

PROJECT MANAGEMENT CONSULTANCY FOR IMPLEMENTATION OF SMART CITY MISSION PROJECTS FOR MANGALURU CITY

DRAFT DETAILED PROJECT REPORT –

- ❖ CITY LEVEL COMMAND & CONTROL CENTRE
- ❖ AIR QUALITY MONITORING
- ❖ CITY WIDE CCTV SURVEILLANCE
- ❖ IT CONNECTIVITY



ISSUE AND REVISION RECORD

Date	Author	Version	Remark
10.07.2017	PMC	0.1	First Draft Released
15.07.2017	PMC	0.2	a) Software Development Components added b) BoQ Completed
18.07.2017	PMC	0.3	Minor Corrections
04.08.2017	PMC	0.4	Smart City Components updated
05.08.2017	PMC	0.5	Cost Estimates updated
18.08.2017	PMC	0.6	Cost Estimates revised and diagram edited
16.09.2017	PMC	0.7	KUIFDC Technical Committee review comments complied
3.11.2017	PMC	0.8	KUIDFC recommendation and review comments based on Centralized CCC and City CCC complied. Scope increased to include additional subprojects for surveillance and connectivity.
17.11.2017	PMC	1.0	KUIDFC recommendation and the comments given in the review meeting held on November 14, 2017, complied.
17.12.2017	PMC	1.21	KUIDFC inputs given in the review meeting held on December 4, 2017, complied. Project 34, 'Installations of Air Quality Monitoring Sensor and Connecting them to CCC', merged in the CCC DPR.
27.12.2017	PMC	1.22	Annexure H
03.01.2018	PMC	1.29	Sections 2.16, 5.6, 6.7, 7, Annexure A
07.02.2018	PMC	1.30	Revised core, RAM and Storage sizing for KMDS
20.02.2018	PMC	1.31	GIS Integration Responsibility Matrix and KMDS/MIS/CSI Responsibility Matrix added
24.02.2018	PMC	1.32	Cost revision based on KUIDFC comparison sheet
27.02.2018	PMC	1.33	Cost revision based on Belagavi & Kaizen rates
Reviewers			
Date	Reviewer		Remarks

21.08.2017	KUIFDC Technical Committee		Annexure G
30.10.2017	Sathish, KUIDFC		Annexure G
14.11.2017	KUIFDC Technical Committee		Sections 2.9, 3.3.1, 3.4.1, 3.6.1, 4.5.1, 6.1.
04.12.2017	KUIFDC Technical Committee		Sections 2.10, 3, 4.3.2, 4.4.2, 4.6.2, 5.5.2, 7
23.12.2017	KUIDFC		Annexure H
03.01.2017	KUIDFC		Rationalized budget estimate based on Belagavi DPR cost shared by KUIDFC
Approval			
Version	Name		Location

This document is issued for the party which commissioned it and for specific purposes connected with the above-captioned project only. It should not be relied upon by any other party or used for any other purpose.

We accept no responsibility for the consequences of this document being relied upon by any other party, or being used for any other purpose, or containing any error or omission which is due to an error or omission in data supplied to us by other parties.

This document contains confidential information and proprietary intellectual property. It should not be shown to other parties without consent from us and from the party which commissioned it.

Table of Contents

1.	Introduction	15
1.1.	Mangaluru Smart City Proposal	15
2.	Command and Control Centre (CCC)	17
2.1.	Project Vision / Goals / Objectives	18
2.1.1.	Business Intelligence and Data analytics	18
2.1.2.	GIS	19
2.1.2.1.	City Level SI (LSI) Scope	20
2.1.2.2.	GIS Database Creation	20
2.1.2.3.	Integration with State Wide GIS Platform.....	20
2.1.2.4.	Centralised CCC SI (MSI) Scope.....	21
2.1.2.5.	GIS Integration	21
2.2.	Project Implementation Model and Timelines.....	23
2.3.	Expected Outcomes	29
2.4.	Proposed Interventions.....	29
2.5.	Problems/ Issues Addressed.....	30
2.6.	Technology Principles	30
2.7.	Best Practice Alignment	31
2.8.	Processes	32
2.9.	Use Cases.....	35
2.10.	Standard Operating Procedure.....	39
2.11.	People.....	40
2.12.	Technology	40
2.13.	Capacity Building & Training Plan	41
2.14.	Non-Functional Requirements	42
2.14.1.	Performance Requirements	42
2.14.2.	Deployment & Provisioning Requirements.....	42
2.14.3.	Operational Requirements	43
2.14.4.	Security and Confidentiality Requirements	46
2.14.5.	Data Conversion Requirements.....	47
2.14.6.	Maintenance and Technical Support Requirements	47

