCC System level as well as at the user level with the help of the enterprise monitoring tool on a

periodic basis.

iii. Reports for SLA measurement must be produced DSCL officials as per the project requirements.

3.9 Testing and Acceptance Criteria

a. MSI shall demonstrate the following mentioned acceptance criteria prior to acceptance of the solution as well as during project operations phase, in respect of scalability and performance etc. MSI may propose further detailed Acceptance criteria which the DSCL will review. Once DSCL provides its approval, the Acceptance criteria can be finalized. In case required, parameters might be revised by DSCL in mutual agreement with bidder and the revised parameters shall be considered for acceptance criteria. A comprehensive system should be set up that would have the capability to log & track the testing results, upload & maintain the test cases and log & track issues/bugs identified.

b. The following table depicts the details for the various kinds of testing envisaged for the project:

Type of Testing	Responsibility	Scope of Work
System Testing	✓ MSI	▪ MSI to perform System testing ▪ MSI to prepare test plan and test cases and maintain it. DSCL may request MSI to share the test cases and results ▪ Should be performed through manual as well as automated methods ▪ Automation testing tools to be provided by MSI. DSCL doesn't intend to own these tools
Integration Testing	✓ MSI	▪ MSI to perform Integration testing ▪ MSI to prepare and share with DSCL the Integration test plans and test cases ▪ MSI to perform Integration testing as per the approved plan ▪ Integration testing to be performed through manual as well as automated methods ▪ Automation testing tools to be provided by MSI
Security Testing (including Penetration and	✓ MSI ✓ DSCL / Third Party Auditor (to monitor the	▪ Solution should demonstrate the compliance with security requirements as mentioned in the RFP including but not limited to security controls in the application, at the network layer, network, data center (s), security monitoring system deployed by MSI

Type of Testing	Responsibility	Scope of Work
Vulnerability testing)	security testing)	▪ Solution shall pass vulnerability and penetration testing for rollout of each phase. The solution should pass web application security testing for the portal, mobile app and other systems and security configuration review of the infrastructure. ▪ MSI should carry out security and vulnerability testing on the developed solution. ▪ Security testing to be carried out in the exact same environment/architecture that would be set up for production. ▪ Security test report and test cases should be shared with DSCL ▪ Testing tools if required, to be provided by MSI. ▪ During O&M phase, penetration testing to be conducted on yearly basis and vulnerability assessment to be conducted on half-yearly basis. ▪ DSCL will also involve third party auditors to perform the audit/review/monitor the security testing carried out by MSI. Cost for such auditors to be paid by DSCL
User Acceptance Testing of Project	✓ DSCL or DSCL appointed third party auditor	▪ DSCL appointed third party auditor to perform User Acceptance Testing ▪ MSI to prepare User Acceptance Testing test cases ▪ UAT to be carried out in the exact same environment/architecture that would be set up for production ▪ MSI should fix bugs and issues raised during UAT and get approval on the fixes from DSCL /third party auditor before production deployment ▪ Changes in the application as an outcome of UAT shall not be considered as Change Request. MSI has to rectify the observations.

Note:

a. Bidder needs to provide the details of the testing strategy and approach including details of intended tools/environment to be used by MSI for testing in its technical

proposal. DSCL does not intend to own the tools.

b. MSI shall work in a manner to satisfy all the testing requirements and adhere to the testing strategy outlined. MSI must ensure deployment of necessary resources and tools during the testing phases. MSI shall perform the testing of the solution based on the approved test plan, document the results and shall fix the bugs found during the testing. It is the responsibility of MSI to ensure that the end product delivered by MSI meets all the requirements specified in the RFP. MSI shall take remedial action based on outcome of the tests.

c. MSI shall arrange for environments and tools for testing and for training as envisaged. Post Go-Live; the production environment should not be used for testing and training purpose. If any production data is used for testing, it should be masked and it should be protected. Detailed process in this regard including security requirement should be provided by MSI in its technical proposal. The process will be finalized with the selected bidder.

d. All the Third Party Auditors (TPA) as mentioned above will be appointed and paid by DSCL directly. All tools/environment required for testing shall be provided by MSI.

e. STQC/Other agencies appointed by DSCL shall perform the role of TPA. MSI needs to engage with the TPA at the requirement formulation stage itself. This is important so that unnecessary re-work is avoided and the audit is completed in time. The audit needs to be completed before Go-Live of different phases. MSI needs to prepare and provide all requisite information/documents to third party auditor and ensure that there is no delay in overall schedule.

f. The cost of rectification of non-compliances shall be borne by MSI.

3.10 Factory Testing

Success MSI shall have to submit Factory Test Certificate for the below mentioned materials before the actual supply of the items. MSI has to provide MAF (OEM certificate) where applicable.

3.11 Final Acceptance Testing

The final acceptance shall cover 100% of the DSCL Project, after successful testing by the DSCL; a Final Acceptance Test Certificate (FAT) shall be issued by the DSCL to MSI.

Prerequisite for Carrying out FAT activity:

1. Detailed test plan shall be developed by MSI and approved by DSCL. This shall be submitted by MSI before FAT activity to be carried out.

2. All documentation related to DSCL Project and relevant acceptance test document (including IT Components, Non IT Components etc.) should be completed & submitted before the final acceptance test to the DSCL.

3. The training requirements as mentioned should be completed before the final acceptance test.
4. Successful hosting of Application, NMS and other Software.
5. For both IT & Non-IT equipment's/software manuals/brochures/Data Sheets/CD/ DVD/media for all the DSCL Project supplied components.

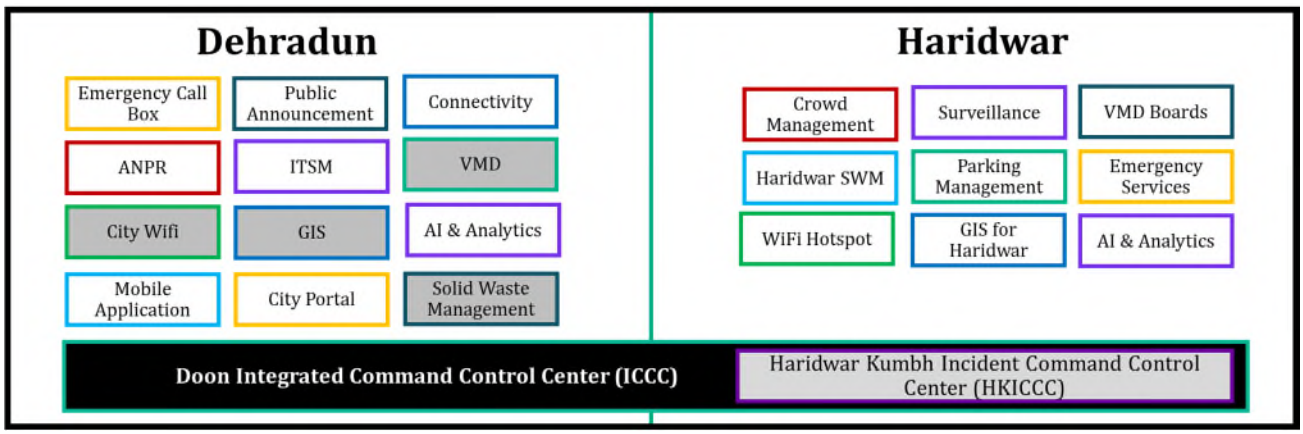
The FAT shall include the following:

1. All hardware and software items must be installed at respective sites as per the specification.
2. Availability of all the defined services shall be verified.
3. MSI shall be required to demonstrate all the features/facilities/functionalities as mentioned in the RFP.
4. MSI shall arrange the test equipment required for performance verification, and will also provide documented test results.
5. MSI shall be responsible for the security audit of the established system to be carried out by a certified third party as agreed by DSCL.

Any delay by 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 DSCL and MSI. In the event MSI is not able to complete the installation due to non-availability of bandwidth from the bandwidth service providers, the Supplier and DSCL may mutually agree to redefine the Network so MSI can complete installation and conduct the Final Acceptance Test within the specified time.

4 Detailed Scope of Work

Following figure shows high level functional architecture and integration with existing DICCC:



4.1 Haridwar Kumbh Mela Integrated Command and Control Centre (HKICCC)

It is envisaged that the Haridwar will implement multiple Smart use cases for Kumbh Mela 2021. These smart use cases shall be integrated with Doon Integrated Command and Control Center (DICCC). A new tenant in the existing DICCC shall be created in multi-tenant architecture. This tenant would be customized as per requirements of DSCL and called HKICCC. HKICCC shall also be extended for emergency services monitoring and tracking. Bidder shall provision for 200 supervisors (using Mobile Workforce App) in emergency vehicles so that emergency service vehicles and supervisors can be tracked and incidents can be dispatched to supervisors. Provision to create manual incidents and dispatch the same should also be created in HKICCC

Following are the details of DICCC Software:

MSI: M/S HPE India Pvt. Ltd.

Software OEM for ICCC: Trinity ICCC

4.2 TOR/Distribution Switch

1	The switch should have minimum 48 ports of 1/10G for use with SFP and SFP+ transceivers, and 6 ports of 40G for use with QSFP+ transceivers. Switch should come with 24 x 10G SFP ports on day 1
2	Switch should have internal redundant Field-replaceable, hot-swappable, Power Supply and fans
3	The switch should support 1000 Base-SX, LX, LH, 1000BASE-T and 10G (10GBASE-T ,10G SFP+ LC SR,LR, ER and 40G Transcivers to meet the connectivity requirements .
4	Switch should have minimum 16 GB RAM and 8 GB Flash from day -1
5	The switch shall have 2.5 Tbps switching capacity & 1,905MPPS for forwarding.
6	The switch should have Modular operating system with OVSDB to support a database-centric operating system.
7	The switch should support 96K mac address , 120K IPv4 routes and 4,096 port-based or IEEE 802.1Q-based VLANs
8	All switching and routing are wire-speed to meet the demands of bandwidth-intensive applications today and in the future.
9	The switch should have Distributed architecture with separation of data and control planes & support REST APIs and Python scripting provide fine-grained programmability
10	The switch should have independent monitoring and restart of individual software modules, and enhanced software process serviceability functions.
11	The Switch support 4K IEEE 802.1Q-based VLANs and vlan ids
12	Switch should have Layer 3 Routing functionality like OSPF v3, BGP ,policy Based Routing (PBR) Multiprotocol BGP (MP-BGP) with IPv6 Address Family , 6in4 tunnels , Dual IP stack, ECMP and GRE from day-1.
13	Switch should have Multicast features like IGMP,MLD, Multicast Service Delivery Protocol (MSDP) , IGMP/MLD Snooping and PIM-SM/DM, IPv4 and IPv6)

14	Switch should have distributed and redundant architecture by deploying two switches with each switch maintaining independent control yet staying synchronized during upgrades or failover. Also supports upgrades during live operation.
15	The switch should have modular Linux architecture with OVSDB, providing powerful access to all state at all times allows unique visibility and analytics capabilities to enables full integration with other workflow systems and services
16	The switch should have RJ-45 serial ,micro USB console RJ-45 Ethernet port for management.
17	The switch should support Dual flash images and Multiple configuration files.
18	The switch should support IEEE 802.1D STP, IEEE 802.1w Rapid Spanning Tree Protocol (RSTP) for faster convergence, and IEEE 802.1s Multiple Spanning Tree Protocol (MSTP).
19	Shall provide support for RoHS and WEEE regulations
20	Operating temperature of 0°C to 40°C and Operating relative humidity 5% to 95% non-condensing
21	Should have safety certifications like EN 60950-1:2006 +A11:2009 +A1:2010 , EN60825-1; IEC60950-1:2005 ; IEC 60825-1; UL60950-1, CSA 22.2 , EN 55032:2012, Class A; EN 55024:2010; EN 61000-3-2:2014, Class A; EN 61000-3-3:2013; FCC CFR 47 Part 15:2010, Class A; EN 50581:2012 (RoHS)
22	Switch should have NDPP Certified under common Criteria

4.3 Access Switches

Sr. No	Specifications
1	48 RJ-45 autosensing 10/100/1000 and 4 SFP+ 1/10GbE ports . Switch shall be populated with minimum 4 x 10G SR Transceivers from day 1 . Switch should have internal redundant power supply from day-1
2	The switch should have 1 dual-personality (RJ-45 or USB micro-B) serial console port
3	shall have minimum 1G DRAM and 12 MB Packet buffer size
4	Shall have switching capacity of 176 Gbps and 110 million pps switching throughput
5	The Switch should support 32000 MAC address
6	The switch should have Routing table size of 2000 entries (IPv4),1000 entries (IPv6) & 10000 RIP routes.
7	The switch should support OpenFlow 1.0 and 1.3 specifications to enable SDN by allowing separation of the data (packet forwarding) and control (routing decision) paths
8	The switch should support HTTP redirect function
9	The Switch should support real-time traffic classification into eight priority levels mapped to eight queues
10	The Switch should have RIPv1, RIPv2, and RIPng ,Access OSPF v2 ,OSPF v3 and Policy Based Routing (PBR) from day-1
11	The switch should support IPv6 host ,Dual stack (IPv4 and IPv6) ,MLD snooping ,IPv6 ACL/QoS from day-1

12	The switch should have RA guard, DHCPv6 protection, dynamic IPv6 lockdown, and ND snooping
13	The Switch should have minimum 2 dedicated Stacking ports with 100G Stacking bandwidth. Cables and Modules should be available from day-1.
14	The switch should support IEEE 802.3ad LACP and Port trunking up to 60 trunks, each with up to eight links (ports) per trunk
15	The switch should support Multiple user authentication methods like IEEE 802.1X supplicant ,Web-based authentication ,MAC-based authentication
16	Switch should support Concurrent IEEE 802.1X, Web, and MAC authentication schemes per switch port accepts up to 30 sessions of IEEE 802.1X, Web, and MAC authentications
17	Switch should support Dynamic segregation to provides a secured tunnel to transport network traffic on a per-port or per-user-role basis.
18	Switch should support DHCP protection ,Switch CPU DOS protection ,Identity-driven ACL,Port security
19	The switch should support IEEE 802.1v protocol VLANs ,IEEE 802.1ad Q-in-Q ,MAC-based VLAN ,Rapid Per-VLAN Spanning Tree (RPVST+)
20	The switch should support VxLAN encapsulation (Tunneling) protocol for overlay network that enables a more scalable virtual network deployment
21	The switch should support RADIUS/TACACS+
22	The switch should support IEEE 802.1Q (4094 VLAN IDs) and 2K VLANs simultaneously
23	Shall support IEEE 802.3az Energy-efficient Ethernet (EEE).
24	5 Year warranty with advance replacement and next-business-day delivery including Software upgrades/updates
25	The proposed Switch should be IPv6 Ready Certified and NDPP certified under Common criteria at the time of delivery.
26	Switch should have NDPP Certified under common Criteria

4.4 Endpoint Detection and Response.

1. The proposed solution should be positioned in the leader quadrant from last three published Gartner Magic quadrant report for Endpoint Protection
2. Endpoint solution should have capability of AV, Vulnerability Protection, Firewall, Device control, Application Control, Virtual Patching, EDR, DLP capabilities in a single agent
3. Proposed solution should have Pre, Post and Runtime machine learning capability
4. Proposed solution should have True file type scan along with Proactive outbreak prevention and Command & Control callback detection
5. File reputation - Variant protection - Census check - Web reputation
6. Endpoint vulnerability protection should scan the machine and provide CVE number visibility and accordingly create rule for virtual patch against vulnerability
7. Behavior monitoring along with ransom ware protection engine, ransom ware engine should have feature to take backup of ransom ware encrypted files and restoring the same.
8. Proposed solution should have IPv4 and IPv6 support

9. Endpoint solution should have data loss prevention with pre-defined templates for HIPAA, PCI-DSS, GLBA etc. for compliance requirements and should have capability to create policies on basis of regular expression, key word and dictionary based
10. Offers visibility and control of data in motion of sensitive information—whether it is in email, webmail, instant messaging (IM), SaaS applications, and most networking protocols such as FTP, HTTP/HTTPS, and SMTP.
11. Prevents potential damage from unwanted or unknown applications (executables, DLLs, Windows App store apps, device drivers, control panels, and other Portable Executable (PE) files).
12. Provides global and local real-time threat intelligence based on good file reputation data correlated across a global network
13. Uses intelligent and dynamic policies that still allow users to install valid applications based on reputation-based variables like the prevalence, regional usage, and maturity of the application
14. Uses application name, path, regular expression, or certificate for basic application whitelisting and blacklisting.
15. Contains broad coverage of pre-categorized applications that can be easily selected from application catalog (with regular updates).
16. Ensures that patches/updates associated with whitelisted applications can be installed, as well as allowing your update programs to install new patches/updates, with trusted sources of change.
17. Features roll-your-own application whitelisting and blacklisting for in-house and unlisted applications.
18. Limits application usage to a specific list of applications supported by data loss prevention (DLP) products for specific users or endpoints.
19. Collects and limits application usage for software licensing compliance.
20. Proposed solution should not send any file/sample with cloud to inspect and analyze for any threat
21. Features system lockdown to harden end-user systems by preventing new applications from being executed
22. Should be capable of recommending rules based on vulnerabilities on endpoint and create dynamic rules automatically based on System posture and endpoint posture
23. Extend protection to critical platforms, including legacy operating systems such as Microsoft® Windows® XP and protects end of support and legacy operating systems, for which patches may never be provided.
24. Blocks known and unknown vulnerability exploits before patches are deployed
25. Vulnerability Protection virtually patches known and unknown vulnerabilities, giving you instant protection, before a patch is available or deployable
26. Automatically assesses and recommends required virtual patches for your specific environment.
27. Dynamically adjusts security configuration based on the location of an endpoint.
28. Blends signature-less techniques, including high-fidelity machine learning, behavioral analysis, variant protection, census check, application control, exploit prevention, and good file check with other techniques like file reputation, web reputation, and command and control (C&C) blocking.

29. Provides protection before patches are deployed and often before patches are available

30. Shields operating system and common applications from known and unknown attacks
31. Organizes vulnerability assessments by Microsoft security bulletin numbers, CVE numbers, or other important information
32. Solution must support CPU usage performance control during scanning -Checks the CPU usage level configured on the Web console and the actual CPU consumption on the computer i.e. High, Medium and low.
33. Should be capable of Powerful Investigative Capabilities (EDR) including :

- Investigation and IOC Sweeping (server-side metadata sweep)
- Patient Zero ID / Root Cause Analysis and IOA Behavior Hunting/Detection
- API's for query / automation and Unknown file guidance
- Variant Protection to detects mutations of malicious samples by recognizing known fragments of malware code
- Packer Detection to Identifies packed malware in memory as it unpacks, prior to execution
- Runtime Machine Learning scores real-time behavior against a cloud model to detect previously unknown threats
- IOA Behavioral Analysis detects behavior that matches known indicators of attack (IOA), including ransomware encryption behaviors, script launching
- In-memory runtime analysis malicious script detection, malicious code injection, runtime un-pack detection
- Isolation, Quarantine, Process kill, Execution block and Damage rollback
- Provides context-aware endpoint investigation and response (EDR), recording and detailed reporting of system-level activities to allow threat analysts to rapidly assess the nature and extent of an attack. Custom detection, intelligence, and controls
- Record detailed system-level activities and perform multi-level search across endpoints using rich-search criteria such as OpenIOC, Yara, and suspicious objects.
- Detect and analyze advanced threat indicators such as fileless attacks.
- Root cause analysis for simple or full "kill chain
- Search by multiple parameters by OpenIOC rule for disk scans and Yara rules for memory scans

4.5 Server Security (HIPS)

1. Proposed solution should protect against distributed DoS attack and should have the ability to lock down a computer (prevent all communication) except with management server.
2. Solution should support stateful Inspection Firewall, Anti-Malware, Deep Packet Inspection with HIPS, Integrity Monitoring, Application Control, and Recommended scan in single module with agentless and agent capabilities
3. Firewall rules should filter traffic based on source and destination IP address, port, MAC address, etc. and should detect reconnaissance activities such as port scans and

Solution should be capable of blocking and detecting IPv6 attacks and Product should support CVE cross referencing when applicable for vulnerabilities.
4. It should provide automatic recommendations against existing vulnerabilities
5. Solution should support any pre-defined lists of critical system files for various operating systems and/or applications (web servers, DNS, etc.) and support custom rules as well.
6. Solution should have feature to take backup of infected files and restoring the same.
7. Host IPS should be capable of recommending rules based on vulnerabilities with the help of virtual patching and should have capabilities to schedule recommendation scan and entire features of solution should be agentless.
8. Product should support CVE cross referencing when applicable for vulnerabilities.
9. Host based IPS should support virtual patching both known and unknown vulnerabilities until the next scheduled maintenance window.
10. Should provide automatic recommendations against existing vulnerabilities, dynamically tuning IDS/IPS sensors (Selecting rules, configuring policies, updating policies)provide automatic recommendation of removing assigned policies if vulnerability no longer exists
11. Solution should have Security Profiles allows Integrity Monitoring rules to be configured for groups of systems, or individual systems.
12. Should have pre and post execution machine Learning and should have Ransom ware Protection in Behavior Monitoring.
13. Demonstrate compliance with a number of regulatory requirements including PCI DSS, HIPAA, NIST, SSAE 16
14. Should be Common Criteria EAL 4 and FIPS 140-2 validated
15. Machine Learning: Analyses unknown files and zero-day threats using machine learning algorithms to determine if the file is malicious
16. Container security automated processes for critical security controls to protect containers and the Docker host. Bake security into the CI/CD pipeline for frictionless automation
17. API-first, developer-friendly tools to help you ensure that security is baked into DevOps processes
18. Host IPS should be capable of recommending rules based on vulnerabilities with the help of virtual patching and should have capabilities to schedule recommendation scan and entire features of solution should be agentless.
19. HIPS Solution Should not has the need to provision HIPS Rules from the Policy Server as the Rules should be automatically provisioned and de provisioned
20. OEM of proposed solution should have local 24x7 TAC support in India

4.6 Internal Firewall for Haridwar Server Room

Sr.No:	Specification
1	**General**
1.1	Integrated Security Appliance which is capable of supporting Firewall, VPN, Application Control, Web/URL filtering, supporting full IPv6 with High Availability support.
1.2	OEM should support the proposed products (Firewall & Reporting tool and their firmware /Software) for at least 5 years from the date of delivery.

1.3	The OEM quoted in bid must be Gartner's Leader Quadrant for Enterprise Firewall.
1.4	The proposed Firewall should belong to a family of products that attains NSS Recommended rating Certification for Data Center Security Gateway.
1.5	The OEM should have published all the performance requirement on the corporate public website.
2	**Firewall Performance & Features requirements.**
2.1	Security appliance must support 8 xGE RJ45 Interfaces, 8 x SFP & 2 x 10G SFP+ Interfaces
2.2	Security appliance should support 25 GBPS of Firewall throughout with Enterprise mix traffic
2.3	Should support at least 8 mil concurrent sessions
2.4	Should support at least 275000 New sessions/sec
2.6	The firewall should do stateful inspection & must also support asymmetric routing if required
2.7	Firewall should support NAT66 (IPv6-to-IPv6), NAT 64 (IPv6-to-IPv4) & NAT46 (IPv4-to-IPv6) functionality
2.8	Should support Static, RIP, OSPF, OSPFv3 and BGP, BGPv6
2.9	solution should support Creating tags based on multiple administrator-defined categories to separate and categorize network objects, interfaces, and devices
2.10	Should be able to link Active Directory and/or LDAP usernames to IP addresses related to suspected security events.
2.11	Should support the capability to quarantine end point by integrating with other security solution like Network Admission Control
2.12	It should load balance & support automated Failover for multiple ISP's
2.13	Security solution must support IP, User & Device based policies.
2.14	Security solution must integrate with Open LDAP, Radius, AD for user based policy.
2.16	Should support Active-Active & Active-standby High Availability
2.17	Solution should support VXLAN and Support SPAN ports and port aggregation with multiple interfaces
2.18	Solution should support traffic redirection with ICAP and WCCP support for integration with proxy servers / DLP
2.19	solution should support Intelligent WAN path control with ability to direct traffic among WAN links based on (over 3,000) applications and application transactions such as latency, jitter and packet-loss
2.20	solution should support QoS, Traffic Shaping based on individual users / group and policy routing for bandwidth management
2.21	Firewall should support High Availability like Active-passive, active-active, virtual clusters and VRRP
2.22	Firewall should support virtual systems, for configuring into multiple Virtual firewall and each virtual firewall must support NAT or Transparent mode. Security profiles and inspection policies must be confined within respective virtual firewall.
2.23	solution should have IPv6 support for routing, NAT and security policies on both IPv4 & IPv6

2.24	Should provide minimum Real World / Enterprise Mix Next Generation Firewall throughput of 3 GBPS
2.25	Should support REST API for monitoring and config programmability
2.26	Security appliance should support 7 GBPS of IPS throughput - Enterprise mix traffic
2.27	Security appliance should support 5 GBPS of NGFW throughout- Enterprise mix traffic
2.28	Security appliance should support 4 GBPS of Threat protection throughout - Enterprise mix traffic
3	**VPN**
3.1	Security solution must have VPN throughput of 12 Gbps or more.
3.2	Security solution must support IPSec & SSL VPN licenses from dayone
3.3	SSL-VPN must be support both web based acess and client based acess for MAC OSX, Linux, Windows Vista and with 64-bit Windows operating systems
3.4	SSL-VPN must support Host integrity checking and OS check prior to SSL tunnel mode connections
3.5	SSL-VPN must restrict devices connecting based on MAC host check.
3.6	The solution should support IPSEC VPN on the follwogin modes Gateway-to-gateway, hub-and-spoke, full mesh and redundant-tunnel.
3.7	Solution should support Auto VPN, i.e establish dynamic on-demand direct tunnels between remote locations so as to avoid routing through the topology's hub device.
4	**Web-Content filtering**
4.1	Security solution should have URL's Categorized under broad 75+ categories filtering over http/https protocols.
4.2	Solution should support Inspect SSL encrypted traffic option for application control, web filtering, and DLP
4.3	Security solution must understand websites of different languages & rate them.
4.4	Solution should be have provisions to create local categories and category rating override.
4.5	Solution should facilitate administrator to temporarily assign different profiles to user/user group/IP
4.6	Solution should support restricting access to Google Corporate Accounts
5	**Application-Control**
5.1	Should be able to identify & control all commonly used web 2.0 applications & should should be bale to detect minimum 3000 applications.
5.2	It must support applications such as Torrent, P2P, Botnets, Games, Social networks irrespective of their websites.
5.3	Security solution should support to create custom application signatures.
5.4	Solution should Support detection for traffic using HTTP/2 protocol and able to block QUIC traffic so that browser automatically falls back to HTTP/2 + TLS 1.2
5.5	Application control should be capable of Allow, block, reset session and monitor applications based on individual signature / category.
5.6	Solution should provide Deep application control over popular public cloud services, such as SalesForce, Google Docs, and Dropbox etc

4.7 EMS Enterprise Management System (EMS):

Dehradun Smart City is doing implementation of EMS as per following specifications. Bidder needs to provide the following functionalities as extension to existing platform or as new platform (meeting the specifications specified below). Bidder should also propose additional hardware required for new EMS environment. :

1. Monitoring of all new Network Devices including Cameras
2. System Monitoring Fault ,Performance Monitoring and Consolidated event Dashboard, Reporting for additional servers

Specifications of EMS

S.No.	Minimum Requirements
General:	
1	For effective operations and management of IT Operations, there is a need for an industry-standard Enterprise Management System (EMS). Given the expanse and scope of the project, EMS becomes very critical for IT Operations and SLA Measurement. Some of the critical aspects that need to be considered for operations of IT setup of are:
	a) Network Fault Management
	b) Network Performance Management
	c) Network Flow Traffic Monitoring
	d) Application Performance Management
	e) Server Performance Monitoring
	f) Centralized Log Management
	g) Centralized and Unified Dashboard
	h) Centralized and Customizable Service Level Reporting
	I) Help Desk for Incident Management
2	The Monitoring Solution should provide Unified Architectural design offering seamless common functions including but not limited to:
	a) Event and Alarm management,
	b) Auto-discovery of the IT environment,
	c) Performance and availability management
	d) Correlation and root cause analysis
	e) Service Level Management, notifications
	f) Reporting and analytics
	g) Automation and Customization

3	There should be a tight integration between infrastructure metrics and logs to have the single consolidated console of Infrastructure & security events.
4	Consolidate IT event management activities into a single operations bridge that allows operator quickly identify the cause of the IT incident, reduces duplication of effort and decreases the time it takes to rectify IT issues.
5	The Operator should be able to pull up security events related to a given Configuration Item, from a single console which also has NOC events, and use the security events to triage the problem. This way the Operator gets consolidated system/network event details and security events (current and historical) from the same console and save time in troubleshooting/isolating the issue.
6	The operator should be able to build correlation rules based environment where the Operator should be able to correlate cross domain events.
7	Scalability – The system should be capable of supporting at least 100 thousand network flow per second on single server with capability to capture each unique traffic conversations.
8	Scalability – The solution must be scalable, it should be able to support at least 25000 log events per second and also be able to support beyond 25000 EPS by linearly adding more servers of either reference system type, depending on the size of the expected load.
9	The solution shall provide future scalability of the whole system without major architectural changes.
10	The Solution shall be distributed, scalable, and multi-platform and open to third party integration such as Cloud, Virtualization, Database, Web Server, Application Server platforms etc.
11	All the required modules should be from same OEM and should be tightly integrated for single pane of glass view of enterprise monitoring.
12	The solution must provide single integrated dashboard to provide line of business views and drill down capabilities to navigate technical operator's right from services to last infrastructure components.
13	Consolidated dashboard of the proposed EMS solution must be able to do dynamic service modelling of all business critical production services & use near-real time Service Model for efficient cross domain topology based event correlation.
DETAILED SPECIFICATIONS: EMS	
Consolidated Dashboard	
1	The platform must provide complete cross-domain visibility of IT infrastructure issues.

2	The platform must consolidate monitoring events from across layers such as Network, Server, Application, Database etc.
3	The solution should support dynamic discovery to maintains Run-time Service Model accuracy e.g. virtualization and cloud.
4	The solution must support custom dashboards for different role users such as Management, admin and report users.
5	The solution must allow creating custom data widget to visualize data with user preferences.
6	The solution must support multiple visualization methods such as gauge, grid, charts, Top N etc.
7	The proposed solution must support capacity views to find most consumed resources.
8	The solution should provide superior view of infrastructure health across system, networks, application and other IT Infrastructure components into a consolidated, central console.
9	The solution should allow for customizable operator perspectives.
Network Performance Management:	
1	The proposed solution platform shall provide a single integrated solution for comprehensive management of the wired/wireless access, and rich visibility into connectivity and performance assurance issues.
2	The design functionality shall facilitate creation of templates used for monitoring key network resources, devices, and attributes. Default templates and best practice designs are provided for quick out-of-the- box implementation automating the work required to use OEM validated designs and best practices.
3	The proposed solution must provide comprehensive and integrated management of IT infrastructure components to maximize the availability of IT services and SLA performance.
4	The proposed solution must provide the complete view of the Topology and network elements. The NMS shall have the ability to include the network elements and the links in the visual/graphical map of the department. The visual maps shall display the elements in different colour depending upon the status of the element. It is preferable that green color for healthy and amber/yellow colour for degraded condition and red for unhealthy condition is used.
5	The proposed solution must have suitable system level backup mechanism for taking backup of NM data manually of at least one month.
6	The proposed solution must provide the visual presentation of the Network Element's status and the alarms. It shall also present the complete map of the network domain with suitable icons and in suitable color like green for healthy, red for non-operational, yellow for degraded mode of operation etc.