2.14.7.	Business Continuity Requirements	48
2.15.	Solution Architecture	50
2.16.	Cost Estimates	52
3.	Air Quality Monitoring	54
3.1.	Project Vision	54
3.2.	Goal of the Project	54
3.3.	Smart Objectives	55
3.4.	Project Overview	55
3.4.1.	Stakeholder’s Analysis	55
3.4.1.1.	Mangaluru Smart City Limited (SPV)/Mangaluru City Corporation	55
3.4.1.2.	Karnataka State Pollution Control Board	55
3.4.1.3.	Regional Transport Office, Mangaluru	56
3.4.1.4.	Hospitals in Mangaluru	56
3.5.	Problems /Issues Addressed	56
3.5.1.	Traditional Air Quality Monitoring station	56
3.5.2.	Environment sensor	57
3.6.	Sources of Funding	57
3.7.	Project Details and Implementation Model	57
3.7.1.	Process and Technology	57
3.7.2.	People	58
3.7.3.	Non-IT Infrastructure	58
3.7.4.	Policy Interventions	58
3.7.5.	Capacity Building and Training Plan	58
3.8.	Solution Architecture	59
3.9.	Technical Solution	59
3.9.1.	Application Architecture	59
3.9.2.	Data Architecture	59
3.9.3.	Network Architecture	60
3.9.4.	Deployment Architecture	60
3.9.5.	Security Architecture	60
3.9.6.	Interfaces	61

3.9.7.	Linkage with Core Infrastructure	61
3.10.	Organization Structure	61
3.11.	Monitoring and Evaluation	61
3.12.	Assumptions & Risk Management	64
3.13.	Project Costs and Financing	65
3.14.	Geographic Locations of Environment Sensors in ABD area	65
3.15.	Technical Specification of Environmental Sensor	66
3.16.	Sustainability Plan	67
3.17.	Expected Outcomes and Benefits of the Project	68
4.	One Touch Mangaluru	71
4.1.	Organizational Principles	71
4.2.	Data Principles	76
4.3.	ICT and Disaster Safety Components	77
4.3.1.	Use Cases	80
4.3.2.	Standard Operating Procedure	82
4.4.	Public Mobility (Intelligent Transport Management System)	82
4.4.1.	Use Cases	83
4.4.2.	Standard Operating Procedure	86
4.5.	Hardware & GPS Support	86
4.6.	MCC Citizen Interface App (eGovernance Service Integrations)	87
4.6.1.	Use Cases	88
4.6.2.	Standard Operating Procedure	89
4.6.3.	MCC: Projects/Works Tracking and Monitoring	90
4.6.4.	MCC Asset Management	90
4.7.	Project Implementation Model and Timelines	92
5.	City Wide Surveillance in Mangaluru	95
5.1.	Need for Intervention	96
5.2.	Project Vision	96
5.3.	Project Implementation Model and Timelines	97
5.4.	Expected Outcomes	98
5.5.	Proposed Interventions	101

5.5.1.	Use Cases.....	101
5.5.2.	Standard Operating Procedure.....	102
5.5.3.	Process and Technology.....	103
5.5.4.	People.....	103
5.5.5.	Non-IT Infrastructure	103
5.5.6.	Policy Interventions	103
5.5.7.	Implementation Strategy	104
5.5.8.	Process Re-engineering.....	105
5.5.9.	Change Management.....	105
5.6.	Cost Estimates	106
6.	IT Connectivity	107
6.1.	Project Vision / Goals / Objectives	108
6.2.	Project Coverage.....	110
6.3.	Project Implementation Model and Timelines.....	111
6.4.	Expected Outcomes	113
6.5.	Proposed Interventions.....	114
6.5.1.	Processes	115
6.5.2.	People.....	116
6.5.3.	Matrix for Service Response and Service Definition.....	116
6.5.4.	Operations & Maintenance Escalation Process	117
6.5.5.	Technology	117
6.5.6.	Infrastructure (non-IT)	118
6.5.7.	Capacity Building & Training Plan.....	119
6.5.8.	Solution Architecture	120
6.5.8.1.	Network Layout	120
6.5.8.2.	Network Architecture	121
6.5.8.3.	Network Flow Diagrams.....	122
6.6.	Bandwidth Requirement	127
6.7.	Cost Estimates	129
6.8.	Bandwidth	130
6.9.	Hardware & Related Software.....	131