7	The proposed solution must provide Health Monitoring reports of the network with settable periodicity -@24 Hrs, 1 week, 1 month.
8	The proposed solution must provide the graphical layout of the network element with modules drawn using different colors to indicate their status
9	The proposed solution must provide calendar view which allows the operator all the schedule activities such as Reports, Inventory scans etc. It shall also allow to define scheduled report for uptime, link status etc.
10	The proposed solution should have multiple alerting feature to get the notification via email, sms and third party systems
11	The proposed solution must support listening to traps and syslog events from the network devices with retention period at least 6 months.
12	The proposed solution must support defining the data retention period to control storage.
13	The solution must support custom device template to support Generic SNMP devices.
14	The solution must provide discovery & inventory of heterogeneous physical network devices like Layer-2 & Layer-3 switches, Routers and other IP devices and do mapping of LAN & WAN connectivity with granular visibility up to individual ports level.
15	It shall provide Real time network monitoring and Measurement offend-to-end Network performance & availability to define service levels and further improve upon them.
System and Application Monitoring:	
1	The solution should offer service driven operations management of the IT environment to manage distributed, heterogeneous systems - Windows, UNIX & LINUX from a single management station.
2	The solution should carry out automated probable cause analysis by picking up feeds from every infrastructure component being monitored and automating the correlation of these alarms Or events to point out the probable cause using remedy actions - E.g. pull the top 5 processes consuming most of the CPU when CPU alarm triggers.
3	The solution should provide a centralized point of control with out-of-the-box policybased management intelligence for easy deployment for the servers, operating systems, applications and services for correlating and managing all the IT infrastructure components of a business service
4	The solution shall be able to monitor Hypervisor host hardware status e.g. fans, disk, memory, CPU etc.

5	The solution must support SNMP v1-3, PowerShell, SSH, JDBC, HTTP, JMX, collected agents for monitoring various type of devices and systems.
6	It should also be able to monitor various operating system parameters depending on the operating system being monitored and setting thresholds.
7	The solution should support Virtual platforms - VMware and Microsoft Hyper-V, Citrix Xen, AWS, Azure and provide capability to monitor both Microsoft. NET and J2EE applications from the same platform.
8	The solution should provide support for maintenance window and scheduled downtimes.
9	The solution should measure the end users' experiences based on transactions without the need to install agents on user desktops.
10	The solution must be able to provide user usage analysis and show how user's success rate, average time and transaction count has changed over a specific period of time such as current week versus previous week.
11	The solution must be able to provide the ability to detect and alert when users experience HTTP error codes such as 404 errors or errors coming from the web application.
12	Solution shall be able to monitor customer transaction by end-user name, and thus able to understand exactly which customers were impacted, their location, type of browser used etc.
13	The solution must simplify complex app topologies through task–relevant views based on attributes such as location, business unit, application component etc.
14	The solution must proactively monitor 100% of real user transactions; detect failed transactions; gather problems that affect user experiences and prevent completion of critical business processes.
15	The solution must determine if the root cause of performance issues is inside the monitored application, in connected back-end systems or at the network layer from a single console view.
16	The solution must provide proactive real-time insights into real user behaviour, trends, log analytics and performance to enhance customer experience across various channels.
Fault Management:	
1	The proposed solution must should provide out of the box root cause analysis with multiple root cause algorithms inbuilt for root cause analysis. It should also have a strong event correlation engine which can correlate the events on the basis of event pairing, event sequencing etc.

2	The Platform must include an event correlation automatically fed with events originating from managed elements, monitoring tools or data sources external to the platform. This correlation must perform:
	a) Event filtering
	b) Event Deduplication
	c) Event aggregation
	d) Event masking
3	The proposed solution must support creating and monitoring of rising or falling thresholds with respect to basic key performance indicators for network, system and application infrastructures.
4	The solution should have predictive analytics and intelligence in-built into it so as to detect any anomaly before it could potentially hit the threshold thereby giving enough lead time to users to resolve the issues before the threshold is breached.
5	The proposed solution should provide out of the box root cause analysis with multiple root cause algorithms inbuilt for root cause analysis. It should also have a strong event correlation engine which can correlate the events on the basis of event pairing, event sequencing etc.
6	Powerful correlation capabilities to reduce number of actionable events. Topology based and event stream based correlation should be made available.
7	The solution must offer relevant remedy tools, graphs in context of a selected fault alarm/event.
8	The proposed monitoring solution should have capability to configure actions based rules for set of pre-defined alarms/alerts enabling automation of set tasks.
9	The Platform must support Event or Alarm Correlation integrations with service desk to trigger automated creation of incidents, problems management.
10	The solution should classify events based on business impact.
11	The solution should allow creation of correlation or analytics rules for administrators.
12	The proposed solution must provide default event dashboard to identify, accept and assign generated alarms.
Log Management:-	
1	The proposed solution must provide a common classification of event irrespective of the log format.
2	The proposed solution must provide the ability to store/retain both. Normalized and the original raw format of the event log as for forensic purposes.
3	The log data generated should be stored in a centralized server. The period at least which the data must be available should be customizable.

4	The proposed solution must support logs collected from commercial and proprietary applications i.e. Microsoft, Cisco, Brocade, HP, Security System, Firewall, Access Points etc.
5	The proposed solution must support log collection for Directories (i.e. AD, LDAP), hosted applications such as database, web server etc. using agents.
6	The proposed solution must support log collection from Network infrastructure (i.e. switches, routers, etc.). Please describe the level of support for this type of product.
7	The system shall support the following log formats for log collection:
	a) Windows Event Log
	b) Syslog
	c) Access Log Data
	d) Application Log data
	e) Any Custom Log data
	f) Text Log (flat file)
8	The solution should be able to collect raw logs in real-time to a Central log database from any IP device including:
	a) Networking devices (router/switches/voice gateways)
	b) Security devices (IDS/IPS, AV, Patch Mgmt., Firewall/DB Security solutions)
	c) Operating systems(Windows 2003/2008,Unix,linux,AIX)
	d) Virtualization Platforms(Microsoft HyperV, VMware Vcenter/VSphere 4.X, vDirector, Citrix)
	e) Databases(Oracle/SQL/MYSQL/DB2)
9	The collection devices should support collection of logs through Syslog, syslogNG and also provide native Windows Agents as well as Agentless (PowerShell) connectors.
10	The proposed solution must provide alerting based upon established policy.
11	The proposed solution must provide SDK/API to write custom connectors and collectors to pull log and monitoring data from third party system.
12	The proposed solution must provide UI based wizard and capabilities to minimize false positives and deliver accurate results.
13	The proposed solution must collect, index the log messages and support full-text searching for forensic investigation.
14	The proposed solution must support the ability to take action upon receiving an alert. For example, the solution should support the ability to initiate a script or send an email message.
15	The solution must provide pre-defined log correlation rules to detect suspicious behaviour.

16	The solution must support real-time and scheduled alerting time-line while creating a log policy to catch specific log pattern.
17	The solution should support applying regex pattern in real-time to extract vendor specific log data for reporting and alerting purpose.
18	The system shall have the capability to drag and drop building of custom queries & reports.
19	The system shall be capable of operating at a sustained 10000 EPS per collection device. The system shall provide the ability to scale to higher event rates by adding multiple collection devices.
Network Flow-based Traffic Analysis:	
1	The proposed traffic monitoring system must be able to track all flow of traffic on the network and identify malicious behaviour with all IP conversations.
2	The proposed system must provide details of applications, hosts, and conversations consuming WAN bandwidth to isolate and resolve problems.
3	The proposed system must provide eight-hour, daily, weekly, monthly, yearly, or customizable reporting time periods.
4	The proposed solution must be able to monitor and report on a variety of unique protocols (used in the overall deployed solutions) per day and display utilization data for each protocol individually. This capability must be available for each monitored interface uniquely.
5	The proposed solution must keep historical rate and IP to IP, IP to Protocol, Protocol to Protocol conversation data for a minimum of 12 months (most recent) in its current long term operating database. All data in that database must have a maximum 15 minute window granularity.
6	The proposed solution must keep historical rate and protocol data for a minimum of 60 days (most recent) in its short term operating database. All data in that database must have a maximum 1 minute window granularity.
7	Flow collection systems must support a minimum of 6 million flows per minute and be capable of storing gathered information in a common database where all long term reporting information is held.
8	The system must support the ability to create reports that allow the user to search all IP traffic over a specified historical period, for a variety of conditions.
	a) Search for any traffic using a specific configurable destination port, or port range.
	b) Search for any protocol in use by a specific host, interface or list of hosts or interfaces.
Helpdesk - Incident Management:	

1	The proposed helpdesk system shall provide flexibility of logging, viewing, updating and closing incident manually via web interface.
2	The proposed helpdesk tool must be pink elephant/AXELOS gold lable certified on atleast 10+ ITILv3 2011 processes ; incident management, problem management, change management, knowledge management, SLA management, Service asset and configuration management, service catalogue and request fulfilment etc the certificate copy must be submitted.
3	Each incident shall be able to associate multiple activity logs entries via manual update or automatic update from other enterprise management tools.
4	The proposed helpdesk system shall be able to provide flexibility of incident assignment based on the workload, category, location etc.
5	The proposed solution should automatically provide suggested knowledge base articles based on Incident properties.
6	The proposed solution should automatically suggest available technicians based on workload while assigning tickets
7	The proposed solution should tightly integrate with monitoring system to provide two way integration - E.g. when system down alarm created, it should automatically create ticket and assign it to technician, in case system comes up before ticket is resolved by technician, it should automatically close the ticket to minimize human efforts.
8	The proposed system must not create more than ticket for same recurring alarm to avoid ticket flooding from Monitoring system.
9	Each escalation policy shall allow easy definition on multiple escalation levels and notification to different personnel via web based console with no programming.
10	The proposed helpdesk system shall be capable of assigning call requests to technical staff manually as well as automatically based on predefined rules, and shall support notification and escalation over email.
11	The proposed solution should allow administrator to define ticket dispatcher workflow which automatically assign incoming tickets based on rules defined in workflow. E.g. Network fault keyword tickets gets assigned to network technician automatically within NOC team.
12	The proposed helpdesk system shall provide grouping access on different security knowledge articles for different group of users.
13	The proposed helpdesk system shall have an updateable knowledge base for technical analysis and further help end-users to search solutions for previously solved issues.

14	The proposed solution should allow Technician to relate Incidents to Problem, Change and vice versa to have better context while working on any of ticket type.
15	The proposed helpdesk system shall support tracking of SLA (service level agreements) for call requests within the help desk through service types.
16	The proposed helpdesk system shall integrate tightly with the Knowledge tools and CMDB and shall be accessible from the same login window.
17	A configuration management database shall be established which stores unique information about each type Configuration Item CI or group of CI.
18	The proposed solution allow scheduling periodic report to check current software and hardware inventory.
Service Level Reporting:	
1	The solution must provide Out of the box reporting templates for performance, availability, operation, virtualization and capacity and audit.
2	The solution should provide reports that can prove IT service quality levels, such as application response times and server resource consumption.
3	The system reports should be accessible via web browser and Reports can be published in PDF and csv format.
4	The solution must provide Reports that can be scheduled to publish automatically or they can be produced on demand.
5	The solution should be able to report in the context of the business services that the infrastructure elements support—clearly showing how the infrastructure impacts business service levels.
6	The solution should provide Business Service Management functionality to track Service quality by logically grouping Network, Server and Application components. The solution should provide correlation between Network, Server and Application to identify the business impact from the specific event or alarm.
7	The solution must provide way to define key performance indicators (KPIs) within the Service Quality report.
8	The solution must provide SLA measurement to track service quality from both Availability and Performance perspective.
Role-Based access control: -	
1	The solution should have inbuilt role-based access module to enable multiple users with different groups to create dashboards specific to their department.
2	The Solution should have way to control and define permission such as read/write for set of devices rather than all the devices for the ease of use.
EMS Other Key Requirements: -	

1	The Solution should provide all the modules as a single monitoring engine to correlate events in real-time from Networks, Servers and Applications
2	The solution should be deployable on Linux/Windows operating systems to reduce the overall TCO
3	The solution should run without any propriety database license for data store Data store must be bundled within EMS (E.g. popular time-series, no-sql, hbase based monitoring systems) to reduce the TCO MSI can give external Database like Oracle, MS SQL etc.
4	The solution must provide way to define key performance indicators (KPIs) within the Business Service Management module.

4.8 Compute Specifications

Bidder has to propose compute hardware as required for his solution. Compute hardware with following specifications to be used with CPU, RAM & HDD proposed as per bidders solution. Details needs to be specified in bidder's technical bid.

4.8.1 Blade Enclosure

S.No.	**Blade Chassis Specifications**	
	Item	**Specifications**
1	Solution requirement	Proposed solution should support provisioning infrastructure from pools of compute, storage and networking resources
		Solution should have single console provisioning for compute, storage and server side network configuration.
		Solution should support API to integrate into popular management tools such as Microsoft System Center and VMWare vCenter and into open source automation and DevOps tools such as Chef, Docker and OpenStack.
		Solution should support software defined templates to quickly make changes to the infrastructure.
2	Blade Chassis	Solution to house the required number of blade servers in smallest number of enclosures. Should support half height/single width and full height / double width blades in the same enclosure. Should support minimum 8 number of 2 cpu servers or 4 number of 4 CPU servers. Each chassis should keep 25% enclosure vacant for future scalability.

		Enclosure should support storage blade within enclosure along with a compute module to configure as DAS.
		Should support redundant interconnect bays to configure
		Should support built-in/external management software appliance in redundancy with separate management network from production network
		Should support technology built-in to every chassis for Auto-Discovery of resources
		Should support linking multiple enclosures together to form single management ring to reduce complexity and provide single console of management for connected enclosures
3	Interconnects support	Should support housing of FCoE, Ethernet, FC and SAS interconnect fabrics offering redundancy as a feature.
4	Converged Interconnect	Interconnects should support minimum 40Gbps downlinks bandwidth to each Blade Server.
		Redundant Interconnect modules shall be integrated within the chassis such that uplinks from the chassis can be directly connected to core LAN/SAN switches.
		Should support aggregation of multiple enclosures to consolidate data center network connections, reduce hardware and to scale network bandwidth across multiple enclosures. Minimum 36 servers should be supported per aggregation. Layer 2 network traffic should be switched within enclosure aggregation (without using top of the rack switch)
		Aggregation Switch/modules must be offered with at least 80Gbps for external uplink connectivity for Ethernet LAN to Core Switch and 64Gbps bandwidth for FC uplinks to the SAN Fabric. All the modules/ switches for chassis interconnectivity should be in redundancy with 1:1 connectivity.
5	Power Supply	1. The enclosure should be populated fully with power supplies of the highest capacity available with the vendor. Power supplies should be supplied with N+N.
6	Cooling	Each blade enclosure should have a cooling subsystem consisting of redundant hot pluggable fans or blowers enabled with technologies for improved power consumption and acoustics
7	System Software	Management/controlling softwares have to be from the hardware OEM.

8	Management capabilities	Solution should support redundant physical management appliances within/ outside the enclosure with failover and high-availability
		Should support auto-discovery of Compute, Memory, Storage and Fabrics within an enclosure or on multiple connected enclosures.
		Should support activity, Health and Power LEDs/LCD for immediate status
		Should support software-defined intelligence for configuring profiles to provision compute, storage, fabrics and images
		Should support Firmware and OS Driver updates for the servers using profile templates to monitor, flag, and remediate
		Should provide a dedicated 1GbE or higher management network for multi-enclosure communications, separate from data plane
		Should support reporting capabilities for:
		1) Asset and inventory information for the devices in the enclosures
		2) Thermal and power information, including real-time actual power usage per server and per enclosure.
9	Integration with virtualization and open source software	Should support integration with popular virtualization offerings VMware vCenter and Microsoft system center
		Should support integration with open source automation and DevOps tools such as Chef, Docker, and OpenStack

4.8.2 Blade Servers without GPU

	Item	**Specifications**
1	CPU	Each blade shall have two numbers of latest Intel Xeon Scalable Processors
2	Motherboard	Intel C621 Series Chipset
3	Memory	Min. 128GB Memory scalable upto 2.0 TB using DDR4 memory operating at 2933 MT/s.
4	Memory Protection	Advanced ECC with multi-bit error protection.
5	Hard disk drive with carrier	Minimum 2 * 600 GB hot plug SAS 10k SFF HDD
6	Storage Controller	Integrated or Addon 12Gb/s SAS Raid Controller with RAID 0/1/1+0
7	Networking features	Converged Network Adaptor with minimum 40Gbps bandwidth
8	Bus Slots	Minimum of 3 Nos of PCIe 3.0 based mezzanine slots supporting Converged / Ethernet/ FC adapters.

9	OS Support (Latest Version)	Microsoft Windows Server
		Red Hat Enterprise Linux (RHEL)
		SUSE Linux Enterprise Server (SLES)
		Virtualization
10	Embedded Remote Management	1. System remote management should support browser based graphical remote console along with Virtual Power button, remote boot using USB/CD/DVD Drive. It should be capable of offering upgrade of software and patches from a remote client using Media/image/folder; It should support server power capping and historical reporting and should have support for multifactor authentication
		2. Server should have dedicated remote management.
		3. Server should support agentless management using the out-of-band remote management port.
		4. Should support RESTful API integration
		5. System should support embedded remote support to transmit hardware events directly to OEM or an authorized partner for automated phone home support
11	Server Management	1. Software should support dashboard view to quickly scan the managed resources to assess the overall health of the data center. It should provide an at-a-glance visual health summary of the resources user is authorized to view.
		2.The Dashboard minimum should display a health summary of Server Profiles, Server Hardware, Appliance alerts
		3.The Systems Management software should provide Role-based access control
		4.Management software should support integration with popular virtualization platform management software like vCenter, and SCVMM
		5.Should help provide proactive notification of actual or impending component failure alerts on critical components like CPU, Memory and HDD.
		6. Should help to proactively identify out-of-date BIOS, drivers, and Server Management agents and enable the remote update of system software/firmware components.
		7.The Server Management Software should be of the same brand as of the server supplier.

4.8.3 Servers with GPU

S.No.	Specifications	
1	GPU Support	Up to 8 PCIe or SXM-2 NVLink GPU with min. 2 x NVIDIA Tesla T4 cards configured from day 1.

2	Expansion	4 x16 PCIe Gen3 for GPU Module (LP PCIe for PCIe, FHHL for SXM-2)for InfiniBand, Omni Path Architecture or high-speed Ethernet fabric
		1 x16 FHHL PCIe Gen3 on system board module
3	Processor	Each server shall have min. two numbers of latest Intel Xeon Scalable Processors
4	Memory (type, max, slots)	Should Support up to 2933MT/s DDR4 Smart Memory
		3TB Max, 24 DIMM slots
5	Storage	Upto 16 SFF HDD bays should be supported
6	Network controller	Dual port 10G SFP+ Adapter
7	Storage Controller	RAID controller 12Gbps with 2GB Cache supporting RAID 1,5,6, 10
8	Embedded Remote Management	1. System remote management should support browser based graphical remote console along with Virtual Power button, remote boot using USB/CD/DVD Drive. It should be capable of offering upgrade of software and patches from a remote client using Media/image/folder; It should support server power capping and historical reporting and should have support for multifactor authentication
		2. Server should have dedicated remote management.
		3. Server should support agentless management using the out-of-band remote management port.
		4. Should support RESTful API integration
		5. System should support embedded remote support to transmit hardware events directly to OEM or an authorized partner for automated phone home support

4.8.4 Operating System, Database

Bidders are encouraged to use Open Source software for OS & DB licenses as much as possible. However, bidder will need to honour the SLAs as per Volume 3 of this RFP. In case bidder wants to quote for licensed versions to maintain SLAs or if required for its solution, bidder is free to do so.

4.9 Storage

This Storage will be placed at Haridwar and contain Video data.

S.No.	Description	Minimum Technical Requirements
1	Controller	Min. Dual active active controller that is scalable to 4 or more active active controller with automated I/O path failover. Offered storage should be UNIFIED/ Converged storage supporting both block and file protocols Controllers shall be true active-active so that a single logical unit can be shared across all offered controllers in symmetrical fashion, while supporting all the major functionalities like Thin Provisioning, Data Tiering etc.

2	Connecting ports(SAN)	Should have minimum of 4x10 Gbe or 4x16Gb FC Host ports.
3	Management Software	Must include Storage Manager software
4	O/S Support	Support for multiple Operating Systems connecting to it, including of Windows/Linux/AIX/HP UX etc.
5	Capacity	Offered Storage Solution shall be configured with 1PB usable capacity. All application/ DB data should be directly pinned to SSD and NL SAS/ MDL SAS for video data. Bidder needs to factor additional capacity as required to meet solution requirement. Offered storage should be scalable to min. 4PB raw capacity
6	Raid Controllers	1. Minimum 300GB DRAM protected aggregate cache across all Controllers. 2. Offered storage should support minimum 1 TB Flash/ SSD Cache 3. Controller Cache shall be completely dynamic for read and write operations and vendor shall not offer any additional card / module for write cache operations. 4. Cache shall be used only for Data and Control information. OS overhead shall not be done inside cache.
7	Protocol Support	File and Block
8	Drive Interface	The storage should have 12 Gb Drive interface
9	Supported Drives, Mixed Drives	Should support SSD, SAS/ NL-SAS, 12 Gbps Drives in same enclosure.
10	Raid Support, Virtualization	1. Offered Storage Subsystem shall support Raid 1 , 5 and Raid 6. 2. Offered storage array shall have native virtualization support so that Raid 1. Raid 5, Raid 6 can be carved out from a logical space instead of dedicating separate physical disks for each application. 3. Every supplied disk shall be able to participate into multiple and different raid sets simultaneously. 4. In case vendor doesn't have above functionality, then 20% additional raw capacity shall be provided for each type of disk to balance out the capacity utilization.
11	Fans and power Supplies	Redundant, hot-swappable power supplies and fans
12	Rack Support	Suitable for industry-standard Racks and PDUs
13	Data Services	Should include data Snapshot, Thin provisioning, Volume Cloning or equivalent features for the offered capacity of the storage solution. The proposed system should support storage based replication software.
14	Alerts	Automated alerts for Improving service response times.
15	Others	All required cable and connectors to be supplied

16	SAN Switch	Minimum DUAL Redundant 48 Port 16 Gb/s SAN Switch with LC LC Cable. Bidder needs to factor additional SAN port to fulfill solution requirement

4.10 Tape Library – Backup Appliance

Sr. Number	Parameter	Functionality
1	Capacity	1. Shall support data capacity of 1.2PB (2.5:1 compressed) using LTO-8 Technology.
		2. Shall be offered with minimum of three LTO-8 FC tape drive. Drive shall support encryption
		3. Shall be offered with min. 40 Cartridge slots. 4. Shall be offered with 20 LTO-8 Tapes and 2 Cleaning Cartridges
2	Tape Drive Architecture	1. Offered LTO-8 drive in the Library shall conform to the Data rate matching technique for higher reliability.
		2. Tape Drive Architecture in the Library shall conform to the INCITS/T10 SCSI-3 standard or newer standards.
3	Scalability	Tape Library shall be scalable to quad number of LTO-8 drives. Drive upgrade process shall be completely tool free.
4	Speed	Offered LTO-8 drive shall support 300MB/sec in Native mode.
5	Connectivity	Offered Tape Library shall provide native FC connectivity to SAN switches.
6	Partitioning	Offered Tape Library shall have at-least two partition support so that drives can be configured in a partition with dedicated slots.
7	Encryption device	Offered Library shall be provided with a hardware device like USB key, separate appliance etc. to keep all the encrypted keys in a redundant fashion.
8	Management	Tape Library shall provide web based remote management.
9	Barcode Reader and Mail	1. Tape library shall support Barcode reader and mail slot.
		2. Offered LTO-8 drives shall also support LTO-7 Media M type so that LTO-7 native capacity can be increased from 6TB to 9TB.
10	Other Features	1. Tape Library shall have GUI Panel
		2. Shall be rack mountable.
		3. Shall have option for redundant power supply
		4. Tape Library shall be supplied with software which can predict and prevent failures through early warning and shall also suggest the required service action.
		5. Offered Software shall also have the capability to determine when to retire the tape cartridges and what compression ratio is being achieved

4.11 Backup Software

Backup software is required for 2 purpose:

1. For Backup of Video Data at Storage in Haridwar to Local Tape Library
2. For Backup of data at ITDA DC to the DR

S. No.	Specifications
1	The proposed Backup Solution should be available on various OS platforms such as Windows, Linux etc. and be capable of supporting SAN based backup / restore from various platforms including Linux, Windows etc.
2	The solution should offer centralized, web-based administration with a single view of all back up servers
3	The proposed backup solution should allow creating tape clone facility after the backup process.
4	Scheduled unattended backup using policy-based management for all Server and OS platforms
5	The proposed Backup Solution has in-built frequency and calendar based scheduling system.
6	The software should support on-line backup and restore of various applications and Databases
7	The backup software should be capable of having multiple back-up sessions simultaneously
8	The proposed backup solution should be capable of taking back up of SAN environment as well as LAN based backup.
9	The backup software should support different types of backup such as Full back up, Incremental back up, Differential back up, Selective back up, Point in Time back up and Progressive Incremental back up and snapshots
10	The backup software should support different types of user interface such as GUI, Webbased interface
11	The proposed Backup Solution has in-built media management and supports cross platform Device & Media sharing in SAN environment.
12	Backup Software is able to rebuild the Backup Database/Catalogue from tapes in the event of catalogue loss/corruption.
13	The proposed Backup Solution has online backup solution for different type of Databases such as Oracle, MS SQL, MySQL and Sybase / DB2 etc. on various OS.
14	Backup Solution shall be able to copy data across firewall.

15	The backup software must also be capable of reorganizing the data onto tapes within the library by migrating data from one set of tapes into another, so that the space available is utilized to the maximum. The software must be capable of setting this utilization threshold for tapes
16	The backup software should be able to support versioning and should be applicable to individual backed up objects.

4.12 Disaster Recovery

MSI is free to utilize the existing DR (being implemented for DICCC) and augment the capacity to provide DR as per following specifications or propose new CSP for DR complying to following specifications.

S.No.	Functional Specifications
1	Disaster Recovery Center on Cloud.
2	MSI should provide DR as a service on cloud with 50% capacity of DC.
	Following criteria need to be complied by CSP (Cloud Service Provider)
1	Data Center Service Provider (CSP) should be a company registered under Indian Companies Act 1956. The company should be providing Data Center related services in India for atleast the last FIVE financial year ending 31st March 2016
2	CSP must have annual revenue of INR 30 Crores or more for last three financial years ending 31st March 2016.
3	CSP must be operating at least two Data Center Facilities operational in India with a minimum provisioning capacity of 400 Racks
4	DC/DR facility proposed should be certified by Uptime Institute for atleast TIER III certificate and should be valid at the time of bidding.
5	CSP should have executed atleast TWO projects of DC/DR with Cloud deployment with an order value of minimum 5 Cr hosted out of the proposed DC/DR facility
6	CSP should have executed at least ONE project of DC/DR with proposed Cloud deployment with an order value of minimum 1 Cr from its proposed DC/DR facility and should be operational at the time of bidding.
7	CSP must be having at least 1000 VM's running out of the proposed DC/DR facility at the time of bidding.
8	Both DC & DR facility should be owned by the CSP and should be a separate building or in a non-commercial premises.
9	DC and DR should conform to at least Tier III standard, certified under TIA 942 or Uptime Institute certifications and the certificate should be valid at the time of bidding
10	Data Center and Disaster Recovery Center Facilities must be certified for the latest version of ISO 27001 / 27018 (year 2013 or above) and provide service assurance and effectiveness of Management compliant with ISO 20000 standards.
11	Data Center facility must be PCI certified and should be valid at the time of bidding
12	CSP should have atleast 150+ technical staff on its payroll at the time of bidding.
13	CSP should have atleast 150+ technical staff on its payroll at the time of bidding.

14	CSP should have atleast 5 ITIL v3 certified staff on its payroll at the time of bidding.
15	CSP should have atleast 1 BS7799/ISO27001 lead implementation /auditor at the time of bidding.
16	NOC / Operations centre should be part of data centre facility proposed.
	DR As a Service
1	MSI shall also be responsible for providing Cloud service for storing all applications at DR [minimum 50% production capacity, RTO – 4 Hrs, RPO – 2 hrs which will be implemented under this project for the project duration. The cloud provider should be MEITY empaneled as well as STQC certified
2	All applications need to have high performance clustering (redundancy) within the Data Centre with heartbeat, automatic fail-over, and redundant data storage is active passive or active-active configuration as per the high availability targets. The data replication should be continuous among all the servers and shared storage should not be used. All mission critical systems must be active-active configurations. Active passive configurations may be permissible for supporting applications.
3	The proposed Cloud Service Provider (CSP) must be an empaneled cloud service provider by Meity (Ministry of Electronics and Information Technology for Public cloud, Virtual Private Cloud.
4	The Cloud Data Centre Facility must be within India and must be Tier III or above. The DR site within India should be at least 250 Km away from the DSCL Data Center and in a different seismic zone
5	The Cloud Data Centre, where cloud hosting is proposed, must have ISO 27001 certification
6	The cloud service provider must have billing model of pay-per-consume where it will charge for amount of computing resources being consumed by application rather than for the allocated resources. MSI shall provide the rate chart of the cloud services to DSCL.
7	Cloud services should be accessible via Internet, Point to Point / MPLS, Leased Lines, OFC WAN etc.
8	MSI shall be fully responsible for upgrades, technological refreshes, security patches, bug fixes and other operational aspects of the infrastructure that is in the scope or purview of MSI.
9	MSI shall provide interoperability support with regards to available APIs, data portability etc. for DSCL to utilize in case of Change of cloud service provider, migration back to Local Data Centre, burst to a different cloud service provider for a short duration or availing backup services from an alternate Cloud service provider
10	MSI is required to prepare and submit along with their technical proposal, the details of methodologies and computations for sizing and capacity of storage, compute, backup, and network and security resources
11	DSCL shall retain ownership of all virtual machines, templates, clones, and scripts/applications created for DSCL's applications. DSCL shall retain the right to request (or should be able to retrieve) full copies of these virtual machines at any time.

12	In no circumstances, the data accumulated and processed by Command and Control Centre should be compromised. Hence, provisions will be made to keep all the data stored in this platform highly secured with required multi layered security access control and authorization framework. Further the platform shall provide an open standards based integration Bus with API Management, providing full API lifecycle management with governance and security features.
13	Additional Parameters - Cloud services should be accessible via internet and MPLS. - MSI should configure, schedule and manage backups of all the data including but not limited to files, folders, images, system state, databases and enterprise applications. - Encryption of all backup files and data and management of encryption keys as a service that can be enabled for Government Departments that require such a service. - MSI should offer dashboard to provide visibility into service via dashboard. - MSI shall not delete any data at the end of the agreement (for a maximum of 45 days beyond the expiry of the Agreement) without the approval of the DSCL.
14	The below High Level Design (HLD) is just for reference over cloud deployment. MSI can suggest security stack & deployment method according to their recommendations.
	Preparation of Disaster Recovery Operational Plan
15	The bidder should provide detailed operating procedures for each application during the following scenarios. These will be mutually agreed upon with DSCL during the project kick off.
16	Business as usual: the primary site is functioning as required, procedures for ensuring consistency of data availability at secondary site.
17	Disaster: Declaration of disaster, making the DR site live for production, ensuring availability of users to the secondary site.
	Operations from DR site: Ensuring secondary site is addressing the functionality as desired.
	Configure proposed solution for usage.
	MSI shall provide DR Management (DRM) Solution to DSCL meeting following specifications:
S.No.	**Features**
1	The proposed solution must offer a workflow based management & monitoring and reporting capability for the real time monitoring of a DR solution parameters like RPO (at DB level), RTO, replication status and should provide alerts(including SMS and email alerts) on any deviations. The proposed solution should be able to conduct DR Drills from a centralized location
2	The proposed solution should provide a single dashboard to track DR Readiness status of all the applications under DR
3	The proposed solution should be capable of reporting important health parameters like disk space, password changes, file addition/deletion etc. to ensure DR readiness

4	The proposed solution should have inbuilt ready to use library of recovery automation action for heterogeneous databases and replication environment. This must significantly reduce custom development of scripts and speedy deployment of DR solutions
5	The proposed solution should facilitate workflow based switchover and switchback for DR drills for standard applications based on industry best practices
6	The proposed solution should facilitate workflows for bringing up the applications and all the components it depends on at DR while it is up at primary site without pausing/stopping the replication

4.13 Video Wall, Video wall Management software and Controller

S.No.	Parameters	Minimum Specification
1.	Technology	LASER DLP based Rear Projection Video wall
2.	Screen Size	70" (70 Inches diagonally) with Laser Light Source complete configuration with covered base. All cubes have to be of the exactly same size, configuration
3.	Combined Native Resolution Of The Wall	Minimum Native resolution should be 19000 x 4200)
4.	Screen Support	Screen should be minimum three layer with hard backing to prevent bulging
5.	Brightness Uniformity	Uniformity: 95% or better certified by third party
6.	Viewing angle	178 degree/178 degree (H/V)
7.	Bezel Gap	<1 mm or better
8.	Pixel clock	Min 162 MHz or higher to ensure flicker less display
9.	Heat Dissipation	Less Than 1400 BTU/Hr Normal Mode
10.	Response time	12 ms
11.	Input	Display Port(1.2) x 1, DVI x 1, HDMI(2.0) x 1
12.	Cube control & Monitoring	System should be based on Python- Django framework with web browser architecture
		Should be able to control & monitor individual cube , multiple cubes and multiple video walls
		Should provide a virtual remote on the screen to control the videowall
		Input sources can be scheduled in " daily", "periodically" or "sequentially" mode per user convenience
		System should have a quick monitor area to access critical functions of the videowall
		User should be able to add or delete critical functions from quick monitor area
13.	Light Source Type	The light source lifetime of the Light Source in eco mode shall be 80,000 hours. This should be certified by the OEM.
14.	Cube Size including screen module	1550 mm X 872 mm and 550 mm ± 5%

15.	Brightness of engine	Min 2200 Lumens
16.	Remote	Should have remote control
17.	Access	Rear Only
18.	Power Supply	Dual Redundant and Hot Swappable Power Supply. This should be built inside the cube for fail safe operation with cooling features.
19.	Power Consumption	Less than 350 Watt
20.	Cooling Inside Cubze	Any advanced cooling mechanism and Cooling mechanism should not have any hazardous liquid.

Video Wall Controller

Sr No	Parameters	Minimum Specification
1.	Display controller	Controller to control Video Wall as per offered configuration
2.	Processor	Latest Generation 64 bit Quad Core processor or better
3.	RAM	8 GB DDR3 ECC RAM or better
4.	HDD	Minimum 500 GB
5.	RAID	Should support all RAID , 0, 1, 5 & 10
6.	Networking	Dual-port Gigabit Ethernet Controller with RJ-45 ports
7.	Accessories	104 key Keyboard and Optical USB mouse
8.	USB Ports	Minimum 2 USB Ports
9.	Platforms	Support 64-bit Operating System Windows
10.	Power Supply	(1+1) Redundant hot swappable
11.	Chassis Type	19" Rack mount
12.	Redundancy support	Power Supply, HDD, LAN port
13.	Scalability	Display multiple source windows in any size, anywhere on the wall
14.	Universal Inputs	10 Nos
15.	Operation	The controller shall be designed for 24 x 7 operation and high availability
16.	Wall configuration	Outputs as per the no. of cubes offered. Loop in Loop Out of signal from cube to cube is Not Allowed
17.	Video Wall, Controller, Cube & wall management	Video Wall, Controller, Cube & Wall management software should be from same OEM for ensuring smooth operations. All licenses of the software supplied with Controller and Video Wall

		should be with perpetual license and cost of the same should be included in the quoted cost.

Video Wall Management Software

S.No.	Parameters	Minimum Specification
1.	Display and Scaling	Display multiple sources anywhere on display up to any size
2.	Input Management	All input sources can be displayed on the video wall in freely resizable and movable windows
3.	Scenarios management	Save and Load desktop layouts from Local or remote machines
4.	Layout Management	Support all Layout from Input Sources, Internet Explorer, Desktop and Remote Desktop Application
5.	Multi View Option	Multiple view of portions or regions of Desktop, Multiple Application Can view from single desktop
6.	Other features	• Remote management • Region management • Active directory • Offline layouts • Four lever of user permission • Live Preview • Ticker

4.14 IP Telephony, Contact Center

The IP Telephony and Contact Center System being implemented at DICCC shall be extended for Haridwar Kumbh. Bidder is required to supply and install IP Phones as per following specifications and integrate the same with DICCC IPT Infrastructure. Bidder should supply required licenses to integrated with existing infrastructure.

Sr no	Parameter	Minimum Specifications
1	Display	2-line or more, Monochrome display for viewing features like messages, directory
2	Integral switch	10/100 Mbps for a direct connection to a 10/100BASE-T Ethernet network through an RJ-45 interface
3	Speaker Phone	Yes
4	Headset	Wired (Kevlar cord), Cushion Padded Dual Ear-Speaker, dual microphone mouthpiece with noise cancellation, port compatibility with IP Phone. Headset should be light in weight.

5	VoIP	SIP V2 VoIP supported
6	POE	IEEE 802.3af or better and AC Power Adapter (Option)
7	Supported Protocols	SNMP, DHCP, DNS
8	Codecs	G.711, G.722, G.729 including handset and speakerphone
9	Speaker Phone	Full duplex speaker phone with echo cancellation
		Speaker on/off button, microphone mute
10	Volume control	Easy decibel level adjustment for speaker phone, handset and ringer
11	Phoneboo k/Address	Minimum 100 contacts
12	Call Logs	Access to missed, received, and placed calls. (Minimum 20 overall)
13	Clock	Time and Date on display
14	Ringer	Selectable Ringer tone
15	Directory Access	Able to integrate with LDAP standard directory
16	QoS	QoS mechanism through 802.1p/q

4.15 Industrial Grade Outdoor PoE switches

S.no	Requirement
1	4 X 10/100BaseT(X), 802.3af (PoE), and 802.3at (PoE+)-compliant Ethernet ports, and 2 combo Gigabit Ethernet ports (10/100/1000BaseT(X) or 100/1000BaseSFP+)
2	Out of 4 Port PoE 2 port must deliver 60 Watt output. Total PoE budget Max. 180 W Max. 180 W for total PD's consumption @ 48 VDC input
3	4 kV LAN surge protection for extreme outdoor environments
4	Fiber Digital Diagnostic Monitoring (DDM) function and event warning on SFP fiber ports
5	Should support Smart PoE functions (PoE diagnosis, PD failure check, PoE scheduling, and PoE Event Warning) to enhance PoE operational efficiency
6	SNTP, NTP Server/Client, IEEE 1588v2 PTP

7	IEEE 802.3af/at for Power-over-Ethernet IEEE 802.3 for 10BaseT IEEE 802.3u for 100BaseT(X) and 100BaseFX IEEE 802.3ab for 1000BaseT(X) IEEE 802.3z for 1000BaseX IEEE 802.3x for Flow Control IEEE 802.1D-2004 for Spanning Tree Protocol IEEE 802.1w for Rapid STP IEEE 802.1s for Multiple Spanning Tree Protocol IEEE 802.1Q for VLAN Tagging IEEE 802.1p for Class of Service IEEE 802.1X for Authentication IEEE 802.3ad for Port Trunk with LACP
8	IPv4/IPv6, SNMP v1/v2c/v3, LLDP, Port Mirror, DDM, RMON, DHCP Server/Client, DHCP Option 66/67/82, BootP, TFTP, SMTP, RARP, Telnet, Syslog, SNMP Inform, Flow Control, Back Pressure Flow Control
9	Automatic warning by exception through e-mail, relay output
10	TACACS+, IEEE 802.1X, SNMPv3, HTTPS, and SSH to enhance network security Lock port function for blocking unauthorized access based on MAC address, PoE diagnostic for powered device mode analysis, Console Port USB serial console. Should Support Cybersecurity standard based on IEC 62443 structure.
11	Should Support the Ring Architecture, recovery time of <50MS for 200 nos. switches in single ring
12	Switch Properties Priority Queues: 4 Max. Number of VLANs: 64 VLAN ID Range: VID 1 to 4094 IGMP Groups: 256 MAC Table Size: 16 K Packet Buffer Size: 1 Mbit
13	Physical Characteristics Housing: Metal IP Rating: IP40 protection
14	Operating Temperature :-10 to 60°C

15	Standards and Certifications Safety UL 61010-2-201, EN 61010 (LVD) EMC EN 61000-6-2/6-4 EMI CISPR 22, FCC Part 15B Class A EMS EN 61000-4-2 (ESD): Contact: 8 kV; Air: 15 kV EN 61000-4-3 (RS): 80 MHz to 1 GHz: 20 V/m EN 61000-4-4 (EFT): Power: 4 kV; Signal: 4 kV EN 61000-4-5 (Surge): Power: 4 kV; Signal: 4 kV EN 61000-4-6 (CS): 10 V EN 61000-4-8 Electrical Substations IEC 61850-3, IEEE 1613 Traffic Control NEMA-TS2 Rail Traffic EN 50121-4 Shock IEC 60068-2-27 Freefall IEC 60068-2-31 Vibration IEC 60068-2-6 MTBF; more than 700000Hrs

4.16 Field Junction Box

S.N.	Parameter	Minimum Specifications
1.	Size	Suitable size as per site requirements to house the field equipment
2.	Cabinet Material	Powder coated CRCA sheet/ Stainless steel
3.	Material Thickness	Min 1.2mm
4.	Number of Locks	Two
5.	Protection	IP55
6.	Mounting	On Camera Pole / Ground mounted on concrete base
7.	Form Factor	Rack Mount/DIN Rail
8.	Other Features	Rain Canopy, Cable entry with glands and Fans/any other accessories as required for operation of equipment's within junction box.

4.17 Camera Poles

S.N.	Parameter	Minimum Specifications
1.	Pole type	Hot Dip Galvanized after Fabrication with Silver coating of 86 micron as per IS:2629; Fabrication in accordance with IS-2713 (1980)
2.	Height	5-10 Meters, as-per-requirements for different types of cameras & Site conditions
3.	Pole Diameter	Min. 10 cm diameter pole (bidder to choose larger diameter for higher height)

4.	Cantilevers	Based on the location requirement suitable size cantilevers to be considered with the pole
5.	Bottom base plate	Minimum base plate of size 30x30x15 cm
6.	Mounting facilities	To mount CCTV cameras, Switch, etc.
7.	Pipes, Tubes	All wiring must be hidden, through tubes/pipes. No wires shall be visible from outside.
8.	Foundation	Casting of Civil Foundation with foundation bolts, to ensure vibration free erection (basic aim is to ensure that video feed quality is not impacted due to winds in different climatic conditions). Expected foundation depth of min. 100cms. Please refer to earthing standards mentioned elsewhere in the RFP.
9.	Protection	Lightning arrester at all sites should be done
10.	Sign-Board	A sign board describing words such as "This area under surveillance" (in English and Hindi)

4.18 Surge Protection Device

Surge Protectors for Electronics Equipment

Suitable for: (PoE / 10 BASE-T / 100 BASE-TX / 1000 BASE-T)

Desired Functions & Features

- Designed specifically for Ethernet network
- Conforms with 1000 Base-T, PoE and PoE Plus
- LAN cable's shield wire can be floating or grounding by a short-circuit bar
- DIN rail mounting

APPLICABLE NETWORK: 10 BASE-T: IEEE 802.3i, 100 BASE-TX: IEEE 802.3u, 1000 BASE-T: IEEE 802.3ab,

PoE: IEEE 802.3af

PoE Plus: IEEE802.3at

Connection

Network: RJ-45 modular jack

Grounding: M3 screw terminal (torque 0.6 N·m) or via DIN rail

Screw terminal: Nickel-plated brass

DIN rail material: Aluminum

Housing material: Flame-resistant resin (black)

Operating temperature: -25 to +85°C (-13 to +185°F)

Operating humidity: 30 to 90 %RH (non-condensing)

Mounting: DIN Rail (TH35-7.5, 1-mm-thick)

Transmission performance:

TIA/EIA-568-B.2 CAT5e

TIA/EIA-568-B.2 CAT6

Surge protection: IEC 61643-21 Categories C1, C2

STANDARDS & APPROVALS :

EU conformity:

EMC Directive

EMI EN 61000-6-4

EMS EN 61000-6-2

RoHS Directive

EN 50581

Max continuous operating voltage :±6V Line to Line (Pair), :58V Line to Line(PoE), ±150V Line to Earth or better

Voltage Protection Level: :±15V max @2KV Line to Line (Pair), ±100KV max @2KV Line to Line(PoE), ±600KV Line to Earth or better

Leakage Current : 25µA Line to Line (Pair), 25µA Line to Line(PoE), 5µA Line to Earth or better

Max Discharge current: 100A Line to Line (Pair), 100A Line to Line(PoE) , 10kA Line to Earth or better

Nominal current : 1A Line to Line (Pair), Line to Line(PoE) , Line to Earth or better

Series resistance : 0Ω

4.19 Monitoring Workstations

S.N.	Parameters	Minimum Requirements
1	Processor	Latest generation 64bit x 86 Xeon Processer with latest chipset
2	Motherboard	OEM Motherboard
3	RAM	Minimum 8 GB DDR3 RM expendable to 32 GB
4	Graphics card	Minimum Graphics card with 2 GB video memory (non- shared)

5	Monitor	3 TFT LED Monitors of 18" TFT LED monitor, with Minimum 1920 x1080 resolution, Minimum input of 1xDP, 1x HDMI, 1xDVI, Energy star 5.0/BEE star certified
6	HDD	Min. 2 TB Hard Drive @7200 rpm
7	Other Accessories	Line/Mic IN, Line- out/Spr Out (3.5 mm), Minimum 6 USB ports (out of that 2 in front), 104 keys minimum OEM keyboard, USB Optical OEM mouse,
8	PTZ joystick controller	PTZ speed dome control for IP cameras Minimum 10 programmable buttons Multi-camera operations Compatible with all the camera models offered in the solution Compatible with VMS /Monitoring software offered
9	Operating System	64 bit pre-loaded OS with recovery disc
10	Antivirus feature	Advanced antivirus, antispyware, desktop firewall and encryption as required.

4.20 Desktops

S.N.	Parameters	Minimum Technical Specifications
1.	Processor	latest & high performance (3.0 Ghz) or higher
2.	Memory	8 GB DDR3 RAM @ 1600 MHz. One DIMM Slot must be free for future upgrade
3.	Motherboard	OEM Motherboard
4.	Hard Disk Drive	Minimum 500 GB SATA III Hard Disk @7200 RPM or higher
5.	Audio	Line/Mic In, Line-out/Speaker Out (3.5 mm)
6.	Network port	10/100/1000 Mbps auto-sensing on-board integrated RJ-45 Ethernet Port
7.	Wireless Connectivity	Wireless LAN - 802.11b/g/n/
8.	USB Ports	Minimum 4 USB ports
9.	Display Port	Minimum 1 Display Port (HDMI/VGA) port
10.	Keyboard	104 keys Heavy Duty Mechanical Switch Keyboard (USB Interface) with 50 million keystrokes life per switch. Rupee Symbol to be engraved.
11.	Mouse	Optical with USB interface (same make as desktop)
12.	Monitor	Minimum 18.5" diagonal LED Monitor with 1366x768 or higher resolution. (Same make as desktop). Must be TCO05 certified.
13.	Operation System and Support	Pre-loaded Windows 10 (or latest) Professional 64 bit, licensed copy All Utilities and driver software, bundled in CD/DVD/Pen-drive media.

14.	Certification for Desktop	Energy Star 5.0 or above / BEE star certified

4.21 Surveillance

TECHNICAL SPECIFICATIONS FOR CCTV SURVEILLANCE CAMERAS:

4.21.1 Dome Camera

Sr No	Features	Specification
1	Form Factor	Dome
2	Image Sensor	1/2.5" Progressive Scan CMOS
3	Day/ Night Operation	Yes, with IR Cut Filter
4	Minimum Illumination	Color: 0.014 Lux @ (F1.4, AGC ON), 0 Lux with IR
5	Lens	2.8 to 12 mm Motorized Zoom Lens
6	Electronic Shutter	1/3 s to 1/100000 s,
7	Image Resolution	8MP (4k) or better
8	Compression	Compression H.265 MAIN PROFILE , H.264 MAIN PROFILE/BASE PROFILE / HIGH PROFILE
9	Compression profile	Should support H .265, H.264 MAIN PROFILE, BASE PROFILE AND HIGH PROFILE
10	Frame Rate and Resolution	20 fps (3840 × 2160), 30 fps (2944 × 1656, 2560 × 1440, 1920 × 1080, 1280 × 720)
11	Simultaneous Stream	Simultaneous Stream Minimum 3 streams should be configurable with main stream as 20 fps (3840 × 2160), 30 fps (2944 × 1656, 2560 × 1440, 1920 × 1080, 1280 × 720)
12	Noise Reduction	Digital Noise Reduction 3D DNR
13	Video Streams	Video Streams Three Stream supportable, each stream should be H.265 MAIN PROFILE, H.265 MAIN PROFILE, BASE PROFILE AND HIGH PROFILE configurable at different resolutions and support atleast 4k Resolution

14	Video quality view	Video quality view Video compression type (H.265 MAIN PROFILE , H.265MAIN PROFILE / BASE PROFILE AND HIGH PROFILE) and bit rate of eachstream should be viewable at home screen on web browser or VMS .
15	Image Setting and enhancement	Image Setting and enhancement Saturation, Back Light Compensation (BLC), 3D DNR ,Rotate mode, saturation, brightness, contrast, sharpness
16	Wide Dynamic Range	120 dB True WDR or better
17	IR	IR at least 30 mtr IR distance or better
18	Alarm	1 x Input / 1 x output
19	Storage backup on network failure	Camera should support network failure detection, Camera should have the capability to start the recording automatically on SD card in case of connectivity between camera and NVR/Storage device goes down
20	Edge Storage	Built in SD card slot with support at least 128 GB SD card
21	Network Interface	RJ-45, 10/100/1000 Mbps Ethernet
22	Protocols	TCP/IP, ICMP, HTTP, HTTPS, FTP, DHCP, DNS, DDNS, RTP, RTSP, RTCP, PPPoE, NTP, UPnP, SMTP, SNMP, IGMP, 802.1X, QoS, IPv6
23	Text Overlay	Date & time, and a customer- specific text etc
24	Edge Analytics and smart alarm Triggers	Line crossing detection, intrusion detection, unattended baggage detection, object removal detection, Face Detection, Motion detection, video tamper, network disconnect, IP address conflict, illegal login, HDD full, HDD error, Alarm input, Alarm output
25	Security	HTTPS / IP Filter / IEEE 802.1X
26	Firmware Upgrade	The firmware upgrade shall be done though web interface,
27	Enclosure	IP 67 weather proof, or Better
28	Vandal Resistant	IK 10
29	Power	POE
30	Certification	UL,CE,FCC,BIS
31	ONVIF	ONVIF (PROFILE S, PROFILE G)
32	User accounts	20

33	Supported Web Browser	Internet Explorer (10+) / Firefox / Safari/ Mozilla or equivalent
34	OEM Criteria	• The OEM shall have a self-owned support Service Center and RMA in India from last 5 years and Toll Free number.• The Camera OEM shall be enlisted in top 10 companies in any of the IHS reports• The Camera OEM shall be a ISO 9001;2015 and ISO 14001:2015 company• The OEM shall be registered in India for more than 10 Years and present globally for more than 20 years

4.21.2 Bullet Camera

Sr No	Features	Specification
1	Form Factor	Bullet
2	Image Sensor	1/2.5" Progressive Scan CMOS
3	Day/ Night Operation	Yes, with IR Cut Filter
4	Minimum Illumination	Color : 0.03 Lux @ F1.8 B/W : 0 Lux (IR LED On)
5	Lens	2.8 to 12 mm Motorized Zoom Lens
6	Electronic Shutter	1/3 s to 1/100000 s,
7	Image Resolution	8MP (4k) or better
8	Compression	Compression H.265 MAIN PROFILE , H.264 MAIN PROFILE/BASE PROFILE / HIGH PROFILE
9	Compression profile	Should support H .265, H.264MAIN PROFILE, BASE PROFILE AND HIGH PROFILE
10	Frame Rate and Resolution	20 fps (3840 × 2160), 30 fps (2944 × 1656, 2560 × 1440,1920 × 1080, 1280 × 720)
11	Simultaneous Stream	Simultaneous Stream Minimum 3 streams should be configurable with main stream as 20 fps (3840 × 2160), 30 fps (2944 × 1656, 2560 × 1440, 1920 × 1080, 1280 × 720)
12	Noise Reduction	Digital Noise Reduction 3D DNR

13	Video Streams	Video Streams Three Stream supportable, each stream should be H.265 MAINPROFILE, H.265 MAIN PROFILE, BASE PROFILE AND HIGH PROFILE configurable at different resolutions and support atleast 4k Resolution
14	Video quality view	Video quality view Video compression type (H.265 MAIN PROFILE , H.265 MAIN PROFILE / BASE PROFILE AND HIGH PROFILE) and bit rate of each stream should be viewable at home screen on web browser or VMS .
15	Image Setting and enhancement	Image Setting and enhancement Saturation, Back Light Compensation (BLC), 3D DNR ,Rotate mode, saturation, brightness, contrast, sharpness
16	Wide DynamicRange	120 dB True WDR or better
17	IR	Atleast 50MTR Distance or better
18	Alarm	1 x Input / 1 x output
19	Storage backup on network failure	Camera should support network failure detection, Camera should have the capability to start the recording automatically on SD card in case of connectivity between camera and NVR/Storage device goes down
20	Edge Storage	Built in SD card slot with support at least 128 GB SD card. 128 GB SD Card shall be supplied along with camera
21	Network Interface	RJ-45, 10/100/1000 Mbps Ethernet
22	Protocols	TCP/IP, ICMP, HTTP, HTTPS, FTP, DHCP, DNS, DDNS, RTP, RTSP, RTCP, PPPoE, NTP, UPnP, SMTP, SNMP, IGMP, 802.1X, QoS, IPv6
23	Text Overlay	Date & time, and a customer-specific text etc
24	Security	HTTPS / IP Filter / IEEE 802.1X
25	Firmware Upgrade	The firmware upgrade shall be done though web interface, the firmware shall be available free of cost
26	Edge Analytics and smart alarm Triggers	Line crossing detection, intrusion detection, unattendedbaggage detection, object removal detection, Face Detection, Motion detection, video tamper, network disconnect, IP addressconflict, illegal login, HDD full, HDD error, Alarm input, Alarm output
27	Enclosure	IP67, IK10
28	Power	POE
29	Certification	UL,CE,FCC,BIS
30	ONVIF	ONVIF (PROFILE S, PROFILE G)
31	User accounts	20

32	Supported Web Browser	Internet Explorer (10+) / Firefox / Safari/ Mozilla or Equivalent
33	OEM Criteria	• The OEM shall have a self-owned support Service Center and RMA in India from last 5 years and Toll Free number.• The Camera OEM shall be enlisted in top 10 companies in any of the IHS reports• The Camera OEM shall be a ISO 9001;2015 and ISO 14001:2015 company• The OEM shall be registered in India for more than 10 Years and present globally for more than 20 years

4.21.3 PTZ Camera

#	Parameters	Minimum Specification
1	Image Sensor	1/1.9"" Progressive Scan CMOS
2	Min. Illumination	Color : 0.002 lux (F1.5, AGC On) B/W : 0.002 lux (F1.5, 1/1 sec, 50 IRE, AGC On) 0 lux with IR
3	White Balance	Auto/Manual /ATW/Indoor/Outdoor/Daylight lamp/Sodium lamp
4	AGC	Auto / Manual
5	Optical Defog and Wiper	Yes
6	3D DNR; HLC; BLC	Yes
7	WDR	120 dB True WDR
8	EIS	Yes
9	Shutter Time	50Hz: 1-1/30,000s 60Hz: 1-1/30,000s
10	Day & Night	IR Cut Filter
11	Digital Zoom	16X
12	Privacy Mask	24 programmable privacy masks
13	Focus Mode	Auto / Manual
14	Focal Length	5.7-205mm or better, 36x
15	Angle of View	60 Degree-2.0 degree (Wide-Tele)
16	Min. Working Distance	10mm-1500mm(Wide-Tele)
17	Pan Range	360° endless

18	Pan Speed	Pan Manual Speed: 0.1°/s to 210°/s, Pan Preset Speed: 300°/s
19	Tilt Range	(-20°-90° Auto Flip)
20	Tilt Speed	Tilt Manual Speed: 0.1°-150°/s, Preset Speed: 300°/s
21	Number of Preset	300
22	Patrol	8 patrols, up to 32 presets per patrol
23	Pattern	4 patterns, with the recording time not less than 10 minutes per pattern
24	Power-off Memory	Supported
25	Park Action	Preset / Patrol / Pattern / Pan scan / Tilt scan / Random scan / Frame scan / Panorama scan
26	PTZ Position Display	On / Off
27	Preset Freezing	Supported
28	Smart tracking	Supported
29	IR Distance	200 Mtr or Above
30	Alarm Input	7
31	Alarm Output	2 relay outputs, alarm response actions configurable
32	Alarm Trigger	Motion Detection, Intrusion, Line Crossing, Region Entrance, Region Exiting, Face Detection, Audio Exception Detection
33	Alarm Action	Preset, Patrol, Pattern, SD/SDHC card recording, Relay output, Notification on Client
34	Audio Interface	1-ch audio input/ Output
35	Network Interface	1 RJ45 10 M/100 M Ethernet Interface; Hi-PoE
36	Max. Image Resolution	1920×1080
37	Frame Rate	60fps or more
38	Image Compression	H.265/H.264/MJPEG
39	Audio Compression	G.711alaw/G.711ulaw/G.722.1/G.726/MP2L2/PCM

40	Protocols	IPv4/IPv6, HTTP, HTTPS, 802.1x, QoS, FTP, DHCP, SMTP, SNMP (V3), DNS, NTP, RTSP, RTCP, RTP, TCP/IP, DHCP, PPPoE, ICMP
41	Number of Simultaneous Live View	Up to 20 users
42	Three Streams	Support
43	Mini SD Memory Card	Manual REC / Alarm REC. Built-in Micro SD/SDHC/SDXC card Slot, up to 256GB Edge recording. 128 GB SD Card shall be supplied along with Camera
44	User/Host Level	Up to 32 users,3 Levels: Administrator, Operator and User
45	Security Measures	User authentication (ID and PW), Host authentication (MAC address) IP address filtering
46	Web Browser	IE 7+, Chrome 18 +, Firefox 5.0 +, Safari 5.02 +, support multi-language
47	ONVIF	Profile S & Profile G
48	Power	24VAC Max. 60W (with IR ON) ; HI-POE
49	Working Temperature / Humidity	Outdoor: -40°C to 70°C (-40°F to 158°F)/0-90%RH (non-condensing)
50	Protection Level	IP67 standard and IK10
51	Mounting	Various mounting modes optional
52	Mount Option (only suitable for outdoor dome)	Long-arm wall mount, Corner mount, Pole Mount, Power box mount,
53	Certification	FCC,CE,UL,BIS
54	OEM Support Qualification	• The OEM shall have a self-owned support Service Center and RMA in India from last 5 years and Toll Free number. • The Camera OEM shall be enlisted in top 10 companies in any of the IHS reports • The Camera OEM shall be a ISO 9001;2015 and ISO 14001:2015 company • The OEM shall be registered in India for more than 10 Years and present globally for more than 20 years

4.22 UPS

Following are specifications for 3 different capacity UPS. UPS would be sized by MSI during site survey and capacity required shall be recommended.