7.	Summary	132
7.1.	Storage and Compute Requirements.....	132
7.2.	Summary of Estimate	138
7.3.	Comparing the Proposed Budget with Estimated Outlay	138
Annexure A: Detailed BOQ: Command and Control Centre.....		139
Annexure B: Detailed BOQ: City-wide CCTV Surveillance		189
Annexure C: Detailed BoQ: IT Connectivity and Networking & Cloud Support.....		208
C.1.	Bandwidth	208
C.2.	Hardware & Related Software.....	209
Annexure D. Air Quality Monitoring: Technical Terms.....		210
Annexure E. CCTV Camera Locations in Mangaluru.....		211
Annexure F. Minutes of Meetings with Stakeholders		220
Annexure G. Compliances with the Reviews by the ICT based Technical Committee		252
Annexure H. Quotations / Estimates Received From the Service Providers / Vendors..		267
H.1.	Airtel.....	267
H.2.	BSNL	271
H.3.	BSCL.....	280
H.4.	CISCO and Partners	284
H.5.	HPE	293
H.6.	BOSCH.....	298
Annexure I. Budgetary estimates from Kaizen proposal.....		304
Annexure J. Responsibility Matrix [MSI (Centralised CCC SI) / LSI (City SI) / KMDS (DC Service Provider)]		306
Annexure K. Stakeholder Departments' Buy-In Letters		308

LIST OF FIGURES

Figure 1. Design Phase Workflow	23
Figure 2. Implementation Phase Workflow: SI	24
Figure 3. Implementation Phase Workflow: PMC	25
Figure 4. O & M Phase Workflow	26
Figure 5. Command and Control Centre Distributed Architecture.....	29
Figure 6. Use-Cases (I) for CCC (Centralized Command and Control Centre + City-level Operations Centre)	35
Figure 7. Use-Cases (II) for CCC (Centralized Command and Control Centre + City-level Operations Centre)	36
Figure 8. Application Architecture of CCC	50
Figure 9. Deployment Diagram of KMDS Data Centre Hosting CCC Platform, One Touch Mangaluru and Supporting Applications	51
Figure 10. Deployment Diagram of CCC (CCCC + CoC).....	51
Figure 11 : Air Quality Monitoring Station	56
Figure 12 : Environment Sensor.....	57
Figure 13 : Architecture of Environment Sensor connecting to CCC.....	59
Figure 14 : AQI Index.....	62
Figure 15 : Associated Health Impacts as per AQI.....	63
Figure 16 : Location of Environment Sensor	66
Figure 17 : Proposed snapshot of the real time AQI displayed on One Touch Mangaluru Portal	68
Figure 18 : Proposed snapshot of real time AQI displayed on One Touch Mangaluru App ...	68
Figure 19 : Health advisory issued to citizens based on current value of AQI	69
Figure 20 : Variable Message Board displaying values of Particulate Matter PM2.5 and PM10 and Current value of Air Quality Index along with Color Code and Value understood by citizens.....	70
Figure 21. Disaster Management and Emergency Response.....	77
Figure 22. Use-Cases for Disaster Management (Emergency Response) System (part of One Touch Mangaluru).....	80
Figure 23. Public Mobility in Mangaluru Smart City	83
Figure 24. Use-Cases for Intelligent Transport Management System (ITMS) (Part of One Touch Mangaluru).....	83
Figure 25. Use-Cases for eGovernance Service Interface (Part of One Touch Mangaluru)....	88
Figure 26. MCC Works Monitoring	90
Figure 27. MCC Asset Management.....	91
Figure 28. CCTV Surveillance Architecture Overview	98
Figure 29. CCTV Surveillance: Technical Architecture	99
Figure 30. Use-Cases for City-Wide CCTV Surveillance System.....	101