1 KVA UPS	
Capacity (VA/Watts)	1000 / 800
Operating voltage range	110～280@50% load,160~280Vac @100%load
Operating frequency range	46~54Hz±0.5Hz or 56~64Hz±0.5Hz (Auto Sensing)
Power factor	≥0.99
Output voltage	220/230/240Vac±1%
Output frequency	Sychronized with the utility on AC mode; 50Hz/60Hz±0.2% on Battery mode
Output Voltage THD	<2% (linear load),<5% (Non Linear Load)
Crest Factor	3:1(max)
Efficiency	≥90%
DC Voltage	36Vdc
Charge Current	6A
Backup time	3 X 42 AH SMF Batteries (45 Mins)
Typical recharge time	8 Hours(to 90% of full capacity)
LCD indication	1. Input voltage/frequency, battery voltage, output voltage/frequency, load watt/VA and percent, inverter temperature. 2. Operation mode such as “on line”, “on batt”, or bypass”
LED indication	1.Green LED for Mains Mode 2.Yellow LED for bypass Mode 3.Yellow LED for battery Mode 4. Red LED for abnormal operation
Overload capability	1.>110%, 30s turn to bypass mode; 2.>150%, 300ms turn to bypass mode
Transfer time	Between AC Mode and Battery Mode : 0ms Between AC Mode and Bypass Mode : 4ms (typical value 2.5ms)
Communication interface	RS232 Available, SNMP (optional)
Operating temperature	0~40^{0}C
Storage Temperature	-25~55^{0}C
Humidity range	0%~95% (non-condensing)
Altitude	<1500m
Noise Level	<45dB
STANDARDS	
Safety	IEC/EN62040-1;IEC/EN60950-1
EMC	IEC/EN62040-2;IEC61000-4-2;IEC61000-4-3;IEC61000-4-4;IEC61000-4-5;IEC61000-4-6;IEC61000-4-8

2 KVA UPS	
Capacity (VA/Watts)	2000 / 1600 W
Operating voltage range	110～280@50% load,160~280Vac @100%load
Operating frequency range	46~54Hz±0.5Hz or 56~64Hz±0.5Hz (auto sensing)
Power factor	≥0.99
Output voltage	220/230/240Vac±1%
Output frequency	Sychronized with the utility on AC mode; 50Hz/60Hz±0.2% on Battery mode
Output voltage THD	<2% (linear load),<5% (Non Linear Load)
Crest Factor	3:1(max)
Efficiency	≥90%
DC Voltage	96Vdc
Charge Current	6A
Backup time	6 X 42 AH SMF Batteries (45 Mins)
Typical recharge time	8 Hours(to 90% of full capacity)
LCD indication	1. Input voltage/frequency, battery voltage, output voltage/frequency, load watt/VA and percent, inverter temperature 2. Operation mode such as “on line”, “on batt”, or bypass”
LED indication	1.Green LED for Mains Mode 2.Yellow LED for bypass Mode 3.Yellow LED for battery Mode 4. Red LED for abnormal operation
Overload capability	1.>110%, 30s turn to bypass mode; 2.>150%, 300ms turn to bypass mode
Transfer time	Between AC Mode and Battery Mode : 0ms Between AC Mode and Bypass Mode : 4ms (typical value 2.5ms)
Communication Interface	RS232 Available,SNMP for remote monitoring required
Operating temperature	0~40^{0}C
Storage Temperature	-25~55^{0}C
Humidity range	0%~95% (non-condensing)
Altitude	<1500m
Noise Level	<45dB
STANDARDS	
Safety	IEC/EN62040-1;IEC/EN60950-1
EMC	IEC/EN62040-2;IEC61000-4-2;IEC61000-4-3;IEC61000-4-4;IEC61000-4-5;IEC61000-4-6;IEC61000-4-8

3 KVA UPS	
Capacity (VA/Watts)	3000 / 2400
Operating voltage range	110～280@50% load,160~280Vac @100%load
Operating frequency range	46~54Hz±0.5Hz or 56~64Hz±0.5Hz (auto sensing)
Power factor	≥0.99
Output voltage	220/230/240Vac±1%
Output frequency	Synchronized with the utility on AC mode; 50Hz/60Hz±0.2% on Battery mode
Output voltage THD	<2% (linear load),<5% (Non Linear Load)
Crest Factor	3:1(max)
Efficiency	≥90%
DC Voltage	96Vdc
Typical recharge time	8 Hours(to 90% of full capacity)
LCD indication	1. Input voltage/frequency, battery voltage, output voltage/frequency, load watt/VA and percent, inverter temperature 2. Operation mode such as “on line”, “on batt”, or bypass”
LED indication	1.Green LED for Mains Mode 2.Yellow LED for bypass Mode 3.Yellow LED for battery Mode 4. Red LED for abnormal operation
Overload capability	1.>110%, 30s turn to bypass mode; 2.>150%, 300ms turn to bypass mode
Transfer time	Between AC Mode and Battery Mode : 0ms Between AC Mode and Bypass Mode : 4ms (typical value 2.5ms)
Communication Interface	RS232 Available,SNMP (optional)
Operating temperature	0~40^{0}C
Storage Temperature	-25~55^{0}C
Humidity range	0%~95% (non-condensing)
Altitude	<1500m
Noise Level	<45dB
DC Voltage	96 Vdc
Charge Current	6A
Backup time	8 X 42 AH SMF Batteries (45 Mins)
Typical recharge time	8 Hours(to 90% of full capacity)
STANDARDS	
Safety	IEC/EN62040-1;IEC/EN60950-1

EMC	IEC/EN62040-2;IEC61000-4-2;IEC61000-4-3;IEC61000-4-4;IEC61000-4-5;IEC61000-4-6;IEC61000-4-8

4.23 VMS, VA and AI

4.23.1 Video Management System (VMS)

Sr. No.	Technical Description
1	The Video Management System (VMS) software shall be used to view live and recorded video from capture cards and IP devices connected to local and wide area networks. The VMS software shall have a client/server-based architecture that can be configured as a standalone VMS system with the client software running on the server hardware and/or the client running on any network-connected TCP/IP workstation. Multiple client workstations shall be capable of simultaneously viewing live and/or recorded video from one or more servers. Multiple servers shall also be able to simultaneously provide live and/or recorded video to one or more workstations.
2	The VMS shall be supplied with minimum 100 No of thick clients and 16 mobile clients
3	Recording of all video transmitted to the VMS shall be continuous, uninterrupted and unattended
4.1	The VMS system shall offer the capability of video motion detection recording, such that video is recorded when the NVRMS detects motion within a region of interest of the camera's view. Video prior to the detection of the motion shall also be stored with recording using the pre-recorded feature.
4.2	It should also provide following feature:
a.	Suspect Tracking : Configure camera links between cameras to follow a suspect between different camera scenes
b.	Archive bookmarks: Specifically archive bookmarked video to create a second copy of important video and avoid using limited WAN bandwidth
c.	Inactivity timeout : Save bandwidth with blacked out video panels after inactivity
5	The VMS system shall manage the video it has been configured to monitor. Loss of video signal shall be configured to annunciate on VMS client by an on-screen visual indication alerting operators of video loss.
6	The VMS software shall have an open architecture supporting IP cameras and encoders from multiple manufacturers providing best-of-breed solutions ranging from low-cost, entry-level features to high-resolution, megapixel features
7	The VMS client software shall be able to view live video and audio, recorded video and audio and be able to configure the complete system all from a single application
8	The VMS client software shall have the same functionality when connected remotely as it does when it is run locally on the same computer as the server software

9	The VMS client software shall operate on all of the following operating systems: Windows, Linux, Mac OSX
10	The VMS software shall allow the user to have any combination of VMS client applications running on any of the supported operating systems and be able to connect to any of the VMS servers running on any of the supported operating systems. For example, a VMS client running on Microsoft Windows 7 shall be able to simultaneously connect to four (4) different VMS servers all running on different operating systems, such as Windows Server 2003, Windows XP, Vista and Linux
11	The VMS software shall have the capability to run multiple client applications simultaneously on one workstation with multiple monitors.
12	The VMS shall also allow an authorized user to view video through a web client interface. The web client interface shall allow authorized users to view live video, view recorded video, control pan-tilt zoom (PTZ) cameras and activate triggers. The web client interface shall allow connections to multiple VMS servers simultaneously.
13	The web client interface shall operate without requiring installation of any software
14	When using the web client interface, the VMS server shall transcode the video into a JPEG file of the size as the browser screen before sending it to the browser
15	The web client interface shall support the following browsers: IE, Firefox, Opera, Safari, Chrome and shall be compliant with HTML 4
16	The VMS server software shall record and retrieve video, audio and alarm data and provide it to the VMS clients upon request
17	The VMS software shall provide a purpose built mobile application capable of viewing multiple simultaneous live video streams and playing a recorded video stream. Application shall be provided for both iOS and Android operating systems.
18	The VMS server software shall operate on any of the following operating systems: Windows, Linux
19	The VMS server software shall record video based on metadata generated by an edge network device. The edge network devices shall generate the metadata and transmit it with the video stream to the VMS server software
20	The VMS shall license the total number of cameras on the system. This license shall be based on the MAC address of a single network card that is present on the system. The VMS shall only require that this network card be enabled and does not require that data is actually sent through it
21	The VMS shall be able to use the Active Directory or LDAP features of a network to authenticate users and determine which permissions they will have on each server.
22	The VMS shall allow the use of maps. The maps will be accessible to users with the appropriate permission levels and display video sources and their status
23	The VMS shall allow maps to be embedded inside of maps (i.e. hierarchical or nested maps). When an event happens on a map that is embedded inside of a map, it shall transmit the alert to all parent maps and change the color of the icon on the parent map and all subsequent parent maps

24	The VMS allows soft triggers to be placed, viewed and triggered from a map
25	The VMS shall have a single page that displays the status of all servers and cameras currently connected. This page shall display any alarms, events, MAC addresses, camera configuration, format and frame rate from each individual camera
26	When in live display mode, the user shall be able to view live video, and alarm information
27	The VMS shall provide an option to view 16:9 wide video display panels
28	The VMS shall allow the customization of the user interface to allow software triggers to be shown. This shall allow them to activate events through the push of a button, which could trigger recording, PTZ presets, output triggers or email
29	The VMS software shall allow control of PTZ cameras to authorized users and be used to maneuver a PTZ camera. When used on a non-PTZ camera, it shall allow you to digitally pan, tilt and zoom on any video whether in live or recorded mode.
30	The VMS shall allow following methods of controlling a PTZ camera to be available:
	- PTZ graphics control windows
	- Live graphic overlay PTZ control icons
	- Keyboard control (up, down, left, right arrows; page up, page down for zoom)
	- PTZ presets
	- Digital PTZ
	- USB joystick to control PTZ cameras
	- Proportional PTZ control by clicking the mouse in the center and moving it
31	The VMS software shall allow virtual matrix functionality by designating a cell to do so. This video cell shall automatically show video as it is triggered
32	The VMS software shall have a feature for viewing logical groups of cameras. This shall allow efficient viewing of cameras in a logical order
33	The VMS software shall have a feature to organize your cameras into preset views. Views are preconfigured arrangements of the video panels so that they may be easily recalled later. A view can save the location of the video streams, audio streams, maps and event views. These views shall be accessible in both live and recorded video modes
34	The VMS software shall have the capability to automatically cycle through two or more saved views to create a video tour. The VMS shall allow the configuration of the dwell time and the different views it shall use
35	The VMS software shall support searching through recorded video based on time, date, video source and image region and have the results displayed as both a clickable timeline and a series of thumbnail images
36	The VMS software shall have the capability to export video, maps, and audio files
37	The VMS software shall provide the option of exporting the file in the following formats:

	- Standalone Exe (*.exe) – includes an executable player with the video and audio data
	- AVI File (*.avi) – a multimedia container format
	1. PS File (*.ps) – a format for multiplexing video and audio
38	The VMS standalone player shall package all of the exported video into a single executable. The VMS standalone player shall be able to authenticate that the video has not been tampered with using a keyed Hash Message Authentication Code (HMAC)
39	The VMS system shall be able to display system information about users that are currently logged into the system, plug-in file version information number and status, and a system log that contains a detailed history of the processes that occur on the system
40	The VMS system shall have the ability to record an audit trail of when users log in that shows what changes they have made, what video they have viewed and what they have exported
41	The VMS shall allow monitoring of the inputs on both network devices and on manufacturer provided hardware. The VMS shall also allow triggering of outputs on the network devices and manufacturer provided hardware
42	The VMS shall allow for the configuration of what drives to use for recording video. Those drives may be local drives, direct attached storage drives or iSCSI drives
43	The VMS shall not require a database when recording video
44	The VMS shall have the ability to receive ASCII data through the COM port on the server or over the network
45	The VMS shall have the ability to look for keywords in the ASCII data and use these to execute various events such as PTZ presets, recording video, recording audio and sending email notifications
46	The VMS software shall be able to send a predefined email based on an event trigger. The VMS software shall also support SSL and TLS connections for transmissions of the mail.
47	The VMS software shall have a feature to export a video segment from specific cameras or audio inputs to a CD or DVD upon an input trigger or other event being activated.
48	The VMS software shall be used to connect different types of events, such as input triggers, to a desired action such as recording video or triggering an alarm. The VMS software shall recognize the following event types: Video Motion, Video Loss, Input Trigger, Health, IP Camera Connection, Software Trigger and Analytics
49	The VMS client shall be able to use OpenGL and Direct 3D to decompress and render video.
50	The VMS software shall allow the user to input time-based triggers through event monitoring, including the time of day and day of week
51	Camera preview Style e.g. Hovering
52	Video Pane must be identify by color e.g. Motion, Alarm, Free Run, PTZ Focused, Book Marked
53	VMS has Video Push feature to another Client desktop simultaneously

54	Support mainstreaming to manage all quality stream
55	Server and Client must be run on single machine another client machine not Required.
56	Support configuration of multiple DNS servers
57	At least 60 second timeout for out of schedule login failure
58	Support analytic metadata in live and search
59	Support Video Wall
60	Search and display analytic meta data when searching analytic event linkages
61	VMS shall support CIFS and NFS network shares for archive target locations
62	All streams can be individually configurable for recording schedules and storage rules
63	configurable recording of video prior to the detection of the motion
64	The VMS shall support a graphical representation of drive status for associated RAID-based storage
65	The VMS shall support local HDD disk storage
66	The VMS shall support iSCSI extended storage whereby a remote storage unit can appear as a local drive
67	Should support Map Functionality and multi-level mapping
68	Should support bookmarking feature shall allow the tagging, naming, and retention of video clips

4.23.2 AI Based Video Analytics – System Specifications

Key	Description
Unified Video Intelligence Platform	Each of the video analytics use case shall be able to run on a unified video intelligence platform. Where the platform shall have the capability to support several multi-vendor/OEM video analytics applications that can be deployed on any camera or video-feed seamlessly.
Dynamic Deployment	Each of the video analytics use-case shall be structured as an independent module that can be deployed on any camera using a simple user interface utility, providing a complete visibility of the use cases and which cameras they are running on.
Advanced AI compatible	The Video Analytics system shall be compatible with the latest technological advancements in the domain of computer vision and AI. Hence, it shall be able to quickly adapt to newer libraries and AI advancements. All the analytics and use-cases shall be based on advanced AI technology, and shall not depend on traditional algorithms.

Libraries and frameworks	The system shall be fully compatible with popular Computer Vision and Artificial Intelligence frameworks such as OpenCV, OpenVINO, Tensorflow, CAFFE, Keras and Darknet.
Training new models	The system shall allow seamless training by labelling any objects within the images and providing them suitable attributes of multiple types such as class, subclass, colour, type etc. The system shall allow training to happen continuously, on demand or on periodic intervals, which shall be configurable.
Annotation	The system shall have an inbuilt annotation tool that allows a user to label the images with relevant information using both rectangle and polygon drawing facilities.
Model Comparison	The System shall have a library of standardized AI models developed by the OEM of the Video Analytics System, academic institutions and members of the developer community. These models shall be used for comparing and benchmarking the performance of newly developed models. The system shall allow for both qualitative and quantitative comparison of models, i.e. it shall allow the end user to compare individual parameters of the model (such as learning rate) as well as the overall performance of the model on any given dataset when compared to a standardized model.
Monitoring and analytics	Autonomously objective metrics shall be available to be evaluated and Insights into the performance of each algorithm, model and their versions shall be made available to key stakeholders or users as defined. Visual map of composition, workflow, usage analytics, resource utilization, failure points etc. would be made available to provide complete control of A.I. workload.
Unsupervised deep learning methods	The system shall be able to use algorithms and unsupervised deep learning methods to provide alerts and useful actionable insights from live streaming video feed data. System shall have capability to automatically analyse hours of video data for defining own rule.
Self-learning Capabilities	The system shall be capable of fully self-learning with no initial programming input by the end user. The solution shall learn what normal behaviour is for people, vehicles, machines, etc. and the environment based on its own observation of patterns of various characteristics such as size, speed, reflectivity, colour, grouping, vertical or horizontal orientation and so forth.
	The System shall provide the following key results form the use case

Key UI View and functionalities	Event Notifications: The result of each of the use case shall be in the form of events that contain the screenshot with other metadata describing the event, such as detected objects, timestamp, camera/video that generated the event and all other metadata representing the event from different use cases. The User Interface shall have a grid and list view with all the events from different use cases, cameras etc.
	Resource Management View: The User interface shall provide a list of all the resources available in the system such as computing servers, edge-computing devices and cameras. The status of each of the devices, whether they are online/offline shall also be available at all times.
	AI Training Tool: The User interface shall have a training tool to annotate and label images from the events to train new AI models and update the existing ones. The training tools shall also contain a list of all the models available in the system, which can be plugged into any AI use case easily.
	Use case deployment matrix: The user interface shall have a matrix to assign, start, stop and schedule any use case on any camera. The status of active and non-active use cases shall be clearly visible with colour coded information.
	Data Analytics Dashboard: The user interface shall also have an analytics dashboard listing all the patterns of events from different cameras with a heat-map of number of events on an hourly basis.
Common UI for all the use-cases	The user interface shall be a unified dashboard that shows events from all the Video Analytics use-cases and all the cameras in a common UI, and which gets populated in real time from event notifications.
Web based Interface	The User interface of the system shall be a web interface that can be accessed from any system in the local area network with login credentials. It shall allow multiple users to log in at the same time, and receive real-time alerts and notifications.
Live Video Interface	The User interface shall allow a user to view the live video stream from any camera with overlaid information of regions, objects, people and vehicles based on each of the use-case
Configuration per-use-case per-camera level	The system shall allow each use-case to be uniquely configured for every individual camera stream, with parameters for camera calibration, image quality improvement, night/day settings etc.

	Each use-case shall be able to run on different cameras with different settings (e.g., different Zones for Intrusion, different lines for line crossing detection, etc.) at different hours of the day.
	The configuration page shall allow a user to choose any of the available AI models to detect and classify objects within the image. The description of the models shall clearly specify performance and hardware requirements of each of the model.
Key configuration parameters	The use case on each camera shall allow setting up configuration of multiple detections zones such as lines and regions that can be used to define perimeters, regions of interest.
	The configuration user interface shall allow adjusting various sensitivity and confidence parameters to adjust each video-analytics use-case's performance with respect to the physical deployment of the camera.
Filtering and Retrieval	The system shall allow a user to filter and retrieve all the events based on any combination of the following parameters: - Time of the event - Objects in the event - Type of the use-case - Camera Location etc.
Transparent and Open Architecture	The architecture shall clearly demonstrate the technology stack with layers of the core platform, data governance and interface to different software applications.
Highly parallel and distributed	The algorithms powering the video intelligence system shall possess capability to operate parallel and distributed manner across a cluster of machines. Both training of AI algorithms and inference shall be distributed.
Complete visibility of all the resources	The System shall provide an intuitive interface for complete visibility of all the resources in the system, such as edge-devices, servers, cameras and their live status on a GIS Map View.
User Management	The system shall support user with a hierarchical access level, with different access level for different users demarcated with respect to cameras, locations and the data. The user access control system shall allow setting of SOP's like CRUD (Create, Read, Update and Delete) operations for each user.

Deployment of use-case across any camera	The system shall allow deployment of any use case on any camera without any MAC level or IP level locking. Ideally any use case shall be deployable and redeploy able on any camera or video source as far as the camera view supports such use cases to be deployed.
Video Compatibility	The System shall be a real-time video analytics engine that utilizes advanced image processing algorithms to turn video into actionable intelligence. The AI based Video Analytics system shall consists of video-processing & analytics engine that works seamlessly both on saved videos or camera streams in real-time and provide events to the user based on the use-case basis. The system shall be compatible with all ONVIF compliant IP cameras with H.264/H.264+ video decoding.
Multi Architecture Deployment Support	Central Deployment: Under this model all the video streams shall be processed centrally at the data centre with one or more servers for video processing. The user shall be able to log in to the system through the central dashboard to access all the data from all the servers. The processing of videos as well as alert generation shall be done on premise. At no point in time shall the data from the site be shared over the internet or sent over to the cloud. The System UI shall only be accessible using workstations and terminals available on premises.
	Edge + Central deployment: In this type of deployment, some of the video streams may need to be processed on edge using Edge computing devices. However, the metadata generated as a result of this processing shall be sent over to a Master Server where it would be stored in a unified database and made accessible to the end-user. The Master Server may either be situated on the central data-canter, on the cloud or on some remote location on premise.
	The system shall be able to switch between the above modes seamlessly on demand based on the availability of hardware
	The AI system shall also support third-party developed algorithms and use-cases that can provide the user with a large base of use-cases to choose from.
Support for third-party use-cases	If a new use-case needs to be developed based on Video Intelligence, the system shall provide a developer Software Development Kit (SDK) for this purpose. The SDK shall be provided along with detailed documentation for building end-to-end use-cases on the system.
Flexible Technology Stack	The technology stack shall be modular and scalable based on containerized micro services. Each use-case shall be orchestrated as a stand-alone micro service, which communicates with a central server for exchanging of the data.

	A.I. micro services components shall be agnostic to language used in technology stack. It shall work with any language, framework, and library of choice without any impact on the rest of the architecture. This type of flexibility will ensure lower friction for collaboration and deployment of AI.
	Algorithms being containerized shall ensure both interoperability and portability, allowing for code to be written in any programming language or any version of library and framework but then seamlessly exposes a single API to be integrated and ported with multiple modules/AI components of diverse stack. It shall seamlessly integrate with other components and shall be portable/ replicable easily across the machines automatically.

4.23.3 Use Case Specifications

4.23.3.1 AI based Crowd Estimation and Management

S. No.	Key	Description
1	**Introduction**	Crowd Estimation and Management (CEM) Video Intelligence system shall allow estimation of crowd density within the camera view. This is an important tool for understanding the crowd movement and management for the security and facilities management agencies. System shall raise an alert if the crowd density within a camera view is above a certain threshold.
2	**Deployment**	The CEM System shall be a purely computer vision and artificial intelligence based system that be deployed on all the existing and new CCTV cameras, including box cameras and PTZ cameras.
3	**Camera compatibility**	The system shall be completely independent of the make/model of the cameras and be compatible with ONVIF compliant cameras. The CEM system shall support H264, H264+, H265 and MJPEG video streaming from cameras.
4	**Accuracy on datasets**	The CEM system shall have 85% average accuracy in estimation of crowd on public databases such as UCF-QNRF and WIDER FACE
5	**Accuracy on cameras**	The accuracy of the system shall be above 85% within 30 metres distance from a CCTV camera with 3.6 mm focal length and 1/2.8" sensor.
6	**Ability to define regions**	The CEM system shall have an ability to annotate multiple regions within the camera view and the user shall be able to specify crowd thresholds for each of the regions separately. If

		within any region the crowd density estimation if above the user defined threshold the system shall raise an alert.
7	**Camera Calibration**	The CEM System shall have a 3D camera calibration tool in-built for depth/distance analysis from the camera. The system shall be able to provide crowd density with respect to the distance from the camera.
8	**Alerts**	The system shall raise alerts in case of the following: - The CEM system shall raise an alert if the density of crowd is above a user-defined threshold. - The system shall raise an alert in case of erratic movement detected within the crowd - The system shall raise an alert if there is any chance of stampede or overcrowding due to increase in flow rate and erratic movement - The system shall trigger alarm if more than desired density is observed near specified regions such as ghats and main pathways.
9	**Crowd flow estimation data**	The CEM system shall also provide a data of crowd flow from one user-defined region to the other, in case of two regions selected by the user.
10	**Data representation**	The CEM system shall have an MIS system with a detailed report and dashboard on crowding events and data at a minimum of hourly granularity. - The system shall report Crowd Density and direction to load-balance various gates. - The system shall provide detailed counts of total visitors in hourly/daily/weekly/monthly and overall during the Kumbh festival - The system shall also provide IN and OUT counters for all the visitors
11	**Heat Maps**	The CEM system shall have an option of generating real time heat maps of crowd density.

4.23.3.2 AI based Automated Number Plate Recognition (ANPR) System & Vehicle of Interest Search & Identification

S. No.	Key	Description
1	**Accuracy**	The ANPR video intelligence system shall have a minimum of 90% accuracy during the day and 70% accuracy at night in reading the number plate.
2	**Detection and Recognition**	Shall detect both Standardized and Non- Standardized plates
		Shall effectively detect reflective and non- reflective number plates.
		Shall also capture and image of the detected number plate.
		The underlying model shall be based on artificial intelligence and utilize deep learning methodology for detection and recognition by providing character level accuracy.
3	**Recognition at night**	Shall be able to detect plates even at night using IR Illuminators
4	**Real-time lookup and alert generation**	**Shall detect a vehicle's number plate and** o Lookup the database from central server o Generate alerts based on the status of the vehicle mentioned in the database.
5	**Assigning Labels**	Shall allow for the assignment of labels to individual number plates, such as 'VIP', 'offender', etc. Parameters such as severity of alerts shall be separately configurable for individual labels.
6	**Vehicle Search**	**Shall have an option to search vehicles by** o vehicle colour o vehicle colour +license plate o date & time o location o type of Vehicle

4.23.3.3 AI based Facial Recognition System (FRS)

S. No.	Key	Description
1	**Adding new faces for recognition**	Shall allow adding new faces for recognition by uploading images of the individual's face. A new face may also be added by selecting images of the individual's face from the list of faces detected by the system.
		Shall allow for the addition of photographs of criminals obtained from newspapers, sketches, etc.

2	**Recognition of partial faces**	Shall be able to recognize partial faces from varying angles. It also shall be able to identify irrespective of glasses, beard, etc.
		Shall be able to identify and authenticate based on individual facial features.
3	**Matching faces from pre-recorded feeds**	Shall be able to match suspected criminal face from pre-recorded feeds (from any private or public organizations source). Blacklisted face – including sketch for suspect. Whitelisted face – lost person -> track past movement,
		Shall be able to identify faces from stored video of any format.
4	**Multiple Face Recognition**	Shall be able to identify multiple persons of interest in a single frame in real-time. The system shall be able to recognize subjects appearing simultaneously in multiple live video streams.
5	**Number of faces that may be added for recognition**	Shall not impose any kind of limitation on the number of faces that may be added for recognition.
6	**Assigning Labels**	Shall allow for the assignment of labels to individual faces, such as 'employee', 'blacklisted', 'whitelisted', etc. Parameters such as severity of alerts shall be separately configurable for individual labels.
7	**Alert Generation**	Shall generate alerts for blacklisted individuals
		Shall generate an alert if somebody is detected in an area where he/she is not permitted.
8	**Continuous Improvement in detection and recognition accuracy**	Shall be a Deep Learning based solution and shall show a continuous improvement in the detection as well as the recognition of faces.
		Shall have a short processing time and high recognition rate. It shall be able to compare a face against a database of 1000 faces within 1 sec on a 4 Core Intel i7 processor with 4 GB RAM.
9	**Face Search**	Shall allow users to search or browse captured faces (based on date or time range)

4.23.3.4 AI based Parking Violation System

S. No.	Key	Description

1	**Vehicle Parking Detection**	The system Shall be capable of detecting parked vehicles that have remained stationary for a pre-defined period of time.
		Shall be capable of performing the parking detection in busy or crowded environments despite constant movement in front of the vehicles or the vehicles being regularly obscured. A crowded scene is defined as one where the vehicle is obscured for up to 50% of the time.
2	**Vehicle in and Out Count**	Shall be able to count the number of vehicles entering and exiting the parking lot, and provide time stamp to each entry and exit.
3	**Number Plate Recognition**	Shall detect and store the number plate of the violating vehicle along with the time stamp.
4	**Configuration of detection time**	Shall have the ability to configure the detection time to suit the environment, from seconds to minutes or hours. The detection time is the elapsed time between when the vehicle is first detected and the time when an alarm is required to be raised.
5	**Detection of multiple vehicles**	Shall be able to detect multiple vehicles each with its own timer as per the defined detection time. If multiple vehicles are parked in the scene one after the other and alarm shall be raised for each object (one after the other) once that vehicle has been parked in the scene for longer than the detection time.
6	**Photographs of violation**	Two types of photographs of the violating vehicle shall be captured: - o Overview: covering the vehicle and its surroundings o Closer view: Indicating readable number plate.

4.23.3.5 AI based Abandoned Object Detection

S. No.	Key	Description
1	**Purpose**	Shall be capable of detecting left objects that have remained stationary for a period of time that is considered suspicious by the user.
2	**Condition Compatibility**	Shall be capable of performing the left object detection despite drastic light changes and the casting of shadows in front of the left objects.
3	**Multiple object detection**	Shall have the ability to detect multiple objects that are left stationary in a scene. The system shall be able to detect multiple objects each with its own timer as per the defined detection time. If multiple objects are abandoned in the scene one after the other and alarm shall be raised for each object

		(one after the other) once that object has been left in the scene for longer than the detection time.
4	**Configuration of detection time**	Shall have the ability to configure the detection time to suit the environment, from seconds to minutes or hours. The detection time is the elapsed time between when the object is first detected as an abandoned object and the time when an alarm is required to be raised.
5	**Event Review**	Shall be able to immediately review the event (with a click of a single jump- to-event button) to recognize the person who has left the object.

4.23.3.6 AI based Advance Intrusion Detection

S. No.	Key	Description
1	**Purpose**	Shall be able to detect an act of intrusion. Intrusion herein refers to the instance of an individual crossing a pre-defined virtual fence defined by the user.
2	**Configurable parameters**	The user shall be able to configure the length and orientation of the virtual fence. She shall also be able to define the direction in which crossing the line would be considered as intrusion.

4.23.3.7 AI based Garbage Detection

S. No.	Key	Description
1	**Purpose**	Shall automatically be able to detect the accumulation of garbage in a camera's field of view and generate alerts accordingly
2	**Alert Content**	The alerts shall contain a snapshot of the area along with location and time.

4.23.3.8 AI based Camera Health Monitoring

S. No.	Key	Description
1	**Purpose**	The Camera Health Monitoring system shall be able to monitor the status of the camera and report an alert in case the camera is not functional or tampered with intentionally or unintentionally.
2	**View Obstruction**	Shall detect and raise an alert if any of the camera's view is obstructed by any foreign object. The user shall able to adjust

		the threshold parameters of extent of obstruction in terms of percentage of camera view
3	**Bright Light Shown**	Shall be able to detect and raise an alert if the camera view is tampered with bright lights. The system shall specifically identify it as a camera tampering event with light shining.
4	**Camera View Changed**	Shall raise an alert if the camera view is changed/moved suddenly.
5	**Illumination Too Low**	Shall raise an alert if the camera scene gets too dark below a threshold.
6	**Camera Connectivity**	Shall raise an alert if the camera is turned off or connectivity is lost.
7	**Notification with Health Type**	It shall notify the user with the type of camera health issue, namely: View Obstruction, Bright Light Shown, Camera View Changed, Low Illumination and loss of connectivity
8	**Sensitivity Management**	It shall have a provision to adjust the sensitivity of detection on each camera

4.23.3.9 AI based Person Count

S. No.	Key	Description
1	**Purpose**	Person count video intelligence system shall be able to report count of people crossing a user-defined boundary with in the camera view
2	**Regions and Lines**	Shall allow user to draw multiple regions or lines to count people moving in or out with respect to individual lines or regions
3	**Person Classification**	Shall not count vehicles or animals or other moving objects as persons
4	**Reporting**	Shall report counts at a minimum of hour level, where the data shall be available on the dashboard with hour-level granularity. The data from past weeks/months shall also be available in graphical and exportable reports.

4.24 Enterprise GIS

The Infrastructure getting implemented at Dehradun Smart City shall be leveraged for Haridwar Kumbh GIS Requirements. Following is the desired guidelines

1. Using existing infrastructure of DICCC at ITDA to host Enterprise GIS & Image Processing (IP) infrastructure
2. Upgrading the Existing Enterprise GIS & IP to host instance for Haridwar Kumbh.
3. Create Base map for Haridwar Municipal Area (Approx 15 Sq KM) using 0.3M resolution satellite Imagery
4. Customise and Configure Web GIS Portal for Haridwar.
5. Integrate base map and Enterprise GIS of Haridwar with ICCC and other smart services.

Project Scope

4.24.1 Base Map Creation

4.24.1.1 Procurement of Satellite Imagery (0.3m or better)

4.24.1.2 Collection & Incorporation of Existing GIS Data

- MSI will collect the available maps and secondary data from DSCL in soft copy and/or hard copy. These data set would include municipal boundary, Zone boundary, Town survey maps (if available), ward boundary maps, basic infra-structural facilities and land marks etc.
- Town Planning Schemes if available should be incorporated in base map. Town Planning Schemes would include proposed land use zoning, transport network and sites designated for various public purposes.
- Soft copy Maps / drawings of utilities if provided by DSCL needs to be suitably digitised and incorporated in base map.
- Any other GIS compatible data available with different department would also be required to be included in base map.
- Location of various POI (Point of interest data) like State and Central Government offices, railways and highways, police stations, land mark buildings hospitals etc..

4.24.1.3 Data validation and gap analysis

- MSI will conduct QA QC of collected data from DSCL and various department and come with detail Gap analysis Report. Selected Bidder will prepare base map using the available and fetched data and validation of the same will be carried out by the Technical Committee of DSCL.

4.24.1.4 DGPS survey for Geo-referencing Satellite Imagery

- Geo-referencing is the process of assigning real-world coordinates to each pixel of the raster. It is the process of scaling, rotating and translating the image to match a particular size and position.

- For Geo-referencing the Bidder needs to take the Ground Control Points (GCPs).
- GCPs are basically taken as a road intersection points, Building Corners, Permanent Locations etc.
- MSI shall generate the Grid of 1 x 1 Sq. Km. on the Satellite Image and collect appropriate No of GCPS per sheet. GCPs need to be collected using DGPS.
- The locations identified on the image and real ground should be verified with the Authorized Representative appointed by DSCL.
- The data should have following:- Projection: Universal Transverse Mercator (UTM), Spheroid: WGS 84, Zone: 43N.
- Observation time for DGPS instruments has to be minimum 12 (Twelve) Hours at Base Station and minimum 30 Min Thirty Minutes at each GCP using DGPS.
- The horizontal accuracy of GCPs should be 0.1-0.3 meters. 5% of GCPs would be randomly selected as sample for the accuracy. If the incorrectness in accuracy found in any sample, the entire work shall be rejected and shall be required to rework.

4.24.1.5 Creation of Data model

- Data Model for storing the spatial & Non-Spatial data shall be decided by DSCL in consultation with the successful Bidder in accordance with the National Large Scale Mapping Policy

4.24.1.6 Digitization of Satellite Imagery

- Bidder will create / update all geographical features class required as per RFP/SRS by digitizing from satellite imagery.
- The Satellite Image / scanned map will be digitized using the suitable COTS GIS software.
- This process includes Creation of standard Template Initially; a standard template will be created & inserted into each Digitized Map. In this template the layer name, line type and color for each feature present on the map will be standardized.
- Post the processing of the satellite imagery by removing the geometric anomalies (if any), the bidder will prepare a Grid of 1Km x 1Km for positioning bidder with respect to its Geographic Location. These grids then further will be divided into 250m x 250m scenes for future usage like Map Book creations, Smart Asset ID creation etc. and future analysis. All the grids and scenes will have unique IDs.

- Bidder will prepare an up-to date large-scale base map (Scale 1:2000) of all the wards/zones of City using satellite imageries and then will prepare a new Database using the existing Database available with Municipal Corporation / Smart City , as unified Geo-spatial Data with infrastructure details.

- Bidder will carry out mapping on the rectified satellite data using heads up digitization process. The features that would be taken for mapping includes Buildings, Vacant Plots, Roads, Bridges, Railway Tracks, Parks, Gardens, Stadiums, Slums, Traffic Squares, Water Bodies (River, Lake, Pond, Drainage, Canal etc), Over Head Tanks, ghats etc. While doing the digitization, a special care of data correctness to be taken like no overshoots / undershoots, proper layering, proper symbology etc

4.24.1.7 Creation of GIS Data from available Paper / CAD Drawings if provided DSCL.

4.24.1.8 Incorporating TP and DP plans in GIS if provided by DSCL

- Bidder wills Incorporate Geo reference existing TP and DP in GIS

4.24.1.9 Preparation of Final Base Map

- Final base maps will be prepared at 1:2000 Scale incorporating the data collected, processed and digitized after survey process. The base maps will be prepared in various layers as defined by DSCL.

4.24.1.10 Data Migration on Centralize GIS Database

- Bidder will migrate updated Base Map and Utility Data at Smart City into centrally located Enterprise GIS database

4.24.2 Supply of COTS GIS & Image Processing Desktop software - 01 No.

Bidder would provide one license of COTS GIS and Image Processing desktop software as per below specification.

Sr. No.	General Features	Compliance Yes/No
1)	**Multiple Document Interface (MDI)**	
	• Project, View and Layer Management	
	• Geo-Linked Multiple Views	
	• Well known Raster, Vector and Tabular file formats support	
	• On the Fly Map Projection Transformation	

	• Large set of Library for Projection & Geographic Coordinate System	
	• Advance Map Navigation and Visualization	
	• Seamless data handling using ORDBMS	
	• Identification and Measurement Tools	
	• Customizable GUI	
	• Extensive Map Composition Tool	
	• Raster and Vector Catalogue	
2)	**GIS Features**	
	• Advance Drawing and Editing	
	• Topology Creation	
	• Edge Matching and Rubber Sheeting	
	• Geometric Correction	
	• Database Management	
	• Query Builder for Simple and Complex Query	
	• Legend Creator for thematic mapping	
	• A large library of symbols	
	• Rule Based Labelling and Annotation	
	• Geo-processing and Overlay Analysis	
	• Vector to Raster	
	• Advanced Report Generation with wizard	
3)	**Image Processing Features**	
	• Image Enhancement and Filtering	
	• Image Analysis Tools	
	• Image Geo-referencing	
	• Image Extraction and Mosaicking	
	• Atmospheric and Radiometric Correction	
	• Image Transformation	
	• Image Classification	

	• Advance Segmentation	
	• Advanced Change Detection	
	• Raster To Vector	
4)	**Network Analysis**	
	• Defining Network Rules	
	• Add Network Location	
	• Remove Network Location	
	• Find Shortest and Optimum Path	
	• Location Analysis	
	• Multi Location Analysis	
	• Service Area	
	• Dynamic Segmentation	
5)	**3D Analysis**	
	• Terrain Extraction	
	• Flythrough & Walkthrough Creation	
	• Drape Raster, Vector and 3D Object	
	• Line of Sight and Radio Line of Sight	
	• View Shed Analysis	
	• Stereo Viewing	
	• Environmental Effect Like Fog, Fire, Cloud, Sun, etc	
	• Particle emitter	
	• Save Image & Animation [*.avi]	
6)	**Raster GIS Analysis**	
	• Spatial Analysis	
	• Distance Tools:	
	• Math Tools	
	• Conditional Tools	
	• Extraction Tools	

	• Local	
	• Generalization	
	• Multivariate	
	• Neighbourhood	
	• Weighted Overlay	
7)	**Terrain Analysis**	
	• DEM to Contour and DEM from Point and Contour Line	
	• Slope and Aspect	
	• Hill Shade and Topographic Normalize	
	• Cut & Fill Analysis	
	• View Shed, Route Indivisibility and Line of Sight	
	• Best Path	
	• Area/Volume Calculation	
	• Hypsometry	
	• Semi Variance	
	• Surface Specification Points	
	• Anaglyph	
8)	**Global Positioning System**	
	• Interface with GPS device	
	• GPS Tracking and Navigation	
	• Extract feature using GPS	
	• Simulate GPS file	
	• GPS data validation	
	• GPS error correction	
	• Satellite sky-view	
	• Speed and Bearing Indication	
	• Way-Path generation and storing	
	• Geo-fencing	

	• Different File formats support	
	• Export to KML/KMZ	
9)	**Tracking Analysis**	
	• Simulate and analyse time-based data	
	• Report on patterns related to time and defined rules.	
	• Monitoring of mobile resources	
	• Analyse patterns of movement	
10)	**Neural Network Classification**	
	• Supervised and Unsupervised Classification	

4.24.3 Supply of COTS Enterprise GIS & Image Processing Software

Bidder should supply the additional license of GIS & Image processing software installed at Dehradun smart city ICCC with below specification.

Sl No	**Technical Specification**	**Compliance (Yes/No)**
1	The proposed software should have functions of GIS and Image Processing along with advance functions such as network analysis, terrain analysis, 3D analysis, change analysis, etc.	
2	GIS Software must allow authority to implement a centrally managed GIS providing the advantage of lower cost of ownership through single, centrally managed, focused GIS applications (such as a Web application) that can be scalable to support multiple users and saves the cost of installing and administering desktop applications on each user's machine.	
3	Platform for GIS Application Software should be able to operate on Windows	
4	ODBC compliance enabling interface with RDBMS like Oracle, SQL server, Access etc. should be available.	
5	GUI shall be highly user friendly, self-explanatory and eye catching. It shall provide the sample example wherever it seeks user input and also preserve the history of the inputs. GUI can be made good looking and beautiful by making use of good color scheme and putting functions indicative image (drawing) on button.	

6	The proposed GIS software could be any Industry standard COTS GIS platform and should be easy to handle, operate, maintain & also train the authority staff/end users.	
7	The customized software for authority should have simple user interface both for departmental users as well as for citizens with easy navigation and querying facility.	
8	On-line help shall be provided at all functions and tools.	
9	The proposed software should be OGC compliant and follow the interoperability.	
10	The software should support OGC Services such as WMS, WFS, WCS, CSW, INSPIRE, etc along with GML, KML, etc.	
11	The software should support all types of raster formats and services like ERDAS IMAGINE, ENVI, PIX, DTED, DEM, CEOS, JPEG, JP2,PNG, GeoTIFF, & Web Coverage Service (WCS, OGC standard), Web Map Service (WMS), OGC standard.	
12	Should be able to support broad range of clients including browsers, desktops, Mobile Handsets, Palmtops, Tough books, etc.	
13	**GIS Functions**	
14	The proposed software should support multiple document interface (MDI), User should be able to create multiple views in single project.	
15	The application framework of the software should be such that it should have Dockable/Floating Toolbars, Dockable and Auto Hiding Windows, Unicode	
16	Support for Multilanguage Attributes, Drag and Drop to Rearrange Tools/Toolbars, Create New Toolbars or Menus without Programming, Extend the Applications with Add-ins built with .NET, Java, or Python, Build New GIS Components with .NET or Java or other development platforms.	
17	The proposed software should have capability to create layer as per the data model defined by the authority. User should be able create table structure as per the requirement.	
18	The software should have provision for definition of map projection system and geodetic datum to set all the maps in a common projection and scale.	
19	It should have facility to create custom projection using 3 to 7 parameters.	

20	It should have the facility to display multiple projection coordinates on map click.	
21	The software should provide facility to click on any feature of the map and return a select set of attributes for feature i.e. Identify tool along with pop-up.	
22	Software should have rich geo-processing functions such buffer generation, clip, erase, intersection, dissolve, union, polyline to polygon, etc. It should have facility to perform the spatial intersection analysis like plot area with buffer zone to calculate road-widening impact on adjacent land.	
23	The Software should be able to import / export data from / to various formats like .dwg, ,dxf, .dgn, .shp (shape files), coverage file, .mif (MapInfo), .mdb (GeoMedia), .gml, .kml, .gpx. , Geo PDF GeoJSON, interlis, GeoRSS, SqlLite etc.	
24	The proposed software should have function to import / export tabular data such as .xlsx, .csv, .dbf, etc.	
25	Support of IFC object for BIM applications.	
26	Support 3 D data	
27	Integrated GPS module for desktop and mobile GIS.	
28	Support of Coordinate Geometry (COGO) description for GIS objects creation and store in GIS database.	
29	Facility to define joins between the two tables (graphic / non-graphic) of the database to get integrated information in the table and perform GIS analysis.	
30	The system should provide facility to exchange the GIS Data with other platform applications like Microsoft Word, and Excel to use GIS data and generate reports like graph and charts.	
31	Software should have rich display and navigation tools. It should have zoom in, zoom out, fixed zoom in, fixed zoom out, pan, real time pan, bookmark, Geo link multiple views, swipe, flicker, search by location, cross hair, cursor location value, numeric dump, query cursor etc. It should have support of continuous panning i.e. real time pan.	
32	Software should allow the user to perform undo / redo operations during edits.	
33	The software should have module for geo-referencing of vector and raster data.	

34	Facility to capture the geometry from the layout maps, Building maps by maintaining the coincident geometry i.e. when a new polygon is captured simply by selecting an existing polygon to digitize the common boundary thereby ensuring no slivers or gaps between adjacent area features like parcels.	
35	The software should provide a complete set of drawing & editing tools in order to enable the user to Draw & Modify any or parts of various geographical objects (point, line and polygon) on the map.	
36	The software should have topology creation tool to remove the topological errors from vector data.	
37	The software should have the ability to add data from internet or intranet users to the existing map data so that data from other sources.	
38	The software should allow user to create layers or shortcuts to geographic data that store symbology for displaying features.	
39	A rich legend creation tool should be required in proposed application for thematic mapping. User should apply color and symbology using the attribute attached with the layer based on single, quantile and unique values functions.	
40	A rich annotation tool should be available such as add label, edit label, move label, rotate label, remove all label, etc.	
41	The software should have module of Dynamic Labelling and Rule based Labelling.	
42	The software should have a provision of hyper linking the GIS feature as well as its attribute fields with existing documents, URLs, Images, drawing files or scanned maps related to that feature.	
43	Software should have versioning capability for history tracking.	
44	Query builder tool should be available with the software to perform simple and complex queries.	
45	The customized application should provide the user facility to make dynamic queries on GIS GUI. The application should allow users to store and retrieve standard queries used by them in day to day operation.	
46	Software should have various query tools for queries based on attributes, location, etc.	
47	Software should have map composition / layout tool for printing spatial data at different scales and at adjustable print quality.	

48	Software should allow users to export results to various file formats like EMF, BMP, TIFF, JPEG, PDF, etc.	
49	Image Processing Functions	
50	The proposed software should support HRSI (High Resolution Satellite Imagery) and low resolution satellite images (panchromatic & multispectral) such as IKONOS, Quick bird, Geoeye, Worldview, CARTOSAT, EROS, LISS-IV, LISS-III, AWIFS, RISAT-1, KALPANA-1, INSAT3A, INSAT3D, PROVA-V, etc..	
51	The software should have capability to process optical satellite data as well as microwave image data.	
52	The software should be capable to process and visualize the stereo pair data. It should be able to create DEM from stereo pair and perform ortho-rectification.	
53	The software should support images with More than 8 bits, 11 bit, 16 bits, and 24 bits per band.	
54	The software should support image format such .tif, geotiff, .img, .pix, .hdr, .h4, .h5, DTED, DEM, CEOS, .bmp, .jpeg, etc.	
55	The software should be also support LiDAR data file format such as *.las, *.isd, *.pcg etc...	
56	The software should have projection transformation tool to reproject the image from one projection to other projection system.	
57	Image extraction module should be available in the proposed software which can be performed by defining the extent, inquire box and polygon layer.	
58	The software should have module for image mosaicing and splitting.	
59	Geometric Correction and atmospheric correct module should be available to remove the geometric distortion in the image and atmospheric anomalies such as haze.	
60	It should have Layer stacking to create composite image from a number of band of the satellite imageries.	
61	The software should have image enhancement module to enhance the imageries. It should have enhancement algorithm such as	
62	Linear, Logarithmic, Histogram Equalize, Histogram Matching, Density Slice, Gaussian, Squire root, Tone Balancing	
63	The software should have Image filtering algorithm such as	
64	Convolution, Texture, Adaptive, Crisp, Laplacian, Statistical, FFT, etc.	

65	The software should have image transformation module such Vegetation Index, Principal Component Analysis (PCA), Inverse PCA, Pan sharpening, Wavelet fusion, etc.	
66	The software should have Natural Color image generation module using NIR, Red and Green band of high resolution multispectral image data. This module should have capability to stretch the natural color image into 8 bit.	
67	Proposed software should have image classification modules such as supervised and unsupervised classification along with image segmentation.	
68	The software should be capable to process the temporal or time series image data. The software should provide change detection module such as: Basic Change Detection Advance Change Detection Auto Change Detection	
69	The advance change detection module should be capable to ingest multiple input images to find the change. It also handles the multi resolution satellite image along with mis-registration. It should supports various methods of advance change detection such as single band differencing, cross correlation, Image regression, Image ratio-ing, PCA, Change Vector Analysis (CVA), Magnitude Differencing, Vegetation Index Differencing, Tasseled Cap, Chi-Square, Unsupervised Change Detection, etc.	
70	The change detection module should have capability of Object Library Creation for Object Identification and Automatic Feature Extraction (AFE).	
71	The software should have functions like Linear Algebraic Combination, Change resolution, Bit Conversion, proximity analysis, etc.	
72	The software should have function called Dynamic threshold for analyzing change detection using image. This function is used to categorize the pixels in input image based on the threshold value.	
73	The software should have raster catalog and vector catalog tool for raster and vector data management.	
74	The software should have network analysis module to find the shortest and Optimum path using the topologically corrected road network.	
75	The software should have tools for terrain analysis and 3D analysis. The module should be able to create slope/aspect, hillshade, elevation profile, topographic normalize, line of sight, viewshed analysis.	

76	The software should have algorithm for surface generation such as Linear, IDW and Krigging.	
77	Software should support fully automatic and semi-automatic raster to vector conversion tools.	
78	OGC Certified	
79	User Management Tools Add User and Assign Rights	
80	Map Tools Vector and Raster Data Support (Display) Zoom In Zoom Out Zoom to Extent Previous Next ViewView Pan Zoom to box Book Mark Layer Visibility on/off	
81	Measure Tool Measure Distance Measure Area	
82	Advanced Tools Select Tool Unselect Identification Buffer Get XY coordinates Find XY coordinates Labelling	
83	Query Tools Basic Query Feature Query (Spatial and Non Spatial) Advance Query	
84	Spatial Editing Tools Feature Creation Add Feature Edit Feature Delete feature	
85	Non Spatial Editing Tools Attribute Information Editing	
86	Geo-processing	
87	Network Analysis	
88	Real Time Data Support and	
89	Online Spatial Data Creation and Updation Support	
90	Should support internet, intranet, cloud	
91	Multiuser data editing	
92	Data Analysis Look up Table Update	
93	Image Enhancement – Linear, Gaussian, Logarithmic, Density slice, Square Root, Histogram Equalize ,Histogram Matching	
94	Tone Balancing	
95	Image Filtering ,Texture ,Adaptive, Crisp, Statistical, Convolution	
96	Image Classification Unsupervised Classification	
97	Supervised Classification, Threshold , Generate Statistics of ROI/ Create Signature File, Post Classification Smoothing	
98	Contingency Matrix , Signature Reparability, PCT Edit	

99	Scatter Plot ,Class Information, Fuzzy Classification	
100	Fuzzy Convolution ,Segmentation	
101	Change Detection - Cut and Fill Analysis	
102	Conversion Tools	
103	It should have display, navigation, measurement, layer management, draw/edit and GPS functions.	
104	The mobile GIS/GPS application should be able to display the vector data with color and symbology.	
105	User should be able the ingest point, line, polygon and image theme in mobile GIS application.	
106	The application should have functions such as draw point/line/polygon features, attribute editing and delete point/line/polygon features.	
107	The GPS tool of the application should be able to collect point, line and polygon features.	
108	The application should have tools such as query builder, identify, find feature using attribute value, clear selection/refresh and find feature by location.	
109	The mobile application user interface should be customizable as per user requirement.	
110	Should have support for the smart phones and tablet devices with GPS Support. It should have support for	
111	Enterprise GIS Function	
112	The GIS server should be based on a Service Oriented Architecture (SOA).	
113	Should support Java /VB Script, .Net etc. and other latest technologies.	
114	OGC certification and capability to serve and consume OGC complied web services including WMS, WFS, WCS, CSW, INSPIRE, etc.	
115	Should be based on 64 bit architecture or better.	
116	Should support Windows/Linux platform.	

117	Should be able to support broad range of clients including Interoperability and browsers, desktops, Mobile Handsets.	
118	Should support unlimited number of Editing and viewing clients. It should also allow multiuser editing with Advanced Editing Functionalities.	
119	Should support standard Web server/application server like IIS, Apache, Tomcat, Oracle HTTP server, etc.	
120	Should supports unlimited Desktop client connection. Desktop GIS applications with the capability to consume WMS/ WFS services should be able to connect and use data from the server.	
121	Should be capable of maintaining data history, version management and conflict detection / resolution.	
122	Should have geo-processing framework, geo-processing core analysis functionalities, spatial and statistics analysis functionalities.	
123	Should have capability of centrally managed data, models, tools, maps and applications.	
124	Should have the capability to link documents like Adobe pdf, word/power-point JPEG, GIF, PNG, DTED and TIFF files etc to map features.	
125	Should support database check in–check out/replication functionalities hence maintaining the parent child relationship of Master Database.	
126	Should have open access to extensive GIS capabilities so as to enable organizations to publish and share geographic data(2D&3D),maps, analysis tools, Manipulate data, 3D models etc.	
127	The publisher should have capability to publish the project/data on GIS server and enable OGC services such as WMS, WFS, WCS and CSW in the data layer.	
128	All the Geo-processing and Image processing function such as buffer creation, clip, erase, image enhancement, image filtering, Vegetation Indices Calculation, Linear Algebraic Combination, Band Math, change detection, image extraction, mosaicing, etc should be performed at server end by sending the request using the web client and should enable the WMS service to display the processed data on web.	
129	Application Server must support Time aware data for Trends / Time Series Analysis. Application Server must support network and perform Routing analysis, Service Area Analysis, and Tracking Analysis.	

130	Should support for GML, RSS (Real Simple Syndication) and KML/KMZ (Keyhole Markup Language).	
131	The server should have in built map caching capability.	
132	It should provide imagery access quickly after acquisition with dynamic mosaicing and on- the-fly processing.	
133	Should support standard Web server/application server	
134	Should have Web Application Functionalities like pan, zoom, identifying features on a map, feature based hyperlink, measure distance, overview window, find place, query attribute, search attribute, editing and geo processing task.	
135	The software should allow visualization of data in 2D, 3D in web as well as desktop application.	

4.24.4 Design and Develop Enterprise Web GIS Portal

Bidder will Design and Develop web GIS application using COTS Base Enterprise GIS platform. This application will cater to the viewing, analysing, & utilizing the Geographic Information needs for citizen, department and Command Control System.

The required features to be developed for web GIS application is as follows:-

- Will be based on COTS Base Enterprise GIS Platform
- OGC Open Geospatial data standards compliant Existing Server, Client, Web, Mobile / Tablets to be supported
- Application will be open to integrate additional functionalities in future
- Should support multiple relational database connections
- Shall have query based results
- Application will have facility of Historical data analysis using time series
- Should support distributed transaction and should allow multiple users to edit the map data at a same time.
- Application will support DBMS spatial index and R- tree index for better system performance
- Creation of server clusters with load balancing and fail-over functionality should be supported
- Application should support data compression and asynchronous map view, static & dynamic cache.

- Application should have facility to configure additional menus for future functionality.
- User authorization and authentication should be GUI based.
- Application will have the facility to create custom GUI without business customization through designated application.
- The selected bidder is expected to follow the complete SDLC for the development of the GIS application.
- Proposed/Developed GIS Application software will follow National Spatial Data Infrastructure (NSDI) Meta standards and should be compatible with National Urban Information System (NUIS) Scheme.
- It should tightly integrate the spatial data with the existing system at Smart City.

4.24.5 Tentative Integrations with Existing Systems

- Integrated Command & Control Centre at DSCL.
- Smart systems being deployed at DSCL as per requirement.
- Other systems like Nagar Nigam Portal or E-Gov application as per requirement.

4.25 City WiFi

Seamless WiFi connectivity is required at Kumbh area to run the workforce Application. Following are specifications required for Access Points.

Access Points Specific Requirements - Outdoor	
1	The WLAN solution shall propose a 802.11ac wave2 MU-MIMO outdoor ruggedized dual-radio AP Access Point.
2	The outdoor ruggedized Access Point shall have integrated omni-directional antennas or may be equipped with external antennas.
3	The outdoor ruggedized Access Point shall support atleast 16 SSIDs (8 per radio).
4	The outdoor ruggedized Access Point shall offer atleast 1733Mbps throughput on the 5Ghz band and atleast 300Mbps throughput on the 2.4GHz band.
5	The outdoor ruggedized Access Point shall support atleast 512 clients.
6	The outdoor ruggedized Access Point shall have One 10/100/1000BASE-T Ethernet network interfaces (RJ-45) and One 1000BASE-X SFP Port
7	Roaming Parameters supported shall be L2 Roaming Fast BSS Transition (802.11r Roaming) Radio Resource Management (802.11k) BSS Transition Management (802.11v)

8	The outdoor ruggedized Access Point shall propose Deep Packet Inspection (DPI) capabilities providing real-time classification of flows at the application level.
9	The outdoor ruggedized Access Point shall be IP66/67 certified.
10	The outdoor ruggedized Access Point shall support persistent moisture and precipitation, and high and low temperatures: -40°C to 65°C
11	The outdoor ruggedized Access Point shall support 802.3af/at PoE.
12	The MTBF for the outdoor ruggedized Access Point shall be at least 525600h (60 Years).
13	The outdoor ruggedized Access Point shall propose a Factory reset button.
14	The outdoor ruggedized Access Point shall propose a console port.
15	Wind Survival: Up to 165 Mph, Humidity must be 5% to 90% non-condensing. CE & RoHS, , WEEE, CB Scheme Safety, Shock and Vibration ETSI 300-19-2-4, FCC , EN 60601-1-2 EMC ,Wi-Fi Alliance (WFA) certified 802.11a/b/g/n/ac (with wave 2 features) "
16	Should be able to integrate seamlessly with existing Wifi Controller at ITDA or Bidder to provide new wireless controllers with following specs:

Wireless Controller Specifications:

1. Solution & Architecture Overview

1.1	The wireless LAN solution shall be based on IEEE 802.11 and shall be WFA certified for Data and Voice.
1.2	The wireless LAN solution shall propose a distributed control function (no centralized controller) with inherent support for redundancy, elimination of traffic bottlenecks and lowered latency.
1.3	The wireless LAN solution shall rely on a distributed and L2 only data plane.
1.4	The wireless LAN solution shall be able to be deployed in mono-site deployment with Access Points spread over a single broadcast domain (VLAN) and operating in a common RF environment and multi-site deployment with Access Points spread over multiple broadcast domains (VLAN) that may operate in different RF environment. For both deployment types, the solution shall offer advanced features like Intrusion Detection/Prevention or a Captive Portal to manage guest's connection without additional third-party components.
1.5	The wireless LAN solution shall propose a centralized management function, irrespective of the deployment model.
1.6	The wireless LAN solution shall scale atleast minimum 4000 Access Points and thousands of users while guarantee ease of deployment and expansion (to be described).

1.7	The deployment model shall rely on a licensing model that is as simple as possible, with one license per AP including all functions (basic or advanced) handled by the AP.
1.9	The mono site deployment shall allow an easy migration to multisite deployment (Minimum 4000 AP) when needed.
1.10	The wireless LAN solution shall have been designed with scalability in mind to allow the additional, minimum 2000 APs limit to be extended in the future (to be described) without requiring new equipment or deployment design change.
2.1	The wireless LAN solution shall support MAC based authentication.
2.2	The wireless LAN solution shall support 802.1x based authentication.
2.3	The WLAN solution shall include a built-in RADIUS server for 802.1x and MAC authentication that shall not be proposed as a separate product.
2.4	The built-in RADIUS server shall be able to interface with an external authentication server (Radius, LDAP, Active Directory): Free Radius, Microsoft NPS Radius Server, Microsoft AD, Open LDAP…
2.5	The built-in RADIUS server shall support at least following EAP types: EAP-PEAP, EAP-GTC, EAP-TLS, EAP-TTLS.
2.6	The wireless LAN solution shall have the ability to utilize RADIUS attributes to assign each authenticated user/device to a specific ROLE. A role defines a VLAN and enforces security and QoS through the use of role-based ACLs and QoS policies that can be directly integrated with the roles defined within existing authentication servers.
2.7	The wireless LAN solution shall support following link layer encryption standards: WPA2_AES, WPA2_TKIP, WPA_AES, WPA_TKIP, DYNAMIC_WEP, WPA_PSK_AES, WPA_PSK_TKIP, WPA_PSK_AES_TKIP, WPA2_PSK_AES, WPA2_PSK_TKIP.
2.8	The wireless LAN solution shall support following 802.1x supplicants: Windows 7, 10, MAC OS, IOS, Android, Chromebook…
2.9	Irrespective of the deployment model, the wireless LAN solution shall propose a "Guest" management solution based on an embedded and built-in Captive Portal providing web based authentication for guests and visitors.
2.10	The Guests Captive Portal included in the wireless LAN solution shall allow a customizable look & feel.
2.11	The Guest management solution shall allow, at least, following authentication methods: Username & Password Access Code Simple Term & Condition acceptance
2.12	The Guest management solution shall allow non-IT staff (e.g., a receptionist) to create temporary guest accounts.
2.13	For a multisite deployment scenario, the WLAN solution shall allow guest self-registration and employee sponsored access.
2.14	The licensing model of the Guest management solution shall be based on the number of devices.

2.15	The Guest management solution shall allow setting a validity period for an authenticated device, in order to avoid entering credentials each time a guest access the network.
2.16	The WLAN solution shall implement strict guests traffic isolation.
2.17	The WLAN solution shall support BYOD and be able to provide device onboarding that is as simple as possible and without requiring additional third party components.
2.18	The on-boarding process of employee devices shall be based on employee corporate accounts.
2.19	The BYOD application shall allow setting the validity period for the device, and the maximum number of devices per account.
2.20	The licensing model of the BYOD application shall be based on the number of on-boarded devices.

3. RF Management

3.1	The WLAN solution shall allow automatic and/or manual RF management (channel and power).
3.2	The WLAN solution shall support Short Guard Interval.
3.3	The WLAN solution shall be smart enough to guide a new client to the optimal band/channel (2.4GHz/5GHz) considering, at a given time, both the number of associated clients on each band, and the medium utilization.
3.4	If no band/channel (2.4GHz/5GHz) is overloaded (high medium utilization) or crowded (high client count), an AP shall by default guide a new client to the 5GHz band.
3.5	Even if the 5GHz band is not overloaded but is crowded (high client count), an AP shall guide a new client to the 2.4GHz band.
3.6	If a band/channel (2.4GHz/5GHz) is overloaded (high medium utilization) and even if it is not crowded, an AP shall guide a new client to the less loaded band/channel.
3.7	If all bands/channels (2.4GHz/5GHz) are overloaded (high medium utilization) and no band/channel is crowded, an AP shall guide a new client to the 5GHz band.
3.8	If all bands/channels (2.4GHz/5GHz) are overloaded (high medium utilization) and the 5GHz is crowded, an AP shall guide a new client to the 2.4GHz band.
3.9	When a new client discovers multiple APs to associate to, the new client shall be guided to the AP that has the fewest associated clients, thus allowing smart/dynamic load balancing.
3.10	The WLAN solution shall deny connection to an AP when the signal of the client becomes too weak and disconnect a client when the signal becomes too weak.
3.11	The WLAN solution shall propose APs that have the ability to scan the air in order to provide interfering/rogue APs and wireless attacks detection, and shall not rely on dedicated scanning equipment.