Figure 31. IT Connectivity Design Phase Workflow	111
Figure 32. IT Connectivity: Component Architecture	113
Figure 33. Network Connectivity for Federated Approach	114
Figure 34. O & M Escalation Matrix	117
Figure 35. Implementation Strategy for Project IT Connectivity.....	118
Figure 36 : Network Layout	120
Figure 37. Network Architecture	121
Figure 38. Network Flow Diagram: Unified Messaging System	122
Figure 39. Network Flow Diagram: Vehicle Tracking System.....	122
Figure 40. Network Flow Diagram: ICT and Disaster Management	123
Figure 41. Network Flow Diagram: SCADA (Water, Waste Water, Energy) Systems.....	123
Figure 42. Network Flow Diagram: Smart Meters.....	124
Figure 43. Network Flow Diagram: Environmental Sensors	124
Figure 44. Network Flow Diagram: City Surveillance.....	125
Figure 45. Network Flow Diagram: Smart Poles.....	125
Figure 46. Network Flow Diagram: Smart Parking, eSmart Schools, Skill Development and Safety Training Centre.....	126
Figure 47. Network Flow Diagram: One Touch Mangaluru Portal	126
Figure 48. Network Flow Diagram: Help-Desk Set-up	127
Figure 49. Basic Wired Connectivity Layout with MPLS and Leased Lines	128

LIST OF TABLES

Table 1. Detailed Project Report Scope	15
Table 2. CCC + One Touch Mangaluru Timelines.....	27
Table 3. Use-Cases for CCC (Centralized Command and Control Centre + City-level Operations Centre)	37
Table 4. Source of Funding	57
Table 5. Risk Assessment Matrix.....	64
Table 6. Cost Estimate.....	65
Table 7. Sensor Locations.....	65
Table 8. eGovernance Services to be Integrated with One Touch Mangaluru	72
Table 9. Use-Cases for Disaster Management (Emergency Response) System (part of One Touch Mangaluru).....	81
Table 10. Cases for Intelligent Transport Management System (ITMS) (Part of One Touch Mangaluru)	83
Table 11. Use-Cases for eGovernance Service Interface (Part of One Touch Mangaluru)	88
Table 12. One Touch Mangaluru Timelines.....	92
Table 13. CCTV Surveillance Projects Timelines	97
Table 14. Use-Cases for City-Wide CCTV Surveillance System	101
Table 15. Process Re-engineering.....	105
Table 16. Change Management.....	105
Table 17: Budget Estimate for City Wide CCTV Surveillance Projects	106
Table 18. Timelines for IT Connectivity Projects	112
Table 19. NoC Resource Team.....	116
Table 20. Service Response Matrix	116
Table 21. Capacity Building and Training Plan.....	119
Table 22. Budget Estimate for IT Connectivity + Networking & Cloud Support	129
Table 23. Summary Budget Estimate for Project Scope	138
Table 24. CoC ICT Infrastructure	186

ABBREVIATIONS

Sr. no.	Abbreviation / Acronym	Description
1.	ABD	Area Based Development
2.	ANPR	Automated Number Plate Recognition
3.	BOQ	Bill Of Quantities
4.	CCC	Command and Control Centre
5.	CCTV	Closed Circuit Television
6.	CeG	Centre for eGovernance
7.	DC	Data Centre
8.	DPR	Detailed Project Report
9.	EMS	Enterprise Management System
10.	GPS	Global Positioning System
11.	GUI	Graphical User Interface
12.	ICCC	Integrated Command and Control Centre
13.	ICT	Information Communication Technology
14.	IP	Internet Protocol
15.	ISMS	Information Security Management System
16.	KSPCB	Karnataka State Pollution Control Board
17.	KUIDFC	Karnataka Urban Infrastructure Development Finance and Corporation
18.	LSI	City Level SI (Local System Integrator)
19.	MCC	Mangaluru City Corporation
20.	MoUD	Ministry of Urban Development
21.	MPLS	Multiprotocol Label Switching
22.	MQTT	Message Queue Telemetry Transport
23.	MRC	Municipal Reforms Cell
24.	MSA	Master Service Agreement
25.	MSCL	Mangaluru Smart City Limited
26.	MSI	Centralised CCC Level SI (Master System Integrator)
27.	NH ₃	Ammonia
28.	NIC	National Informatics Centre
29.	NO ₂	Nitrogen Dioxide
30.	NOC	Network Operations Centre
31.	NVR	Network Video Recorder
32.	O ₃	Ozone
33.	ONVIF	ONVIF is an open industry forum that provides and promotes standardized interfaces for effective