3.12	The scanning function of the APs shall not impact active voice or video calls (SIP and H.323).

4. Intrusion Detection and Prevention

4.1	The WLAN solution have WIDS/WIPS capabilities with no additional and dedicated equipment nor additional license.
4.2	The WLAN solution shall be able to identify Interfering APs.
4.3	The WLAN solution shall be able to identify and contain Rogue APs.
4.4	The WLAN solution shall allow the definition of flexible policies to classify an AP as a Rogue AP.
4.5	The WLAN solution shall allow the definition of flexible AP attacks detection policies.
4.6	The WLAN solution shall allow the definition of flexible client attacks detection policies.
4.7	The WLAN solution shall be able to blacklist a WLAN client, either manually or automatically after a client attack has been detected.
4.8	The WLAN solution shall allow to configure a blacklist duration.
4.9	The WLAN solution shall allow to configure an authentication failure times threshold.

5. Quality of Service

5.1	The WLAN solution shall offer WLAN Access Points that shall support fine-tuned Quality of Service (QoS) allowing following actions based on the identity of the connecting user: ACL based (source/destination IP address and TCP/UDP ports) permit/deny decision QoS priority marking and queuing
5.2	The wireless LAN solution shall comply with the 802.11e WMM standard and shall allow for custom QoS tag (802.1p/DSCP) to WMM queue mapping.
5.3	The WLAN solution shall have traffic Deep Packet Inspection (DPI) capabilities allowing an administrator to take control of applications (even if they all run on top of the HTTP or HTTPs protocols), including not only blocking applications, but also allowing to prioritize and rate-limit applications.
5.4	The wireless LAN solution shall be able to define and guarantee bandwidth based on the SSID. It shall also be to define and guarantee bandwidth based on the user/device role.
5.5	The WLAN solution shall allow to set the maximum number of clients per band/radio and per AP for a specific SSID.

5.6	The wireless LAN solution shall propose broadcast traffic optimization mechanisms (including Broadcast filtering and Broadcast/Multicast Key rotation).
5.7	Leveraging its IGMP snooping capabilities, the wireless LAN solution shall be able to optimize multicast traffic by converting multicast traffic to unicast traffic.
5.8	For a multisite deployment scenario, Multicast optimization shall stop on high load.
5.9	The wireless LAN solution shall propose the WMM Automatic Power Save delivery (APSD) feature to allow clients conserve battery life.
5.10	The wireless LAN solution shall by default identify Voice and Video (SIP and H323) calls and provide appropriate treatment.

6. Mobility

6.1	The WLAN solution shall support Layer 2 roaming capabilities across APs with no special client-side software required.
6.2	The WLAN solution shall support Layer 3 roaming across APs with no special client side software required.
6.3	The WLAN solution shall support both Opportunistic Key Caching (802.11k).
6.4	The WLAN solution shall comply to the 802.11r standard.

7. Management

7.1	The wireless LAN solution shall propose a centralized management function based on an embedded and secure WEB GUI, irrespective of the deployment model.
7.2	The proposed solution should be premise based and not cloud based
7.3	If the centralized management function requires the deployment of a dedicated application, this one shall be in the form of a Virtual Appliance that can be installed on top of any of following hypervisors: VMware ESXi, Microsoft HyperV and Oracle VirtualBox.
7.4	Centralized management function shall be able to handle wired equipment (switches) management for a “unified management” approach.
7.5	The WLAN solution shall be able to automatically discover new APs added to the network.
7.6	WLAN solution shall be able to blacklist a WLAN client, either manually or automatically after a client attack has been detected.
7.7	The centralized management function shall allow to display the physical topology of the network.
7.8	The centralized management function shall allow per equipment configuration and software backup and restore, and bulk backup and restore.

7.9	The centralized management function shall allow access to all wIPS/wIDS features.
7.10	The centralized management function shall offer, on the basis of an application signature file, insight at application layer (e.g. facebook.com, youtube.com, salesforce.com…) even if the applications run on top of the HTTP or HTTPs protocols. It shall also allow control of those applications.
7.11	The centralized management function shall allow to display the Wi-Fi coverage quality within a given area ("Heat Map").
7.12	The centralized management function shall allow, before deployment, to determine optimal placement of Access Points (APs) in a location (RF Planning).
7.13	The centralized management function shall be collocated with the Guest and BYOD management applications.

4.26 Non-IT Requirements, Specifications & Office Interior Spaces

Selected bidder would be required to design and implement Command Centre at Haridwar comprising of

a. Control Room with Video wall, Operator Workstations, Desktops etc.. as specified in other sections of this RFP
b. Local Server Room
c. Meeting Rooms and Cabins as per design

Bidder will also be required to supply and install office furniture to building being constructed by department at Rishikesh. MSI will be responsible to move following items from existing Haridwar Mela Control Room and install the same at Rishikesh Control Room:

a) Existing 4 displays
b) Network Racks
c) Network Switches

The selected bidder should adhere to the specifications given below for Non-IT components for new setup at Haridwar:

General Standards:

The HKICCC interiors shall be state of the art adhering to the various best practices norms for integrated control centres, including:

• Development of ergonomic reports for the HKICCC covering Human Factors Engineering (HFE), ISO9241 (Ergonomic requirements for office work with visual display terminals - VDTs) and ISO11064 (Ergonomic Design of Control Centres)

• The proposed interior for Control Room at Haridwar shall be as per Industry Standard with Fire Rated Partitions with necessary Acoustics but the consoles should meet control room norms, including but not limited to:

- ASTM E84 or equivalent fire norms (For Consoles Only)

- High scratch resistant surfaces (For Consoles Only),
- Seismic zone compliance, and Green Guard passed Desk for ensuring safe environment for operators. (For Consoles Only)

Civil and Architectural Work

Bidder shall obtain prior approvals from DSCL on drawings for envisaged HKICCC layout. DSCL would recommend the rooms, cabins, control center and any other area as per requirement of DSCL.

False Ceiling:

Metal false ceiling with powder coated 0.5mm thick hot dipped galvanised steel tiles 595 x 595 mm with regular edge (10mm) suitable for 25mm grid supported on suitable powder coated galvanised steel grid as per manufacturer specification. The same shall be inclusive of cut outs for lighting, AC grills, Fire detectors, nozzles, etc.

Minimum 12 mm thick fire line Gypsum false ceiling and lighting troughs 300 mm as per design including 100 mm high cornices as lighting pelmets on G.I. frame work, in G.I. vertical supports at every 450mm c/c and horizontal runners at every 900mm c/c self-taping metal screws to proper line and level. The same shall be inclusive of making holes and required framing for fixing electrical fixtures, A.C. grills etc. GI vertical supports to be anchored to slab by means of anchor fasteners.

Furniture and Fixture:

Workstation size of min. 18" depth made with 1.5mm thick laminate of standard make over 18mm thick commercial board complete with wooden beading including cutting holes & fixing of cable manager etc. complete with polish. Edges shall be factory post-formed. The desk shall have the necessary drawers, keyboard trays, cabinets etc. along with sliding / opening as per approved design with quality drawer slides, hinges, locks etc. All workstations, cabins should be as per industry best practices and standards.

Providing & making of storage unit with 18 mm thick MDF board along with 1.5 mm approved laminate colour outside and 2 coat of enamel paint inside the storage of size 1'6"x1'6"x2'4". The same should be provided with all the required accessories including the handle, lock, sliding channel and necessary hardware, etc. complete with polish

An enclosure for gas cylinder of Shutters and Partitions along with wooden support and 18 mm thick MDF board along with 1.5 mm approved laminate colour outside and 2 coat of enamel paint inside the shutter. The same should be provided with all the required accessories including the handle, lock, loaded hinges, tower bolt and necessary hardware etc. complete with French polish.

Partitions (wherever required as per approved below Specifications & drawing)

Full height partition wall of 125 mm thick fire line gyp-board partition using 12.5 mm thick double fire line gyp-board on both sides with GI steel metal vertical stud frame of size min. 75 mm fixed in the floor and ceiling channels of 75 mm wide to provide a strong

partition. Glass wool insulation inside shall be provided as required. Fixing is by self-tapping screw with vertical studs being at 610 mm intervals. The same should be inclusive of making cut-outs for switch board, sockets, grill etc. It shall also include preparing the surface smoothly and all as per manufacture's specification etc. finally finishing with one coat of approved brand of fire resistant coating. Glazing including the framework of 4" x 2" powder coated aluminium section complete (in areas like partition between server room & other auxiliary areas).

Fire Rated Wire Glass minimum 6 mm thick for all glazing in the partition wall complete. (External windows not included in this). All doors should be minimum 1200 mm (4 ft.) wide.

Flooring (wherever required as per approved drawing)

MSI shall procure and install a raised floor to match the floor height and room aesthetic in accordance with the approved final layout and design. MSI shall consider standard parameters for developing the final height, width, point of load, and uniform distribution load of the raised floor for the rooms based on type of furniture and overall load.

MSI shall ensure the following features and parameters are considered while designing and commissioning the raised floor:

1. Point of Load (PoL) shall be considered 20% more than the actual load
2. Uniform Distribution Load shall be calculated according to the final Point of Load
3. Noise-proof, Fireproof
4. Maintenance window for easy access to under the raised floor
5. Separate electrical and data cable tray under the raised floor
6. Face of floor tiles shall conform to the aesthetic part of the approved design
7. MSI shall perform load test and noise test of the constructed raised floor.

The MSI shall complete the following requirements for the raised flooring panels:

- Floor shall be designed for standard load conforming to BIS 875-1987.
- Panels shall be made up of 18-gauge steel of 600 mm × 600 mm size treated for corrosion and coated with epoxy conductive paint (minimum thickness 50 Micron).
- Raised flooring covering shall be antistatic, high- pressure laminate, two (2) mm thick in approved shade and color with PVC trim edge. It shall not make any noise while walking on it or moving equipment. Load and stress tests on floor panels shall be performed as part of acceptance testing.

Air Conditioning and Natural Convection

Painting

Provide and apply Fire retardant paint of pre-approved make and shade to give an even shade over a primer coat as per manufacturers' recommendations after applying painting putty to level and plumb and finishing with 2 coats of fire retardant paint. Base coating

shall be as per manufacturer's recommendation for coverage of paint, For all vertical Plain surface and fire line gyp-board ceiling.

Use approved fire retardant coating on all vertical surfaces, furniture etc. as per manufacturer's specification.

PVC conduit:

The conduits for all systems shall be high impact rigid PVC heavy-duty type and shall comply with I.E.E regulations for non- metallic conduit 1.6 mm thick as per IS 9537/1983. All sections of conduit and relevant boxes shall be properly cleaned and glued using appropriate epoxy resin glue and the proper connecting pieces, like conduit fittings such as Mild Steel and should be so installed that they can remain accessible for existing cable or the installing of the additional cables.

No conduit less than 20mm external diameter shall be used. Conduit runs shall be so arranged that the cables connected to separate main circuits shall be enclosed in separate conduits, and that all lead and return wire of each circuit shall be run to the same circuit.

All conduits shall be smooth in bore, true in size and all ends where conduits are cut shall be carefully made true and all sharp edges trimmed. All joints between lengths of conduit or between conduit and fittings boxes shall be pushed firmly together and glued properly.

Wiring

PVC insulated copper conductor cable shall be used for sub circuit runs from the distribution boards to the points and shall be pulled into conduits. Looping system of wring shall be used, wires shall not be jointed. No reduction of strands is permitted at terminations.

Wherever wiring is run through trunking or raceways, the wires emerging from individual distributions shall be bunched together with cable straps at required regular intervals. Identification ferrules indication the circuit and D.B. number shall be where required

Where, single phase circuits are supplied from a three phase and a neutral distribution board, no conduit shall contain wiring fed from more than one phase in any one room in the premises, where all or part of the electrical load consists of lights, fans and/or other single phase current consuming devices, all shall be connected to the same phase of the supply.

Circuits fed from distinct sources of supply or from different distribution boards or M.C.B.s shall not be bunched in one conduit. In large areas and other situations where the load is divided between two or three phases, no two single-phase switches connected to difference phase shall be mounted within two meters of each other.

All splicing shall be done by means of terminal blocks or connectors and no twisting connection between conductors shall be allowed. Metal clad sockets shall be of die cast non-corroding zinc alloy and deeply recessed contact tubes. Visible scraping type earth terminal shall be provided. Socket shall have push on protective cap.

Balancing of circuits in three phases installed shall be arranged before installation is taken up. Unless otherwise specified not more than ten light points shall be grouped on one circuit and the load per circuit shall not exceed 1000 watts.

Cable Work

Cable ducts should be of such dimension that the cables laid in it do not touch one another. If found necessary the cable shall be fixed with clamps on the walls of the duct. Cables shall be laid on the walls/on the trays as required using suitable clamping/ fixing arrangement as required. Cables shall be neatly arranged on the trays in such manner that a criss-crossing is avoided and final take off to switch gear is easily facilitated. Cable shall be laid as per the IS standard

All cables will be identified close to their termination point by cable number as per circuit schedule. Cable numbers should be properly punched. For trip circuit identification additional red ferrules are to be used only in the switch gear / control panels, cables shall be supported so as to prevent appreciable sagging. In general distance between supports shall not be greater than 600mm for horizontal run and 750mm for vertical run.

Each section of the rising mains shall be provided with suitable wall straps so that same the can be mounted on the wall.

Whenever the rising mains pass through the floor they shall be provided with a built-in fire proof barrier so that this barrier restricts the spread of fire through the rising mains from one section to the other adjacent section.

Neoprene rubber gaskets shall be provided between the covers

and channel to satisfy the operating conditions imposed by temperature weathering, durability etc.

Necessary earthling arrangement shall be made alongside the rising mains enclosure by Mean of a GI strip of adequate size bolted to each section and shall be earthed at both ends. The rising mains enclosure shall be bolted type.

The space between data and power cabling should be as per standards and there should not be any criss-cross wiring of the two, in order to avoid any interference, or corruption of data.

Fire Detection and Control Mechanism

Fire can have disastrous consequences and affect operations of a Control Room. It is required that there is early-detection of fire for effective functioning of the Control Room. The facility shall be equipped with adequate and advanced Analogue Addressable Fire Detection and Suppression system (Clean Agent Based). The system shall raise an alarm in the event of smoke detection. The system shall have proper signage, response indicators and hooters in case of an emergency. The system shall be based as per NFPA standards.

- Should proactively alert incase there is a possibility of a electrical fire (short circuit or over current)
- The system should have the capability to integrate with different makes of fire alarm systems in the DCs and provide the alarms generated by the system on the centralized Dashboard.
- The system should be able to plan and process a proper evacuation plan incase of fire
- Trigger Audio and Visual alarm
- Switching ON of lights on the evacuation pathway.

Rodent Repellent System

The entry of Rodents and other unwanted pests shall be controlled using non-chemical, nontoxic devices. Ultrasonic pest repellents shall be provided in the false flooring and ceiling to repel the pests without killing them. However MSI shall conduct periodic pest control using chemical spray once in a quarter as a contingency measure to effectively fight pests.

Access Control System

The Access Control System shall be deployed with the objective of allowing entry and exit to and from the premises to authorized personnel only. The system deployed shall be based on Biometric Technology. An access control system consisting of a central PC, intelligent controllers, power supplies and all associated accessories is required to make a fully operational on line access control system. Access control shall be provided for doors. These doors shall be provided with electric locks, and shall operate on fail-safe principle. The lock shall remain unlocked in the event of a fire alarm or in the event of a power failure. The fire alarm supplier shall make potential free contacts available for releasing the locks in a fire condition especially for staircase and main doors. Entry to the restricted area shall be by showing a proximity card near the reader and exit shall be using a push button installed in the secure area. The system shall monitor the status of the doors through magnetic reed contacts. The system should be designed and implemented to provide following functionality:

#	**Description**
1.	Controlled Entries to defined access points
2.	Controlled exits from defined access points
3.	Controlled entries and exits for visitors
4.	Configurable system for user defined access policy for each access point
5.	Record, report and archive each and every activity (permission granted and / or rejected) for each access point.
6.	User defined reporting and log formats
7.	Fail safe operation in case of no-power condition and abnormal condition such as fire, theft, intrusion, loss of access control, etc.
8.	Day, Date, Time and duration based access rights should be user configurable for each access point and for each user.

	One user can have different policy / access rights for different access points.

DG Set

Sl no	Parameter	Minimum Specifications
1.	General	Auto Starting DG Set Mounted on a common based frame with AVM (Anti-Vibration) pads, residential silencer with exhaust piping, complete conforming to ISO 8528 specifications and CPCB certified for emissions. KVA rating as per the requirement.
2.	Capacity	200 KVA
3.	Fuel	High Speed Diesel (HSD) With 30 Ltr. Tank Capacity or better. It should be sufficient and suitable for containing fuel for 12 hours continuous operation, Complete with level indicator, fuel inlet and outlet, air vent, drain plug, inlet arrangement for direct filling and set of fuel hoses for inlet and return.
4.	Power Factor	0.8
5.	Engine	Engine should support electric auto start, water cooled, multi cylinder, maximum 1500 rpm with electronic/manual governor and electrical starting arrangement complete with battery, 4 stroke multiple cylinders/single and diesel operated conforming to BS 5514/ ISO 3046/ IS 10002
6.	Alternator	Self-exciting, self-regulating type alternator rated at 0.8 PF or better, 415 Volts, 3 Phase, 4 wires, 50 cycles/sec, 1500 RPM, conforming to IS 4722/ BS 5000, Windings of 100% Copper, class H insulation, Protection as per IP 23.
7.	AMF (Auto Main Failure) Panel	AMF Panel fitted inside the enclosure, with the following meters/indicators: ▪ Incoming and outgoing voltage ▪ Current in all phases ▪ Frequency ▪ KVA and power factor ▪ Time indication for hours/ minutes of operation ▪ Fuel Level in field tank, low fuel indication ▪ Emergency Stop button ▪ Auto/Manual/Test selector switch ▪ MCCB/Circuit breaker for short-circuit and overload protection ▪ Control Fuses ▪ Earth Terminal ▪ Any other switch, instrument, relay etc. essential for Automatic functioning of DG set with AMF panel

Sl no	Parameter	Minimum Specifications
8.	Acoustic Enclosure	The DG set shall be provided with acoustic enclosure / canopy to reduce the sound level and to house the entire DG set (Engine & Alternator set) assembly outside (open-air). The enclosure shall be weather resistant powder coated, with insulation designed to meet latest MOEF/CPCB norms for DG sets, capable to withstand local climate. The enclosure shall have ventilation system, doors for easy access for maintenance, secure locking arrangement.
9.	Output Frequency	50 HZ
10.	Tolerance	+/- 5% as defined in BSS-649-1958
11.	Indicators	Over speed /under speed/High water temperature/low lube oil etc.
12.	Intake system	Naturally Aspirated
13.	Certifications	ISO 9001/9002, relevant BS and IS standard

4.27 Network Backbone and Internet Connectivity

DSCL will come up with another RFP to provide the Bandwidth requirement. MSI needs to work with the network provider and integrate all the points at field and at DC, Haridwar, DICCC at ITDA. MSI shall recommend tentative bandwidth requirement in their technical bid.

4.28 Solar Panels for Field Hardware

Solar panels with Rackmount Dual Source (Solar & AC) and DC Integrated Power Supply with Battery Back-Up

This Power Supply is required to provide 24x7 high quality, regulated, uninterruptible primary & backup power to communication & Security camera System. It should be fault tolerant, multifunction, with DC power supply with built-in battery back-up and other accessories within a rackmount chassis with AC voltage correction function.

It must be a precision regulated power supply/charger, back-up battery, low voltage battery disconnect, LCD/LED status, pre-wired and calibrated within the unit for plug-and-play operation. Plug-in terminals should be provided for installation of additional/external batteries for increased back-up capacity.

It should be online topology with Zero transfer time in case of AC mains interruption. Batteries should be recharged when sunlight is available or when AC is restored. It should come with a manual battery disconnect switch which can allow internal or external battery service or replacement while the system is running.

It should support following Features

- Double (Grid AC & Solar) Input.
- It should clean raw input mains/generator power prior to feeding it to load.
- Automatic low voltage and manual battery disconnect.
- Rackmount Unit
- AC Input circuit breaker
- Automatic Identification of System Voltage level
- Intelligent PWM charging mode
- Battery Low Voltage Disconnect
- Battery Reverse Connection Protection
- Battery reverse-discharge protection
- Settable Operating mode of Load
- Adjustable charge-discharge control parameters
- Over current protection
- True Sine Wave Double-Conversion
- Input power factor correction
- Output power factor 0.9
- Wide input voltage range
- Converter mode available
- Generator compatible
- Adjustable charging current
- Emergency power off function
- Hot-swappable battery design
- USB communication port
- RS-232 communication port
- SNMP intelligent slot
- AC Input Range:110-300 VAC
- Frequency: 50/60 Hz± 20% (Auto Sensing)
- AC Output: 220/230/240 V ± 1%, Pure Sine Wave
- Solar Input : 12/24/36/48 VDC Selectable
- DC Output: 12 VDC
- Solar Module Capacity: Approx 600 Wp
- Back up Approx 2 Hr (24 Ah x 2 Nos Lithium Ion Batteries)
- Temperature Rating: -10° to + 60° C

4.29 Variable Message Display Board

VMD Boards are desired with External Audio. Bidders should supply and install the audio devices along with VMD Boards.

4.29.1 Functional Requirement for VMD

1	**Make**
2	**Model**
3	**System Requirements**
a.	The system should be capable to display warnings, traffic advice, route guidance and emergency messages to motorists from the ICCC in real time.
b.	The VMD should display text and graphic messages using Light Emitting Diode (LED) arrays.
c.	The System should able to display failure status of any LED at HKICCC and DICCC at ITDA.
d.	The System should support Display characters in true type fonts and adjustable based on the Operating system requirement.
e.	The VMD workstation at the HKICCC should communicate with the VMD controller through the network. It should send out command data to the variable message display controller and to confirm normal operation of the signboard. In return, the VMD workstation should receive status data from the VMD controller.
f.	VMD controllers should continuously monitor the operation of the VMD via the provided communication network.
g.	Operating status of the variable message display should be checked periodically from the HKICCC.
h.	It shall be capable of setting an individual VMD or group of VMD's to display either one of the pre-set messages or symbols entered into the computer via the control computer keyboard or by another means.
i.	It shall be capable of being programmed to display an individual message to a VMD or a group of VMD's at a pre-set date and time.
j.	A sequence of a minimum of 10 messages/pictures/ pre-decided sign or group of signs shall be possible to assign for individual VMD or group of VMD's.
4	**Variable Message Displays (VMD) application**
a.	Central Control Software allows controlling multiple VMD from one console.
b.	Capable of programming to display all types of Message/ advertisement.

	The system should have capability to divide VMD screen into multi-parts to display diverse form of information like video, text, still images, advertisements, weather info, city info etc.
c.	Capable of controlling and displaying messages on VMD boards as individual/ group.
d.	Capable of controlling and displaying multiple font types with flexible size and picture sizes suitable as per the size of the VMD.
e.	Capable of controlling brightness & contrast through software.
f.	Capable to continuously monitor the operation of the Variable Message Display board, implemented control commands and communicate information to the HKICCC via communication network.
g.	Configurable scheduler on date/day of week basis for transmitting pre-programmed message to any VMD unit.

4.29.2 Technical Requirement for VMD

#	Parameters	Minimum Specification
1	**Make**	
2	**Model**	
3	Display Size (W x H)	Minimum 1.92 m x 0.96 m or bigger
4	Pixel Pitch	8 mm or better (Lower pitch is regarded as better)
5	LED Configuration	RGB 3 in 1 SMD
6	Pixel Density	Minimum 10,000 pixels per sqm or higher
7	Half Gain Horizontal / Vertical Viewing Angle	H 140 deg / V 90 deg or better
8	Refresh Rate	>960 Hz or better
9	Temp Range	-20 to +50 Degrees C or better
10	Gray Scale Processing	12 Bit or better
11	Brightness (Calibrated)	5000 cd/m² or better
12	Maximum Power Consumption	925 w/sqm or lower

13	Dimming Capability	256 levels
14	Power Input	100 ~ 240 VAC
15	Individual Tile/Cabinet Dimensions	960 mm (W) x 960 mm (H) x 141±2 mm (D)
16	Contrast Ratio	1500:1 or better
17	Access For Maintenance	Rear
18	IP Level	Front IP65 / Rear IP54
20	Pre-Qualification Criteria for OEM	The OEM/OEM Indian subsidiary/OEM Group Company of the Outdoor Direct View LED display should have minimum 200 Outdoor LED displays installed (similar or bigger size) in India all of which are connected to a single network and controlled centrally with content also being published centrally on all the displays, OEM should be present in India for at least last 5 years with their own registered & service centre managed by their own engineers.
21	Quality/Health & Safety/Environmental Certifications of OEM/OEM subsidiary in India (Copy to be submitted along with the bid	Quality Management System 9001:2015 ,
		Occupation health & Safety Management System - OHSAS 18001:2007,
		Environmental Management System 14001: 2015
22	LED package vendor acceptable makes(certificate from the LED package vendor to be provided during the supply certifying the same)	Cree/Nichia/Nationstar or equivalent

23	International Safety Certifications (Mandatory to submit along with the bid)	• CE certification for Compliance to CE Under Standards: EN 55022:2010 + AC:2011 Class A, EN 55024:2010+A1:2015, EN 61000-3-2:2014, EN 61000-3-3:2013, AS/NZS CISPR 22:2009+A1:2010 • UL Listed for Compliance to UL Standard for Safety: UL 60950-1 & CAN/CSA C22.2 No. 60950-1-07- Information Technology Equipment-Safety-Part 1: General Requirements • FCC Certification for Compliance to FCC For Electro Magnetic Emission which may not cause harmful interference, and must not accept any interference received Under Standard : FCC CFR Title 47 Part 15 Subpart B: 2015 Class A, CISPR 22:2008, ANSI C63.4:2014, ICES-003 Issue 6:2016 : Class A • BIS Registration (Bureau Of Indian Standards) As per Standard : IS 13252(PART 1) :2010 • CB Certification for Compliance to CB Standard for Safety : EN 60950-1:2006/A11:2009/A1:2010/A12:2011/A2:2013, IEC 60950-1(ed.2), IEC-1(ed.2);am1, IEC 60950-1(ed.2);am2
Rack Frame Power Distribution Unit for Variable Message Display (VMD) System		
23	Front Door	2 Hinges with Rack & Aircon bolted
24	Wall Mount Clamp	Welded on Rack frame rear side
25	19" pillar front & 19" pillar rear	Bolted on rack side wall
26	Locking Arrangement	To be provided with a locking system
27	Limit Switch	The rack door to be provided with a limit switch
28	Earth	Earth studs should be provided in the rack for earth purposes
29	Cable points	Cable entry and exit points should be provided in the rack

30	Mounting	Should be possible to mount the rack either on a pole or on a wall with options of different mounting types
31	Rack Internal size	13U 19" rack
32	Material	GI 120 gsm thickness 1.5 mm
33	IP rating	IP54
34	AC input	380V/220V
35	AC Power Load Min.	35KW
36	AC power Load Min. Each output	3KW
37	Surge protection	Class C
38	Over temperature protection	Selectable from 30 deg to 60 deg C
39	Remote Control	Power Distribution Unit can be controlled from remote location over IP
LED Controller for Variable Message Display (VMD) System		
40	Control Port	RS232
41	Signal Input	DVI with resolution capability of 1920 x 1200 or better
42	Signal Output	RJ45
43	Maximum Load Capacity	2.3 Million Pixels
44	Input Voltage	100~240 VAC
45	Operating Temperature	5~40 Deg C
Media Player for Variable Message Display (VMD) System		
46	Media Player with built in Playout software	Of reputed manufacturers
47	Processor	Intel/Other High End
48	OS	Windows based
49	Internal drive	60 GB Solid State Drive
50	Output	HDMI/Display Port for Graphics

51	Operating System Video	At least should support MPEG-4, WMV, QuickTime
52	Audio	MP3, WAV
53	Image	JPEG, PNG, BMP, GIF
54	Text	Multiple fonts, Speeds, colours, animations
55	Internet	HTML, XML Files, RSS newsfeeds
56	Others Video Zones	1 or more
57	Network	Ethernet 1000/100/10 (RJ45) and WIFI
Mechanical Structure For Mounting Of Variable Message Display (VMD) System		
58	Mounting Structure	VMD should be mounted on unipole/bipole. Structure should be earthed properly and provided with lightning arrestor as well.
59	Material	Should be made from mild steel and painted black along with antirust coating.
Communication Interface Device for Variable Message Display (VMD) System		
68	Ethernet Interface	
i	Number of Ports	One 8 pin RJ45
ii	Speed	10/100 Mbps, auto MDI/MDIX
69	Serial Interface	
i	Number of Ports	One
ii	Serial Standards	RS-232 on DB 9 connector
70	Serial Communication Parameters	
i	Data Bits	5, 6, 7, 8
ii	Stop Bits	1, 1.5, 2
iii	Parity	None, Even, Odd, Space, Mark
iv	Flow Control	RTS/CTS and DTR/DSR (RS-232 only), XON/XOFF
v	Baudrate	110 bps to 230.4 kbps
71	Serial Signals	
i	RS-232	TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND

72	Software	
i	Network Protocols	ICMP, IPv4, TCP, UDP, DHCP, BOOTP, Telnet, DNS, SNMP V1, ARP, HTTP, SMTP
ii	Configuration Options	Web Console, Serial Console, Telnet Console, Windows Utility
73	Physical Characteristics	
i	Housing	Metal
ii	Weight	340 g or less
iii	Dimensions	With ears: 75.2 x 80 x 22 mm
74	Environmental	
i	Operating Temperature	0 to 55°C
ii	Ambient Relative Humidity	5 to 95% (non-condensing)
75	Power Requirements	
i	Input Voltage	12 to 48 VDC
ii	Input Current	128.7 mA @ 12 VDC
76	Certifications	
i	Safety	UL 60950-1
ii	EMC	EN 55022/24
Outdoor Cabinet Air Conditioner for Variable Message Display (VMD) System		
77	Power Supply	230VAC ±15% 50Hz/60Hz
78	Working Temperature Range	-40 to + 55 deg C
79	Max Noise Level	60dB(A)
80	IP Grade	IP55
81	Weight	< 16 Kg
82	Refrigerant	R134a for harsh conditions
83	Dimensions	550 x 320 x 175 mm(Hx WXD)
84	CE & ROHS Compliant	Yes

85	Surface treatment	Outdoor type power coating
86	Cooling Capacity	500W@L35/L35
87	Power Consumption	210W@L35/L35
88	Power Supply	230±15% AV 50/60 Hz
89	Internal Airflow	120 m^3/h
90	Maximum Noise Level	60dB(A)
91	Display Panel	Should be provided with a display panel to show parameters like cabinet temperature, indications for - cooling, running of external fans, flashing on alarm
92	Anti-theft design	The mounting of the AC should have an anti-theft design
93	Communication from AC	AC should be able to send diagnostic communication to remote location over IP
Network Switch for Variable Message Display (VMD) System		
94	Switching Capacity	1 Gbps
95	No. of ports	5
96	Power Supply	DC 5 V / 0.55 A
97	Casing	Plastic
98	Maximum Packet Forwarding Rate	148.8 kpps
99	802.3x flow control	yes
100	Auto MDI/MDIX	yes
Router for Variable Message Display (VMD) System		
101	Parameter	
I	Uplink	1*LTE module (dual SIM), 1*RJ45 FE (configurable)
Ii	LAN-RJ45	3(4)*RJ45 FE
Iii	LAN-Wi-Fi	11n 2T2R
Iv	Mgmt. Port	1*RJ12 RS232 (Console)
V	Log Storage	1*USB 2.0

Vi	Cellular Band2	LTE: 800/900/1800/2100/2300/2600 MHz,UMTS: 850/900/1900/2100 MHz, GPRS/EDGE: 850/900/1800/1900 MHz
Vii	Antenna	2*5dBi detachable ant.(WiFi), 2*3dBi detachable ant. (3G/4G)
viii	Power Source	Dual DC 9V ~ 48V
102	WAN Functions	
i	WAN	Multiple WANs, Failover / Load Balance,
		Configurable Ethernet/4G
ii	Cellular	2G/3G/LTE, IP Pass-through
iii	Ethernet	Dynamic IP, Static IP, PPPoE, PPTP, L2TP
iv	IPv6	Dual Stack, 6-in-4, 6-to-4
103	Basic Functions	
i	Ethernet	LAN IP, Subnet Mask
ii	WiFi System	802.11n 2T2R MIMO 300Mbps (2.4GHz)
iii	WiFi Operation	AP Router, WDS, WDS Hybrid Modes
iv	WiFi Security	WEP, WPA,WPA2, WPA-PSK, WPA2-PSK, 802.1x
v	VLAN	Port-based, Tag-based
vi	NAT	Virtual Server/Computer, DMZ Host, PPTP/L2TP/IPSec Pass-Through
vii	Routing	Static, Dynamic: RIP1/RIP2, OSPF, BGP
viii	QoS	Policy-based Bandwidth Control and Packet Flow Prioritization
ix	Redundancy	VRRP
104	Object Definition	
i	Scheduling	Time Schedule List
ii	Grouping	Host Grouping List
iii	External Server	Email, Syslog, RADIUS, SCEP, FTP
iv	Certificate	My Certificate, Trusted Certificate, Issue Certificate
v	Security	
vi	VPN Tunneling	IPSec, OpenVPN, PPTP, L2TP, GRE;

		Tunneling with Full Tunnel, Tunnel Failover
vii	VPN Scenario	Site to Site, Site to Host, Host to Site, Host to Host, Hub and Spoke, Dynamic VPN
viii	VPN Capability	IPSec: up to 16 tunnels
ix	Firewall	SPI Firewall with Stealth Mode, IPS
x	Access Control	Packet Filter, URL Blocking, MAC Filter
xi	Authentication	Captive Portal
105	Service	
i	Cellular Toolkit	SMS, Data Usage, SIM PIN, USSD, Network Scan
ii	Event Handling	Managing / Nofigying Events;
		SMS, Syslog, SNMP Trap, Email Alert, Reboot
106	Administration	
i	Configure & Management	Web, Telnet CLI, Command Script, TR-069, SNMPv3 standard & AMIT MIB
ii	System Operation	MMI, System Information, System Time, System Log, Backup & Restore,
		Reboot & Reset
iii	FTP	FTP Server, User Account
iv	Diagnostic	Packet Analyzer, Diagnostic Tools
v	Dimension	
vi	Device (L x W x H)	187x110x31mm (w/o mounting kit)
		225x110x39mm (with mounting kit)
107	Environment	
i	Operation Temp.	-20℃ ~ 60 ℃
ii	Storage Temp.	-40℃ ~ 85 ℃
iii	Humidity	10% ~ 95% (non-condensing)
Content Management Server with Software for Variable Message Display (VMD) System		
108	Signage & Content Manager (Software & Hardware)	To be able to create playlists and send them over the network to 100 media players or more for playout based on schedule and sequencing. This software to be loaded on suitable hardware to be supplied by the vendor

109	License support	The license of the software should support management of more than 200 video walls
110	Playlist Automation	Flexible scheduling based on day, date and time; Playlist Scheduling; Emergency Override
111	Content Distribution	Scalable, simultaneous publishing, at least 100 simultaneous subscribers
112	Content Management	Design simplified user interfaces
Auto Brightness Sensor for Variable Message Display (VMD) System		
113	Rated voltage	5V
114	Operating temperature	-30℃~70℃
115	Operating humidity	0~99%
116	Brightness range	0~65535 lux
117	Cable	5m
118	Features	Monitor the ambient brightness to achieve automatic brightness adjustment of LED display
		Asynchronous
		Outdoor use proofing
		No external power supply required

4.30 Solid Waste Management Solution

4.30.1 Overview

Haridwar Municipal Corporation is responsible for collection, segregation, transportation, dumping and processing of the city waste from door to door.

Waste is transferred from primary collection vehicles into secondary collection vehicles for dumping at Waste Processing plant. HMC has field staff responsible for street sweeping and collection of street waste and dumping to the nearest bins.

Currently, managing people responsible for the activity and proper utilization of assets/resources assigned to them has become a complex job for HMC. The main problems of existing solid waste collection process are:

a) Lack of information about collection time and area.
b) Lack of proper system for monitoring, tracking collection & transportation

vehicles

c) Physical visit required to verify employee performance

d) Transfer of waste from primary collection to secondary collection is vehicle transfer and improper co-ordination leads to missed trips and garbage piling.

e) Lack of quick response to urgent cases like truck accident, breakdown, long time idling, etc.

DSCL intends to implement a RF/QR Code based and GPS enabled Solid Waste Management System practices within the Haridwar Kumbh Area for:

a) Waste collection, tracking and monitoring,

b) GIS Mapping with Entity Type

c) RFID Tags/QR Code for bins at Primary Collection Source, waste tracking and monitoring. Primary objective of the project is to track location of waste pickup at each waste collection source bins and tipper vehicles movement.

d) Option to capture pictorial evidence with GPS Location and issue notification for each pickup.

e) Placing RFID tags/QR Code on each Dustbins from where waste need to be picked up.

f) Option for Route Creation over the Map

g) Route assignment/roaster management for route scheduling and assignment

h) Manage routes and vehicles dynamically through an automated system.

i) Route optimization which shall help in reduction of trip time, fuel saving and serving more locations

j) Reduce human intervention in monitoring process

k) Determine the Route Violation if any

l) Record & maintain history of vehicle routes, attended sites/missed sites/bins and other details

m) Reporting of vehicles, garbage collected and other SWM details to higher authorities from any location at any time

n) Monitor and track activities of field staff on daily basis

o) Real time management of missed garbage collection points

p) Ensure complete coverage of door to door and community collections

q) Option to send verification SMS/notification to registered mobile number for each household and collect response.

4.30.2 Project Intent

The ICT enabled solid waste management component will provide a transparent and comprehensive mechanism to monitor & manage the solid waste management process across the Kumbh Area. Under this component, existing vehicles deployed for collection of solid waste will be fitted with GPS devices for vehicle tracking and Smart Phones to read the QR Code tagged community bins. QR Code tags will be installed on community bins. QR Code will be installed at each dustbin in Kumbh Area and associated field staff

collecting the solid waste will be provided with Smart phones. Smart Phones will be deployed to manage the workforce deployed for solid waste collection.

The field staff collecting the solid waste should capture evidence of pickup and notify the user on Mobile App/SMS and DSCL/Haridwar MC should be able to track daily/monthly collection status/report thorough Mobile App.

4.30.3 Scope of Work

Solution should use latest GPS, QR Code, Biometric system and sensor based technology for real time tracking and monitoring of operational vehicles at garbage collection process throughout city. It should enable ease and transparency in operation of collection municipal solid waste.

Provide end-to-end ICT solution to implement and provide support services & maintenance.

a) Implementation of "Waste Collection Monitoring System"

- Supply and installation QR Code and Smart Phones.
- Design and integrate Bin Tracking and Monitoring System
- Registration of Each Bin for Master Data

b) MSI should provide Automatic Vehicle Locator solution to vehicles to track the complete traverse path round the clock with any state of movement or non-movement

c) MSI should provide GPS and Pictorial based attendance management system to the staff

d) MSI should install surveillance cameras at bulk waste generation/ collection points.

e) MSI shall provide an MIS system which shall be capable of recording details of daily waste collection, waste processed and waste disposed in terms of tonnage. Solution shall be automated with a computerized weigh bridge. Data from the weigh bridge shall be transmitted online to ICCC.

f) Integrating data feed from waste disposal site (Existing data feed access would be provided by Haridwar MC) like feeds from CCTV camera and Data from Weigh Bridge

g) Sizing of hardware, software required in DC/DR for using the Integrated SWM.

h) Supply & Installation of hardware (servers), software and network devices required in DC/DR for using the Integrated SWM.

i) Design, Development, Supply, and Deployment & Implementation of Web Based Application software integrated with GPS, RFID devices, QR Codes & Vehicle Tracking Management System (VTMS) and complaint management modules.

j) Mobile Apps for both Android & iOS for Citizens for complaint and Door to Door Solution and also integrate with Citizen App

k) Maintenance of RFID devices and other provided hardware and after warranty period including the replacement of devices in case of damage, new vehicle or any other change.

l) Maintenance of web based application/mobile apps for Integrated SWM, during

and after warranty for a period of 1 year.

m) Real time management of missed garbage transfer

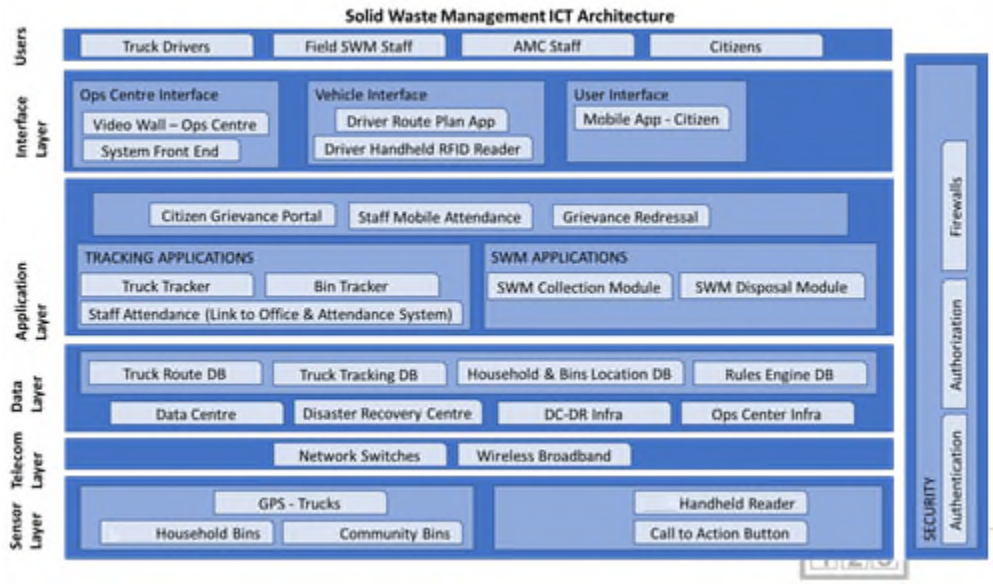
n) Daily report of Door-Door Collection efficiency combined with complaints raised by Public

o) Monitoring & Reporting Application - reports of vehicles, garbage collection status, bin status etc.

p) Provide resources for support, maintenance and administration of the system.

q) Integration of ISWM with City Operation Command Centre

r) Provide training to DSCL resources for operating the SWM system.



4.30.4 Mandatory H/W for Real time monitoring of Solid Waste Collection Process

- All garbage collecting & transferring vehicles need to be fitted with GPS devices and RFID Reader, Smart Phones for reading QR Code. GPS device must be capable to accept the data from such readers and transfer on command center/servers
- All the vehicles will also be fitted with RFID Tag as well
- QR Code on Bin Collection Points
- All Community Bins / Container Bins need to be fitted with Level Sensors and communication module for data transfer.
- RFID Readers at strategic location such as Key Entry/Exit Points, Parking Areas, Waste Transfer Stations, Regional/Zonal Offices, Weighbridges, Dump Site and Waste Recycling Plants (to be identified later, 2 locations considered for now)
- Automated Weighing Scales needs to be fitted and integrated with RFID Readers
- Biometric attendance software on existing devices of supervisor staff have to be given.

- All STP and road sweeping vehicle should have GPS device fitted into it.

Bidders are suggested to refer the detailed Commercial Bid format and BoM for the bill or material to be considered.

4.30.5 Functional Specifications

Automated Vehicle Tracking Management System

a) GPS tracking of waste pick up vehicle for real time tracking

b) System should help in co-ordination between primary and secondary collection vehicles for transferring dump

c) Route Optimization will help in reduction of trip time, fuel saving and serving more locations

d) System should ensure that complete coverage of door to door and community collections served by vehicles

e) Record history of vehicle routes, attended sites and other details

f) Monitoring & Reporting Application - reports of vehicles.

g) Ensure complete coverage of door to door and community collections served by vehicles

h) Alert / Alarm management for Ignition/Over speed/Power Cut and tempering

i) Solution should be integrated into the GIS map

Mobile GPS based Staff Attendance Management System

GPS based device like smart phone or any hand held terminal having biometric capture function shall enable AMC's field staff to register their attendance/presence throughout the day. Existing smart phone devices with the staff shall be used. MSI is not required to supply any mobile devices. System shall periodically track location (with time stamping) of staff through their GPS based mobile device and shall map it in the system with pre-defined area coordinates. Device shall feed data through GPRS/GSM network to the city operation command centre central application for reporting generation and alerts. The system should provide:

a) Mobile device/Smart Phones shall be provided to Staff who are doing activities like door-door collection via Pushcarts / Tricycle / street sweeping

b) Provide ability to the staff to update job completion reports along with pictures.

c) Pictures should be stored on historical mode in the GIS Map for a period of 1 Month.

d) Solution should be integrated into the GIS map

e) Solution should be able to mark route attended by staff along with allocated route

Mobile Application for Customers

MSI should integrate Citizen app provided to citizens/public which will help them raise complaint for following:

a) Garbage Pile on the roads
b) Missed Garbage Collection at residential, commercial, industrial and other areas
c) Crowd sourcing application for compliant registration and grievances
d) Request for Garbage Collection
e) Other issues like Street Sweeping and Blocked Nala/nali etc

Unified Dashboard View for Solid Waste Management

a) A unified view should show the primary and secondary collection.
b) Included all vehicles tracked via AVL or Mobile based.
c) Collection Percentage achieved daily – co-relating with the final dumping process
d) Co-relation with the complaints raised / Area, along with photographic evidence
e) System should be capable of providing missed collection
f) System should be capable of marking areas where waste is generated or high to low basis
g) System should be capable of showing only a single selected process for a particular area
h) System should be capable of showing complaints raised by citizen tagged to a particular location.
i) System should be capable of showing CCTV footages from bulk waste generation points and inside the waste treatment plant on the GIS map
j) Unified view should be capable of being integrated with other departments
k) Unified View goal will be to improve waste collection efficiency using the field infrastructure deployed
l) Any other reports aiding to perform the same shall be in scope of MSI.

Infrastructure Solution - Field Devices

MSI shall be responsible for the supply, installation & commissioning of following field equipment's as per technical specifications mentioned in the RFP document:

a) GPS Tracking System with all fittings & fixtures in all the vehicles
b) GPS based mobile attendance management software.
c) CCTV Cameras at Waste Processing Site and at bulk waste generation points
d) QR Code at bins, RFID tags on collection vehicles
e) Automated Weigh bridge

The solution should have below mentioned indicative functional requirements. However detailed functional requirement will have to be prepared by MSI after award of project by carrying out a detail requirement gathering with MC and other line departments.

<table>
<tr><td colspan="2">Common Functional Requirements</td></tr>
<tr><td colspan="2">Dashboard:</td></tr>
<tr><td colspan="2">Dashboard Module should give a quick and easy view to know overall fleet status on real time basis. It should display status information of all vehicles i.e. Running, Idle or Standby. Dashboard view should provide following information:

▪ For each department, separate authentication based vehicle tracking module.
▪ Within department section, there shall be an aggregated view of all department specific vehicles, its location, movement and other real-time details shall be available.
▪ There should be a facility to club area specific and category specific vehicles in groups.
▪ Zone name, Ward Name, Vehicle No, Vehicle Type, Current Location & Last Updated Date & Time of each vehicle.
▪ It should give alert message if GPS device gets disconnected from a vehicle.
▪ Dashboard should have search parameter where different searches i.e. Vehicle Number wise, Zone & Ward wise, running / idle / standby vehicle wise and “No communication” wise searches can be done.
▪ Running Km and Idle KM Related parameters also required on daily basis
▪ It should also give an indication regarding running speed of vehicle i.e. Normal speed, Alarming speed and above Alarming speed.
▪ There should be a provision to see route followed by a vehicle on a GIS map.</td></tr>
<tr><td colspan="2">Map Based Analysis:</td></tr>
<tr><td>Integration with:

▪ GIS
▪ Vehicle Tracking System</td><td>Functionality:

▪ Creating buffers along emergency site & working site.
▪ Creating & sending alerts in case SUB’s reach particular level for vehicle movement, which can be shown on the map</td></tr>
<tr><td colspan="2">Functional Requirements – SWM:</td></tr>
<tr><td colspan="2">Area Details:</td></tr>
<tr><td colspan="2">▪ Area information (Zone / Ward / Colony / Society)
▪ Population details
▪ Volume of Solid waste which includes Wet & Dry waste (recycled & non-recycled)
▪ Resources required
▪ Collection procedure (i.e. Primary: House to House & Secondary: Community Bin to Garbage transport centre or mix)</td></tr>
<tr><td colspan="2">Garbage Collection Scheduling:</td></tr>
</table>

Integration with: ▪ GIS ▪ Vehicle Tracking System	Functionality: ▪ Assign SWM Vehicles to pick-up Garbage. Category wise assignment like A: Highly in demand, B: Medium, C: Low Demand. ▪ Assignment of dynamic routes using vehicle initial route and bins attended. ▪ Location-wise assignment of Sanitation Staff ▪ Scheduling of garbage collection and cleaning activities with the objective of maximizing citizen friendliness and optimum use of resources.
Primary Garbage Collection & Disposal:	
Integration with: ▪ Weigh Bridge	Functionality: Record volume of garbage collected/disposed on daily basis.
Integration with: ▪ Vehicle Tracking System	Functionality: Keeping certain Checks as per environmental regulations, like minimum frequency of lifting garbage etc
Management Information System (MIS):	
▪ Monitor deployment of pickup trucks & personnel based on schedule originally drawn. ▪ Info on use of Transfer Stations / Quantity of garbage received ▪ Door to door collection, ward wise / Dashboard for all activities ▪ Reports of Ward Wise Weight Reports. / Any other custom report as per department	

4.30.6 Technical Specifications

GPS System

Item	Minimum Requirement Description	Compliance (Yes/No)
GPS Receiver	Minimum 16 channels	
GPS re-acquisition functionality	Cold start <= 42 Sec, Warm Start < 35 sec, Hot Start <= 2 Sec	
GPS Tracking Sensitivity	-165 dBmtyp	
GPS Velocity Accuracy	< 0.01 m/sec	

GPS Navigation Sensitivity	-148 dBmtyp	
GPS Navigation Update	1 Second	
GPS Data Format	Support WGS – 84	
GSM/GPRS Band	GSM/GPRS SMT quad band and UMTS (3G)	
GSM/GPRS Network Support	Support all GSM Network	
Data Acquisition and Transmission	Data packets shall have configurable fields - Unit ID, Latitude, Longitude, Speed, Time Stamp, Orientation, GPS fix, Alert Status.	
Data Acquisition and Transmission	Shall be configurable for Data Transmission at varying minimum time intervals of few seconds and minutes to a central computer application	
Data Acquisition and Transmission	Shall support GPS data storage atleast 10000 logs (based on string size) during non GPRS coverage area and forward the same when GPRS coverage is available. Shall be capable of storing 150 or more route geofences with facility to update route geofence master in the device over the air	
Data Acquisition and Transmission	Shall transmit data in SMS mode when GPRS is not available	
Micro Controller Module support for Interface	16 bit RISC architecture based Micro Controller system for interface with various sub systems	
Antennas	Built -in GPS and GSM Antenna.	
Audio Interface	16 Watts Audio Amplifiers 4 Loud Speaker (4 Watts each)	
Power Supply	Power Supply input support 7 V to 32 V DC battery and shall be powered by vehicle battery and not ignition	
Internal Battery Back Up	6-8 hours backup	
Environment	Shall be heat resistant, dust resistant and water / rain splash resistant, dustproof, shock proof and tamper proof. Shall have at	

	least IP65 or higher protection classification Operate between 0°C to +55 °C	
Status LEDs	Power, GPS, GSM, VMU Status	
Alerts & Notifications	Shall be programmed to provide Alerts on power supply disconnect, speed violation, device tampering etc.	
Configuration	Shall support Over The Air (OTA) firmware upgrade and shall be remotely configured for the required GSM Service Provider, Server IP connection, GPS data Update Interval etc.	
Packaging & Accessories	Dimensions: 121mm (L) x 102mm (W) x 30mm (H) with power supply cable	
Rating	22 tracking / 66 acquisition minimum	
General Requirement	GPS tracking device should have adequate intelligence and programmability to run custom edge applications and analytics on the edge device.	
General Requirement	GPS tracking device should have embedded storage and compute and should offer SDK/API for custom tools and application portability into the same.	
Device I/O	GPS tracking device should have minimum 3 digital input and One Analog input and One input for SOS	
RFID TAG		
Item	Minimum Requirement Description	Compliance (Yes/No)/Page No
Type	ABS, High Quality Engineering Plastic	
Supported Transponders	ISO18000-6C EPC Class 1 GEN2	
Frequency Range	ISM 865~928 MHz	
Operation Mode	Fixed Frequency or FHSS Software Programmable	

Memory capacity	Tag shall support ISO18000-6C protocol standard 2K Bits storage capacity, 1728 Bits (216bytes) writable user area; MR6730B metal supports EPC C1 GEN2 (ISO18000-6C), with 96Bits writable EPC Code area, 512Bits writable user area, and 32Bits password area, EPC 128 bit user 512 bit TID 96 bits.	
Reading Rate	Software Programmable, Average Reading per 64 Bits < 10ms	
Tags material	Metal material	
Reading Range	Shall be able to be calibrated (to be kept as 4 - 6 m max) based on the site visit	
Operation Temp	0°C to 60°C	
IP Classification	IP 68	
Weather	Heat, dust proof, UV resistant & sea water resistant	
Chemical Resistance	No physical or performance changes in -168 hour Motor oil exposure 168 hour Salt water exposure (salinity 10%) 5 hrs Sulfuric acid (10 %Ph 2) 1 h Naoh (10 % Ph 14) exposure	

AVLS System

Item	Minimum Requirement Description	Compliance (Yes/No)/Page No
General Requirement	Each vehicle, using the GPS vehicle tracking (VTS) device, shall determine its precise location through GIS based GPS System and transmit the same to the City Operation Centre at defined intervals of time. The location shall be displayed on GIS based route maps at City Operation centre	
General Requirement	AVLS shall be able to give ETA at next bus stops in real time based on speed and	

	distance measured. System shall update ETA at each bus stop on all PIS accordingly.	
General Requirement	System shall be able to compare the actual location of the vehicle / bus, at any given time, with its scheduled location	
General Requirement	System at the control rooms shall be able to calculate the time for the vehicle / bus to reach all subsequent stops along the route, factoring in the current vehicle / bus and any deviations from the schedule and reported traffic congestion enroute	
General Requirement	Shall provide inputs/feeds to Passenger Information System (PIS) with the real-time data to be displayed at various display units and announcement systems	
General Requirement	Information elements that need to be captured and transmitted to City Operation Centre at the minimum include longitude, latitude, and physical location enroute with date and time stamps, vehicle / bus number, route number, and Driver ID, etc.	
General Requirement	Shall provide these data on real time basis at pre-determined and configurable intervals (10 seconds) over GPRS/GSM network	
General Requirement	Tracking of vehicle / buses that deviate from the scheduled route based on definition of permitted geographic regions of operation	
General Requirement	Vehicle Fleet Summary Dashboard – Quick view on vehicle fleet performance	
General Requirement	Register a vehicle / bus on unscheduled route from backend on real time basis	
General Requirement	Application must have the functioning fort planning/scheduling/Rostering/Dispatching of any Bus using Software	

General Requirement	Option should be there on Driver Console to accept the route assigned by dispatch manager at which bus has to ply	
General Requirement	Real Time ETA based Trip Management showing trips in progress/completed trips and scheduled trip and Missed Stoppage Details etc	
General Requirement	Fare Collection Summary for Each Bus and Stoppage wise for the day	
General Requirement	Exception Recording/ Actions (Over-Speeding, Harsh Acceleration, Harsh Braking, Off-route Detection, unscheduled stoppage, Non-Stoppage at Bus stops/collection points, Trip Cancellation).	
General Requirement	Real-time Running Trip Line diagram of vehicle / buses on a particular route, for headway detection.	
General Requirement	Auto headway detection and notification.	
General Requirement	Applications Software shall have a facility to define the Masters.	
General Requirement	New routes shall be created in the application.	
General Requirement	Business rules engine for fare stages, fare structures, various routes etc. shall be configurable.	
General Requirement	Facility shall be provided to collate the transactional data received from Depots and Bus Stations. The transaction data shall be uploaded once every day for the previous day.	
General Requirement	Officials shall be able to access the application as per the pre-defined roles and responsibilities	
General Requirement	Application shall provide facility to query the data and generate the customized reports as per the requirements.	

General Requirement	System shall display the contact details of the bus driver / conductor so that the operation centre staff can communicate with them directly.	
General Requirement	Operation Centre operator shall be able to drill down to the exact location of the event by clicking on the alert and see the position of event drawn over the map along with driver, vehicle and standard description of event details related to the business rule.	
General Requirement	The system be able to integrate with the City IOP/City Operations Platform with all the available data like Location, route information, Vehicle telemetry information, Speed etc.	
General Requirement	The system should allow programmability, allowing actions to be triggered based on events. e.g. speed metric can trigger API call to GIS Maps pulling speed limit on the road based on GPS or GTFS location.	
General Requirement	The platform should offer an Application builder for developing custom Applications as needed and should support an Interactive Development Environment that can facilitate in-house expertise to develop widgets and create API extensions	

QR Code

Sr. No.	Item	Minimum Requirement Description	Compliance (Yes/No)
QR.001	Video Compression & Resolution	Encode atleast 7,089 numerals with its maximum version being 40 (177 x 177 modules).	

Bin Sensor			
Sr.No.	Parameter	Indicative Requirement Description	Compliance (YES/NO)
1	Enclosure	Polypropylene	
2	Shape & Dimension	Cubical shape with max size of 100mmX80mmX50mm Or Mushroom shaped with max diameter of 100 mm & height	
3	Weight	Up to 450 gm	
4	Enclosure Protection	IP 67	
5		-20 C to + 80 C	
6	Power Supply	High performance battery	
7	Battery Life time	Approximately 5 years	
8	Built In Modem	GSM modem/shield for 2G or 3 G communication	
9	Level Sensor	Ultrasonic sensor with IP rating	
10	Range	0.2 meter to 4 meters	

RFID Reader			
Sr. No.	Parameter	Indicative Requirement Description	Compliance (Yes / No)
1	Dimensions	Length: 300 mm (11.82 in); Width: 300 mm (11.82 in) Thickness: 75 mm (2.96 in)	
2	Weight	2 Kg or lesser	
3	Read Range	13 meters with DogBone tags from Smartrac (FCC version)	
4	Protocol	ISO18000-6C, EPC UHF Class 1 Gen 2, Dense Reader Mode available (Class 3 Gen 2 compliant)	
5	Frequency Range	One of the following: 865-868 MHz, 865-867 MHz, 902-928 MHz, 922-928 MHz, 920-925 MHz, 915-922 MHz	
6	Polarization	Circular Polarization Antenna, choice of LHCP or RHCP	
7	External Control	2 x GPO and 2 x GPI	
8	Environment	Operating Temp: -20°C to 60°C (-4°F to 131°F) Storage Temp: -40°C to 85°C (-40°F	

		to 185°F) Humidity: 98% Non-condensing	
9	Dust & Water	IP 68, Should work in outdoor environment	
10	Shock	MIL-STD-810F Method 516.5 Procedure V, 75g, 6ms, 2 shocks per axis	
11	Vibration	MIL-STD-810F Method 514.5 Category 24	
12	Mechanical Impact Resistance	Free falling ball impacting test: 500 g weight of ball in 1 meter height	
13	Connectivity	Ethernet	
14	Power Supply	DC supply (12 V, 2.5 A), or use POE+ (IEEE802.3at)	

4.31 IP based Public Announcement System

4.31.1 Specifications for IP Based Paging Server

S. No.	Specifications
1	The IP Paging Server shall enable users, through a single IP phone extension, to access multiple zones
2	The IP Paging Server should also support bell scheduling in a VoIP network and connect to legacy analog overhead paging systems
3	The SIP Paging Server should support to be paged directly through SIP phones
4	A second IP extension should support to be configured as a Night Ringer, playing a user- uploadable audio file
5	The Paging Server should have built in bell scheduler that enables, through a secure web interface, scheduled notifications to be sent to different multicast zones and legacy analog paging systems
6	The Paging Server should support up to 25 stored message and 25 individual bells which are user uploadable from day one
7	The SIP Paging Server should have easy-to-use web-based configuration, should provide a graphical user interface to set up to 100 paging zones for IP paging with unique multicast address and port number combinations
8	The SIP Paging Server should connect via a single CAT 5 or 6 network cable to a standard PoE 802.3af compliant switch
9	Inbuilt Bell Scheduler should provide up to 25 “bells”
10	User should be able to do individual zone wise or group paging using a SIP Paging Server from any SIP Phone or from Soft phone on Android, IOS Mobile or from PC/Laptop on same network from day one using a voice router

11	Should provide 25 user uploadable stored messages
12	Should provide Paging through SIP phones
13	Should provide Voice prompting and password controlled zones
14	Should be SIP RFC 3261 compatible
15	Should provide NTP-based internal clock
16	Should provide Multicast output
17	Should provide Two SIP endpoints (one for Night Ringer)
18	Should provide DTMF control of zone selection
19	Should provide Delayed page support
20	Should provide Line-In connection for background music multicasting
21	Should provide Line-out connection to support analog amplifiers
22	Should provide User uploadable audio files
23	Should provide Web-based configuration and firmware upload
24	Should provide PoE 802.3af enabled (Power-over-Ethernet)
25	Should provide 19-inch Rack mount option
26	Should provide minimum 1 Ethernet interface - 10/100 Mbps
27	Should provide Power Input PoE 802.3af or 48VDC
28	Payload Types G711, A-law and μ-law, G.722
29	Page Port Output Balanced 600 Ohm 5VPP
30	Line In Input Signal Amplitudes 2.0 VPP maximum
31	Line In Input Impedance 10k Ohm
32	Line Out Output Signal Amplitudes 2.0 VPP maximum
33	Line Out Output Level +2dBm nominal
34	Line Out Total Harmonic Distortion 0.5% maximum
35	Line Out Output Impedance 10k Ohm

36	The IP Paging server, the Outdoor Horn speaker and indoor wall speaker should be of same make

4.31.2 IP Based Outdoor Horn Speakers

S. No.	Specifications
1	SIP-based IP66, Outdoor overhead paging system for loud areas
2	Up to 9 user-stored messages
3	SIP Enhanced interoperability for hosted environments
4	Support for security code access for SIP paging
5	Auto-provisioning via HTTPS
6	HTTPS web based configuration
7	Support for G.711, G.722, G.729 codecs
8	802.11q VLAN tagging
9	Configurable event generation for device health and status monitoring
10	9 user-uploadable page messages
11	IP66-rated
12	Sealed network cable gland
13	SIP and Simultaneous Multicast
14	Page from Polycom phones
15	Dual-speed ethernet 10/100 Mbps
16	Web-based configuration
17	PoE 802.3at and 802.3af-enabled
18	User-uploadable tones and messages
19	Digital volume control
20	Second SIP endpoint "Night Ringer"
21	Auto-provisioning

22	HTTP Command Interface
23	10 channel prioritized Multicast ports
24	Built-in diagnostics
25	Delayed page support
26	Ethernet interface - 10/100 Mbps
27	Protocol SIP RFC 3261 Compatible
28	Power Input PoE 802.3at or 802.3af
29	Audio Output 802.3af - SPL 114 dB @ 1 meter and 802.3at - SPL 117 dB @ 1 meter
30	Payload Types G.711 a-law, G.711 μ-law, G.722, G.729
31	Payload Types G.711 a-law, G.711 μ-law, G.722, G.729
32	User should be able to do individual zone wise or group paging using SIP Paging Server or Dial directly from any SIP Phone or from Soft phone on Android, IOS Mobile or from PC/Laptop on same network from day one using a voice router
33	The IP Paging server, the Outdoor Horn speaker and indoor wall speaker should be of same make

4.31.3 IP Based Multicast Microphone

S. No.	Specifications
1	The Multicast Microphone allows the user, while pressing the “Page” button, to broadcast a live or buffered announcements directly to VoIP audio endpoints that support Multicast
2	Multicast Transmit
3	Compatible with endpoints that receive multicast
4	Delayed page support (up to 60 seconds)
5	Web-based configuration and firmware upload
6	Auto provision support
7	PoE 802.3af enabled (Power-over-Ethernet)
8	G711 codec

9	12-inch flexible shaft microphone
10	Desktop Design
11	Wall mountable
12	Ethernet interface 10/100 Mbps
13	Equipped with Multicast protocol
14	Power Input PoE 802.3af compliant or +8 to +12VDC @ 1000mA Regulated Power Supply
15	Payload Types G711, A-law and μ-law

4.31.4 SIP Based Voice Router

S. No.	Specifications
1	The SIP Based Voice router should be readily equipped with 300 SIP user licenses, expandable upto 500 SIP user licenses on the same hardware
2	The Voice router should have inbult voice recordings
3	The Voice router should be capable to configure SIP Phones, SIP Soft phones on smart phones/ Mobiles for mobility and on PC/Laptops on same network or outside network using public IP
4	It should be readily equipped with G.729, G.711 Codec, H.264
5	It should be 19" rack mountable

4.32 QR Codes for Toilets

Bidders are required to supply QR Codes for Toilets being established as part of Kumbh 2021. Toilets would be installed by other agency, bidder needs to supply the QR Codes to the Toilet Implementation Agency, so that QR Code can be installed by Toilet Implementation Agency along with Toilet installation. Function of QR Codes would be for feedback system by Citizens and/or by Kumbh field staff. Once QR Code is scanned, it should open Portal for feedback and to register any complaint by the Citizen/field staff. Feedback shall be integrated with HKICCC.