Sr. no.	Abbreviation / Acronym	Description
		interoperability of IP-based physical security products.
34.	Pb	Lead
35.	PM	Particulate Matter
36.	PMC	Project Management Consultant
37.	PoE	Power over Ethernet
38.	POP	Point of Presence
39.	PTZ	Pan Tilt Zoom
40.	PUC	Pollution Under Check
41.	RF	Radio Frequency
42.	RLVD	Red Light Violation Detection
43.	SAN	Storage Area Network
44.	SCP	Smart City Proposal
45.	SI	System Integrator
46.	SIO	State Information Officer
47.	SLA	Service Level Agreement
48.	SO ₂	Sulphur Dioxide
49.	SOP	Standard Operating Procedure
50.	SPV	Special Purpose Vehicle
51.	STQC	Standardization Testing and Quality Certification
52.	ToT	Transfer of Technology
53.	UAT	User Acceptance Testing
54.	VMS	Video management Software/Solution
55.	VPN	Virtual Private Network
56.	WHO	World Health Organization

LIST OF REFERENCE CODES, STANDARDS, AND GUIDELINES

The following documents have been referred in preparing the document:

- Mangalore SCP document
- RFP for System Integrator for Implementation of Belgavi Smart City Solutions, Corrigendums / Addendums, Prebid clarification
- <https://it.maharashtra.gov.in/PDF/CCTV-and-Smart-City-DPR.pdf>
- Rajkot Smart City RFP for City Wide surveillance
- www.apts.gov.in/procurepdf/DPR_TemplateV1.2%20-7.pdf
- National Security Council Secretariat, New Delhi, “Cyber Security Requirement for Smart City - Model Framework”, referred by Ministry of Urban Development, Government of India through an Office Memorandum Dated 19th May 2016.
- Smart Cities Sectional Committee, “Smart Cities – Indicators”, Ref.: CED 59 (10000) WC, Indian Standard: ICS 13.020.20, Draft Dated 30th September 2016 by Bureau of Indian Standards (BIS).
- CCC RFP – Smart City Ahmedabad – Specifications Document.pdf
- GeM (<http://gem.gov.in>)
- www.apts.gov.in/procurepdf/DPR_TemplateV1.2%20-7.pdf
- RFP for selection of SI for implementation of GPS based Vehicle Tracking Solution for Municipal Solid Waste Vehicles and Public Transport Vehicles (GPS_VTS_Ujjain.pdf)
- Tariff Plans shared by the BSNL.
- Cyber Security Model Framework for Smart Cities
 - Cyber Security Model Framework for Smart Cities dated 20 May 2016 as per directives of MoUD.
- National Air Quality Index by Ministry of Environment under Swachh Bharat - One Number-One Colour-One Description to judge the Air Quality for Common Man <http://pib.nic.in/newsite/PrintRelease.aspx?relid=110654>.
- National Ambient Air Quality Standards -Ministry of Environment and Forest (MoEF), Govt of India, vide gazette notification, G.S.R826 (E), dated 18.11.2009 -National Ambient Air Quality Standards by amending the Environment (Protection) Rules 1986.

1. Introduction

1.1. Mangaluru Smart City Proposal

Karnataka Urban Infrastructure Development & Finance Corporation Limited (KUIDFC) is the State Level Nodal Agency (SLNA) for the Smart Cities Mission in Karnataka. ***Mangaluru was a proud Participant in second round of this Challenge and now aspires to translate the vision i.e. the broad components across both 'area-based' and 'pan-city' heads identified in the Smart City Proposal (SCP) into Reality.***

Mangaluru Smart City Proposals (SCP) is considered as Area Based Development Proposals (ABD) and Pan City Proposals. The SCP has identified 65 projects/sub projects to be taken up under ABD and Pan City Proposals.

This DPR has major revision based upon KUIDFC directives to have Centralized CCC at State Level and City CCC to cater to City Surveillance requirement through CCTV. KUIDFC proposed that KMDS shall own up responsibility of Infrastructure provisioning as Data Centre provider. KUIDFC shall own up responsibility of implementing Centralized CCC platform. SI selected for City shall own up responsibility of implementing City Wide Smart IoT elements, implementation of City CCC and integrations of City wide Smart IoT elements with City as well as Centralized CCC. In order for these three objectives to realize, PMC has identified its linkage and dependencies with other Pan City sub projects such as Networking and Cloud, CCTV, GPS etc. In addition, fully functional Smart City operations will feed into One Touch Mangaluru Application to keep its officials as well as citizens abreast on day to day basis. We therefore propose to revise the scope of this DPR to include all the interlinked sub projects through this single DPR in order to facilitate better integrations, smoother operations and faster troubleshooting in event of any failures.