4.33 Dismantling, transportation and re-installation of Infrastructure

The MSI shall be responsible for dismantling the temporary infrastructure of field locations for Kumbh Mela 2021 to other locations within Haridwar, transportation to the site identified by client or its designated agencies and re-installation at other identified sites covered under Haridwar City. The MSI shall be expected to share a strategy for execution of dismantling works and their reinstallation with minimum damage as part of their approach and methodology document submitted in technical bid. Bidder shall

consider 10% of devices (Cameras & VMD) to be relocated along with associated field hardware.

5 Bill of Material

5.1 Bill of Material Guidelines

Following table shows the suggested Bill of material. Quantity for certain material will depend on various factors and hence following process shall be followed for bid evaluation and payments:

a) Bidder's Solutions: Items like Servers, Security software for servers, UPS Capacity for Haridwar Server Room. Bidder shall recommend the quantity required for its solution (as per requirement specified in bid) in their technical bid by giving detailed BoM. In case quantity of these items increases due to increase in Stakeholder requirement, the unit price quoted shall be used for future change requests as required. Quantity for such items is shown as 'As required'
b) Site Layout and Conditions like Poles, Edge Server for AI, Junction Box, Field UPS (with capacity), Network Switch Ruggedized, Cabling, WiFi Access Points. Suggestive quantity of these items has been shown in the BoM below, payment shall be made as per actual consumption. Bidder to do survey and submit the report to committee for approval to procure these items as per requirement. Bid evaluation will be as per quantity defined in BoM as per RFP. Quantity for such items has been fixed in the BoM
c) Stake holder's Requirement (Area for ICCC, AI Licenses, Workstations). Bid evaluation will be as per quantity defined in BoM as per RFP. However in case this requirement increases or decreases, bidder shall follow change management process and obtain necessary approvals. Quantity for such items has been fixed in the BoM

5.2 Detailed Bill of Material

SI	Items	UoM	Qty for RFP
	Data Center		
1	Integrated Command and Control software and associated solution	Lot	1
2	Firewall for Haridwar	Nos.	2
3	Access Switch	Nos.	2
4	TOR/Distribution Switch	Nos.	2
5	End Point Detection and Response	Lot	1
6	EMS	Lot	1
7	Endpoint Security	Lot	1

8	Blade Chassis (Quantity as per Bidder Solution)	Nos.	As Required
9	Non-GPU Servers (Quantity as per Bidder Solution)	Nos.	
10	Storage (1PB)	Nos.	
11	GPU Servers (Quantity as per Bidder Solution)	Nos.	As Required
12	SAN Switch	Nos.	2
13	Video Wall, Controller and Management Software - 5x2	Lot	1
14	VMS and Video Analytics Master Software	Lot	1
15	VMS License	Cameras	900
16	Artificial Intelligence Software License for use cases as per RFP	Nos	200
17	Mobile Incident Reporting Licenses for devices	Nos	50
18	Non IT (Site Preparation at Haridwar)		
a	Site Preparation Cost (Civil & Interiors)	Sq.ft.	2,000
b	Site Preparation Cost (Electrical)	Sq.ft.	2,000
c	Site Preparation Cost (IBMS)	Sq.ft.	2,000
d	Site Preparation Cost (Passive)	Sq.ft.	2,000
e	Site Preparation Cost (HVAC)	Sq.ft.	2,000
19	Officer Furniture and Revolving Chair for Rishikesh ICCC	Nos	20
20	UPS for Server Room at Haridwar	Nos.	2
21	Diesel Genset 150 KW for Haridwar	Nos.	1
22	HIPS License	Lot	1
23	Tape Library with 2 Cleaning Cartridges	Nos.	1
24	LTO-8 Tapes	Nos.	20
25	Backup Software	Lot	1
26	Required OS and DB licenses	Lot	1
27	42 U Racks for Haridwar DC with accessories and interrack cabling	Nos	2
	Field Equipment		
1	Field Junction Box	Nos.	200
2	Camera Poles along with Foundation, Earthing & Lighting Protector	Nos.	200
3	UPS - 1 KVA	Nos.	200
4	Solar Panels	Nos.	50
5	Network Switch Ruggedized	Nos.	200
6	LAN Cabling at Field Location	Meter	5,000
7	Power Cabling at Field Location	Meter	5,000
8	Underground Cable Laying (as per site condition)	Meter	2,000
9	Road Cutting and Repairing	Meter	500
10	Surge Protection Device	Nos.	200
	ICCC and Helpdesk		
1	Workstation with 3 Monitors	Nos.	5

2	Desktop for Help Desk and Video Monitoring (30 for Haridwar, 20 for Rishikesh)	Nos.	50
3	Multifunctional Device	Nos.	2
4	IP Phones	Nos	5
5	Head Set	Nos	5
6	Soft telephone	Nos	5
7	Installation and Program Management charges	Lot	1
	Surveillance System		
1	Bullet Cameras + IR Illuminator	No.	875
2	Outdoor PTZ Camera + IR Illuminator	No.	25
	Variable Message Sign		
1	VMS board including VMS controller	No.	20
2	UPS (required capacity)	No.	20
3	Mounting structures with pole and Junction Box	No.	20
4	Speakers and Associated System for VMD	No.	20
	Wi-Fi		
1	Access Point	Nos	50
2	Wi-fi Management/Controller	Lot	As Required
	City Portal		
1	Enterprise GIS	Lot	1
	Solid Waste Management		
1	RFID Reader (With Controller) for Vehicles	Nos	20
2	QR Code for Bins (Primary Collection)	Nos	1,000
3	QR Code for Toilets	Nos	30,000
4	RFID Tags for Community Bins	Nos	80
5	Application Server Supply &Installation for data centre hosting	Lot	As Required
6	Database Server Supply & Installation for data centre hosting	Lot	As Required
7	RDBMS Supply & Installation for data centre hosting	Lot	As Required
8	Bin Level Sensors (Community Bins)	No	80
9	Solution Cost including License cost if any	Lot	1
10	GPS Devices (for Dumping Vehicles)	Nos	20
11	Citizens' App Development & integration Cost	Lot	1
12	Biometric Face Recognition Device	Nos	15
13	Windshield RFID tag for Dumping Vehicles	Nos	20
14	Weigh Bridge Controller	Nos	1
15	Outdoor PTZ Camera + IR Illuminator	Nos	2
16	RFID reader at weigh bridge, Parking area	Nos	2
	IP based Public Announcement System		

1	IP PA System	Nos	75
	Disaster Recovery		
1	DR as a service with 50 % Capacity of DC	Lot	1
	Manpower		
1	Total Manpower for 1 year	Lot	1

6 Project Governance and Change Management

6.1 Project Management and Governance

6.1.1 Project Management Office (PMO)

A Project Management office will be set up during the start of the project. The PMO will, at the minimum, include a designated full time Project Manager from MSI. It will also include key persons from other relevant stakeholders including members of DSCL and other officials/representatives by invitation. The operational aspects of the PMO need to be handled by MSI including maintaining weekly statuses, minutes of the meetings, weekly/monthly/project plans, etc.

PMO will meet formally on a weekly basis covering, at a minimum, the following agenda items:

i. Project Progress

ii. Delays, if any – Reasons thereof and ways to make-up lost time

iii. Issues and concerns

iv. Performance and SLA compliance reports;

v. Unresolved and escalated issues;

vi. Project risks and their proposed mitigation plan

vii. Discussion on submitted deliverable

viii. Timelines and anticipated delay in deliverable if any

ix. Any other issues that either party wishes to add to the agenda.

During the development and implementation phase, there may be a need for more frequent meetings and the agenda would also include:

i. Module development status

ii. Testing results

iii. IT infrastructure procurement and deployment status

iv. Status of setting up/procuring of the Helpdesk, DC hosting

v. Any other issues that either party wishes to add to the agenda.

Bidder shall recommend PMO structure for the project implementation phase and operations and maintenance phase.

6.1.2 Helpdesk and Facilities Management Services

MSI shall be required to establish the helpdesk and provide facilities management services to support the DSCL and stakeholder department officials in performing their day- to-day functions related to this system.

MSI shall setup a central helpdesk dedicated (i.e. on premise) for the Project. This helpdesk would be operational upon implementation of the Project. Providing helpdesk/support services from a shared facility of any other party/provider is not permitted.

Functional requirements of the helpdesk management system, fully integrated with the enterprise monitoring and network management system. The system will be accessed by the stakeholder department officials for raising their incidents and logging calls for support. The detailed service levels and response time, which MSI is required to maintain for provisioning of the FMS services are described in the Service Level Agreement of this Tender.

MSI shall deploy Manpower during implementation and O&M phases. The deployed resource shall report to DSCL's Project In-charge for Smart City Project and work closely with Program Management Office of the project. Refer to Section "Manpower Deployment" for minimum resources required to be deployed in the Project, however MSI may deploy additional resources based on the need of the Project and to meet the defined SLAs in this RFP:

Note: Numbers provided for staff providing 24*7 support is excluding relievers.

6.1.3 Steering Committee

- The Steering Committee will consist of senior stakeholders from DSCL, its nominated agencies and MSI. MSI will nominate its representative to be a part of the Project Steering Committee
- MSI shall participate in monthly Steering Committee meetings and update Steering Committee on Project progress, Risk parameters (if any), Resource deployment and plan, immediate tasks, and any obstacles in project. The Steering committee meeting will be a forum for seeking and getting approval for project decisions on major changes etc.
- All relevant records of proceedings of Steering Committee should be maintained, updated, tracked and shared with the Steering Committee and Project Management Office by MSI.
- During the development and implementation phase of the project, it is expected that there will be at least fortnightly Steering Committee meetings. During the O&M phase, the meetings will be held at least once a quarter.
- Other than the planned meetings, in exceptional cases, DSCL may call for a Steering Committee meeting with prior notice to MSI.

6.1.4 Project Monitoring and Reporting

- MSI shall circulate written progress reports at agreed intervals to DSCL and other stakeholders. Project status report shall include Progress against the Project Management Plan, status of all risks and issues, exceptions and issues along with recommended resolution etc.
- Other than the planned meetings, in exceptional cases, project status meeting may be called with prior notice to the Bidder. DSCL reserves the right to ask the bidder for the project review reports other than the standard weekly review reports.

6.1.5 Risk and Issue management

- MSI shall develop a Risk Management Plan and shall identify, analyse and evaluate the project risks, and shall develop cost effective strategies and action plans to mitigate those risks.
- MSI shall carry out a Risk Assessment and document the Risk profile of DSCL based on the risk appetite and shall prepare and share the DSCL Enterprise Risk Register. MSI shall develop an issues management procedure to identify, track, and resolve all issues confronting the project. The risk management plan and issue management procedure shall be done in consultation with DSCL.
- MSI shall monitor, report, and update the project risk profile. The risks should be discussed with DSCL and a mitigation plan be identified during the project review/status meetings. The Risk and Issue management should form an agenda for the Project Steering Committee meetings as and when required.

6.1.6 Governance procedures

- MSI shall document the agreed structures in a procedures manual.

6.1.7 Planning and Scheduling

MSI will prepare a detailed schedule and plan for the entire project covering all tasks and sub tasks required for successful execution of the project. MSI has to get the plan approved from DSCL at the start of the project and it should be updated every week to ensure tracking of the progress of the project.

The project plan should include the following:

1. The project break up into logical phases and sub-phases;
2. Activities making up the sub-phases and phases;
3. Components in each phase with milestones;
4. The milestone dates are decided by DSCL in this RFP. MSI cannot change any of the milestone completion dates. MSI can only propose the internal task deadlines while keeping the overall end dates the same. MSI may suggest improvement in project dates without changing the end dates of each activity.

5. Key milestones and deliverables along with their dates including those related to delivery and installation of hardware and software;
6. Start date and end date for each activity;
7. The dependencies among activities;
8. Resources to be assigned to each activity;
9. Dependency on DSCL

6.2 Manpower Deployment

MSI shall deploy Manpower during implementation and O&M phases. The deployed resource shall report to DSCL and work closely with Program Management Office of the project. Following are the minimum resources required to be deployed in the Project, however MSI may deploy additional resources based on the need of the Project and to meet the defined SLAs in this RFP:

Sl no	Type of Resource	Minimum Quantity	Minimum Deployment during Implementation phase	Minimum Deployment during O & M phase	Shifts during O&M
1.	Team Leader-cum-Program Manager	1	100%	100%	1 Shift (Working hours)
2.	Overall Solution Architect	1	80%	100%	1 Shift (Working hours)
3.	Command and Control Expert	1	80%	100%	1 Shift (Working hours)
4.	Database Expert	1	60%	Nil	NIL
5.	Security Expert	1	60%	Nil	NIL
6.	Systems Administrator	1	50%	100%	1 Shift (Working hours)
7.	Network Administrator	1	50%	100%	1 Shift (Working hours)
8.	GIS Expert	1	80%	100%	1 Shift (Working hours)

9.	Command Center Operators	8	0%	100%	2 in each shift with 2 relievers
10.	Project Admin Staff	3	As required	100%	1 in main shift, 1 in other shift with 1 reliever
11.	Helpdesk Operators	6	0%	100%	2 in main shift, 1 in other shifts with 2 relievers
12.	Site Engineer (for Non-IT)	3	0%	100%	1 in Day Shift, 1 in night shift, 1 reliever

DSCL reserves the right to increase or decrease the number of operators. The exact role of these personnel and their responsibilities would be defined and monitored by DSCL and respective departmental personnel. MSI shall be required to provide such manpower meeting following requirements:

a) All such manpower shall be minimum graduate pass

b) All such manpower shall be without any criminal background / record.

c) DSCL reserves the right to carry out background check of the personnel proposed on the Project for verification of criminal record, at the beginning of deployment or during deployment.

d) MSI shall have to replace any person, if not found suitable for the job.

e) All the manpower shall have to undergo training from MSI for at least 15 working days on the working of project. Training should also cover dos & don'ts and will have few sessions from DSCL officers on right approaches for monitoring the feeds & providing feedback to DSCL, and other associated government agencies.

f) Each person shall have to undergo compulsory 1 day training every month

g) Operational Manpower shall work in 3 shifts, with no person being made to see the feeds for more than 8 hours at a stretch.

Detail operational guideline document, standard operating procedure, governance and

oversight plan shall be prepared by MSI during implementation which shall specify detail responsibilities of these resources and their do's & don'ts.

The supervisors required for operationalization of the project will be provided by DSCL, as per requirements.

6.3 Change Management & Control

6.3.1 Change Orders / Alterations / Variations

a. MSI agrees that the requirements given in the Bidding Documents are minimum requirements and are only indicative. The vendor would need to etch out the details at the time of preparing the design document prior to actual implementation. It shall be the responsibility of MSI to meet all the requirements of technical specifications contained in the RFP and any upward revisions and/or additions of quantities, specifications sizes given in the Bidding Documents required to be made during execution of the works, shall not constitute a change order and shall be carried out without a change order and shall be carried out without any time and cost effect to Purchaser.

b. Further upward revisions and or additions required to make MSI's selected equipment and installation procedures to meet Bidding Documents requirements expressed and to make entire facilities safe, operable and as per specified codes and standards shall not constitute a change order and shall be carried out without any time and cost effect to Purchaser.

c. Any upward revision and/or additions consequent to errors, omissions, ambiguities, discrepancies in the Bidding Documents which MSI had not brought out to the Purchaser's notice in his bid shall not constitute a change order and such upward revisions and/or addition shall be carried out by MSI without any time and cost effect to Purchaser.

6.3.2 Change Order

a. The Change Order will be initiated only in case (i) the Purchaser directs in writing MSI to include any addition to the scope of work covered under this Contract or delete any part of the scope of the work under the Contract, (ii) MSI requests to delete any part of the work which will not adversely affect the operational capabilities of the facilities and if the deletions proposed are agreed to by the Purchaser and for which cost and time benefits shall be passed on to the Purchaser, (iii) the Purchaser directs in writing MSI to incorporate changes or additions to the technical specifications already covered in the Contract.

b. Any changes required by the Purchaser over and above the minimum requirements given in the specifications and drawings etc. included in the Bidding Documents before giving its approval to detailed design or Engineering requirements for complying with technical specifications and changes required to ensure systems compatibility and reliability for safe operation (As per codes, standards and recommended practices referred in the Bidding Documents) and trouble free operation

shall not be construed to be change in the Scope of work under the Contract.

c. Any change order comprising an alteration which involves change in the cost of the works (which sort of alteration is hereinafter called a "Variation") shall be the Subject of an amendment to the Contract by way of an increase or decrease in the schedule of Contract Prices and adjustment of the implementation schedule if any.

d. If parties agree that the Contract does not contain applicable rates or that the said rates are inappropriate or the said rates are not precisely applicable to the variation in question, then the parties shall negotiate a revision of the Contract Price which shall represent the change in cost of the works caused by the Variations. Any change order shall be duly approved by the Purchaser in writing.

e. Within ten (10) working days of receiving the comments from the Purchaser or the drawings, specification, purchase requisitions and other documents submitted by MSI for approval, MSI shall respond in writing, which item(s) of the Comments is/are potential changes(s) in the Scope of work of the RFP document covered in the Contract and shall advise a date by which change order (if applicable) will be submitted to the Purchaser.

6.4 Exit Management

a. This sets out the provisions, which will apply on expiry or termination of the Master Service Agreement, the Project Implementation, Operation and Management SLA.

b. In the case of termination of the Project Implementation and/or Operation and Management, the Parties shall agree at that time whether, and if so during what period, the provisions of this Schedule shall apply.

c. The Parties shall ensure that their respective associated entities carry out their respective obligations set out in this Exit Management Schedule.

6.4.1 Cooperation and Provision of Information

During the exit management period:

a. MSI will allow the DSCL or its nominated agency access to information reasonably required to define the then current mode of operation associated with the provision of the services to enable the DSCL to assess the existing services being delivered;

b. Promptly on reasonable request by the DSCL, MSI shall provide access to and copies of all information held or controlled by them which they have prepared or maintained in accordance with this agreement relating to any material aspect of the services (whether provided by MSI or sub-contractors appointed by MSI). The DSCL shall be entitled to copy of all such information. Such information shall include details pertaining to the services rendered and other performance data. MSI shall permit the DSCL or its nominated agencies to have reasonable access to its employees and facilities, to understand the methods of delivery of the services employed by MSI and to assist appropriate knowledge transfer.

6.4.2 Confidential Information, Security and Data

a. MSI will promptly on the commencement of the exit management period supply to the DSCL or its nominated agency the following:

- information relating to the current services rendered and customer and performance data relating to the performance of sub-contractors in relation to the services;
- documentation relating to Intellectual Property Rights;
- documentation relating to sub-contractors;
- all current and updated data as is reasonably required for purposes of DSCL or its nominated agencies transitioning the services to its Replacement MSI in a readily available format nominated by the DSCL, its nominated agency;
- all other information (including but not limited to documents, records and agreements) relating to the services reasonably necessary to enable DSCL or its nominated agencies, or its Replacement MSI to carry out due diligence in order to transition the provision of the Services to DSCL or its nominated agencies, or its Replacement MSI (as the case may be).

b. Before the expiry of the exit management period, MSI shall deliver to the DSCL or its nominated agency all new or up-dated materials from the categories set out in Schedule above and shall not retain any copies thereof, except that MSI shall be permitted to retain one copy of such materials for archival purposes only.

6.4.3 Transfer of Certain Agreements

On request by the DSCL or its nominated agency MSI shall effect such assignments, transfers, licenses and sub-licenses DSCL, or its Replacement MSI in relation to any equipment lease, maintenance or service provision agreement between MSI and third party lessors, vendors, and which are related to the services and reasonably necessary for the carrying out of replacement services by the DSCL or its nominated agency or its Replacement MSI.

6.4.4 General Obligations of MSI

a. MSI shall provide all such information as may reasonably be necessary to effect as seamless a handover as practicable in the circumstances to the DSCL or its nominated agency or its Replacement MSI and which MSI has in its possession or control at any time during the exit management period.

b. For the purposes of this Schedule, anything in the possession or control of any MSI, associated entity, or sub-contractor is deemed to be in the possession or control of MSI.

c. MSI shall commit adequate resources to comply with its obligations under this Exit Management Schedule.

6.4.5 Exit Management Plan

a. MSI shall provide the DSCL or its nominated agency with a recommended exit management plan ("Exit Management Plan") which shall deal with at least the following aspects of exit management in relation to the MSA as a whole and in relation to the Project Implementation, and the Operation and Management SLA.

- A detailed program of the transfer process that could be used in conjunction with a Replacement MSI including details of the means to be used to ensure continuing provision of the services throughout the transfer process or until the cessation of the services and of the management structure to be used during the transfer;
- plans for the communication with such of MSI's sub-contractors, staff, suppliers, customers and any related third party as are necessary to avoid any material detrimental impact on the DSCL's operations as a result of undertaking the transfer;
- (if applicable) proposed arrangements for the segregation of MSI's networks from the networks employed by DSCL and identification of specific security tasks necessary at termination;
- Plans for provision of contingent support to DSCL, and Replacement MSI for a reasonable period after transfer.

b. MSI shall re-draft the Exit Management Plan annually thereafter to ensure that it is kept relevant and up to date.

c. Each Exit Management Plan shall be presented by MSI to and approved by the DSCL or its nominated agencies.

d. The terms of payment as stated in the Terms of Payment Schedule include the costs of MSI complying with its obligations under this Schedule.

e. In the event of termination or expiry of MSA, and Project Implementation, each Party shall comply with the Exit Management Plan.

f. During the exit management period, MSI shall use its best efforts to deliver the services.

g. Payments during the Exit Management period shall be made in accordance with the Terms of Payment Schedule.

h. This Exit Management plan shall be furnished in writing to the DSCL or its nominated agencies within 90 days from the Effective Date of this Agreement.

7 Project Implementation Schedule, Deliverables and Payment Terms

7.1 Project Implementation Schedule and Deliverables Payment Schedule

T = 14 Days from Issue of LOI or LOA

Note:- All the payments against different mile stones shall be done only after the approval of respective mile stones from DSCL authorities.

Sl no	Milestones	Deliverables	Timelines (in months)
1	**Project Implementation Phase**		**T + 6 months**
1.1	Project Inception Report	Detailed site survey report including infrastructure requirement analysis, hardware deployment plan, recommended action plan to address the gaps, budget estimates for addressing the gaps uncovered during the survey, phase wise location distribution etc. Detailed Project Plan including resource deployment, Communication plan, Risk management plan, Information Security and Business Continuity, Sensitization & Training Plan, Operations management plan etc. **Bidder has to Conduct Project Orientation (approximate 4 hours duration) with all the stakeholders within 15 days of Contract Signing. Venue for the same has to be arranged by bidder.**	T + 1 months
1.2	Requirement Study • Command and Control Centre including Data Centre • Enterprise GIS • Wi-Fi • Smart Surveillance	Architecture and design for DICCC, City IT Network and Data Centre including Data Centre Architecture, Network Architecture, Security architecture etc. approval of FRS, SRS including Solution Architecture, Application Design	T + 2 months

Sl no	Milestones	Deliverables	Timelines (in months)
	• Solid Waste Management • Integration of platform with existing & under-development external Systems/ Applications as per scope	Documents (HLD & LLD) of the proposed system, HLD & LDD should be prepared by OEM Integration report for external applications also to be approved.	
1.3	**Phase I: Go-Live** **a.** Design, supply, installation, commissioning including interior civil work, hardware, system software, network equipment.	1. Site Completion/readiness Report 2. Delivery Acceptance Reports from DSCL/authorized entity 3. Installation & Commissioning Reports 4. Software Licenses details requirement	T + 3 months
1.3	**Phase II: Go-Live** • Operationalization of Command Control & Communication Centre along with DC • GIS – Supply, installation, data migration, training & operationalization of enterprise GIS system for the city • Wi-Fi - Supply, installation, commissioning, training & operationalization of Wi-Fi at 50% of total identified locations • Variable Messaging Board - Supply, installation, commissioning, training & operationalization of	a) Site Completion/readiness Report b) Delivery Acceptance Reports from DSCL/authorized entity c) Installation & Commissioning Reports d) UAT/FAT and Go Live Certificate from DSCL/authorized entity e) Training Content & Completion Certificate f) Security Audit Certificate from Cert-In/STQC for Data Centre and Applications	T+4 Months

Sl no	Milestones	Deliverables	Timelines (in months)
	Variable Messaging Boards at 50% of total identified locations • City Surveillance - Supply, installation, commissioning, training & operationalization of Cameras at 50% of total identified locations • Solid Waste Management - Supply, installation, commissioning, training & operationalization of 30% of total SWM items		
1.4	**Phase III: Go-Live** • Wi-Fi - Supply, installation, commissioning, training & operationalization of City Wi-Fi at 50% of total identified locations • Variable Messaging Board - Supply, installation, commissioning, training & operationalization of Variable Messaging Boards at remaining 50% of total identified locations	a) Site Completion/readiness Report b) Delivery Acceptance Reports from DSCL/authorized entity c) Installation & Commissioning Reports d) Software Licenses details e) UAT/FAT and Go Live Certificate from DSCL/authorized entity f) Availability of Mobile App on Play Store & Apple App Store g) Training Content & Completion Certificate	T + 5 months

Sl no	Milestones	Deliverables	Timelines (in months)
	• City Surveillance - Supply, installation, commissioning, training & operationalization of Cameras at 50% of total identified locations • Solid Waste Management - Supply, installation, commissioning, training & operationalization of 70% of total SWM items		
1.5	**Phase IV: Integration & Project Final Go-Live** Completion of all the field and DC initiatives as per scope of RFP Integration with external applications (existing & proposed)	a) UAT/FAT and Go Live Certificate from DSCL/authorized entity b) Training Content & Completion Certificate c) Security Audit Certificate from Cert-In/STQC d) Source code of portal, Mobile App & customized applications	**T + 6 months = T1**
2	**Project Operation & Maintenance Phase**		**T1 + 12 months**
2.1	Operation & Maintenance	• Monthly & Quarterly SLA Reports • Adhoc Reports	T1 + 12 Months

Based on findings of the site survey activity done by MSI, MSI may propose a change in the number of sites or individual units to be deployed in each phase as well as overall scope and a consequent change in phasing. DSCL also retains the right to suo-moto change the number of sites or individual units to be deployed for each scope item. The final decision on change in phasing and related change in payment schedules shall be at the discretion of DSCL.

MSI should complete all the activities within the defined timelines as indicated above. The timeline will be reviewed regularly during implementation phase and may be extended in case DSCL feels that extension in a particular Request Order/Integration or any track is imperative, for the reason beyond the control of the bidder. In all such cases DSCL's

decision shall be final and binding. MSI will be eligible for the payment based on the completion of activities and approval of the relevant deliverables.

7.2 Payment Schedule

The total payment shall be paid in two part (i) Capex (ii) Opex. The further breakup of Capex and Opex shall be as under:

Sl no	Milestones	Timelines	Payment
	Capex		
1.	Requirement study	T + 2 Months	15% of capex value
2.	Phase I : Go Live	T + 3 Months	20% of capex value
3.	Phase II : Go Live	T + 4 Months	25% of capex value
4.	Phase III : Go Live	T + 5 Months	20% of capex value
5.	Phase IV : Integration & Project Final Go-Live	T1 = T + 6 months	20% of capex value
	Opex		
6.	Project Operations & Maintenance phase for a period of 12 months from the date of Final Go Live	T1 + 12 Months	OPEX will be paid in twenty (4) equal quarterly instalments spread across 1 year Post Final Go-Live

Note 1:

a) All payments to the Systems Integrator shall be made upon submission of invoices along with necessary approval certificates from DSCL within 30 days
b) The above payments are subject to meeting of SLA's failing which the appropriate deductions as mentioned in the Volume III of this RFP