The projects under the scope of this Detailed Project Report (DPR) are:

Table 1. Detailed Project Report Scope

Project Code	Project Name	Brief Description	Budget Proposed in SCP (in INR Crores)
57	Command and Control Centre	CCC is a pan city project and a central converging point for all smart interventions, especially the IT/ICT based ones, proposed in each of the 64 projects.	60.0
34	Air Quality	Installation of Air Quality Sensors and connecting them to the Command & Control Centre.	1.0
One Touch Mangaluru			

Project Code	Project Name	Brief Description	Budget Proposed in SCP (in INR Crores)
39	ICT and Disaster Safety Components	Pan city Project managing the emergency response systems triggered when a natural / man-made disaster is announced.	15.58
40	Public Mobility App	App + One Touch Mangaluru Portal to facilitate public mobility through the systems such as Intelligent Transit Management System (ITMS)	10.0
41	Hardware & GPS Support	Hardware and Software Infrastructure Setup for One Touch Mangaluru.	10.0
42	MCC – Citizen Interface App	eGovernance Systems Integration	2.5
City Wide Surveillance			
58	CCTV System Fixed Zoom Telescopic Camera	CCTV Camera Setup across pan city to provide road as well as safety surveillance.	3.0
61	CCTV for road surveillance (PTZ) with WP		12.5
62	CCTV for road surveillance (fixed tele) with WP		4.5
63	Control Room Hardware	Hardware and Software Infrastructure Setup for connecting CCTV Cameras to the Control Room	3.5
64	Cabling and Other Hardware		2.5
IT Connectivity			
27	100% IT Connectivity	Providing the IT Connectivity in the Area marked under ABD.	4.4
60	Networking and Cloud Support	Providing the IT based Interventions connectivity across pan city.	5.0
Total Budget Outlay for CCC + CCTV Surveillance + IT Connectivity Projects			134.48

2. Command and Control Centre (CCC)

“Command and Control” is a term that has emerged from the dictionaries of the military and associated terms. The meaning on the term is defined as *“the exercise of authority and direction by a properly designated commander over assigned and attached forces in the accomplishment of the mission”*. It is an IoT platform that facilitates such an exercise.

The Internet of things (IoT) is the inter-networking of physical devices, "connected devices" and "smart devices", buildings, and other items embedded with electronics, software, sensors, actuators, and network connectivity which enable these objects to collect and exchange data. The IoT platform is a suite of components that enable:

- ✓ deployment of applications that monitor, manage, and control connected devices and systems
- ✓ remote data collection from connected devices and systems
- ✓ independent and secure connectivity between devices
- ✓ Device / sensor management.

A smart city needs to be instrumented, interconnected, and intelligent. All the governing, and civic bodies running the city need to be on a centralized command and control centre. This enables regular monitoring of public services and facilities through a unified system for governing public administrations by technology providers. This requires a robust physical infrastructure powered by a future-proof, secure, and scalable IoT technology platform for managing millions of varied devices, networks, connectivity, analytics, and industry- specific applications.

The role of technology providers, especially those who can bring together an end-to-end IoT platform through Command and Control Centre (CCC) is hence very crucial. For proper functioning of a smart city a future-ready, industry-proven integrated platform optimized for delivering M2M (machine to machine) communications services, which include online connectivity management, cloud-based application enablement platform, analytics, and more is essential.

The platform will facilitate seamless flow of information through a centralized command and control centre, and enable the transformational needs of smart cities across areas such as energy consumption, transportation, healthcare, connectivity, sustainability, and environment management. Such a system will deliver smart access to public services and also create a maintainable infrastructure. Citizens will benefit with enhanced service delivery, convenience, efficiencies, affordability, security, privacy and time savings. This not only enables real-time monitoring for better governance, but also enables timely smart decision making and maintains peaceful law and order situation in the city but also captures the real progress made in the city ensuring the effective utilization of funds.

2.1. Project Vision / Goals / Objectives

The main objective of the CCC is to facilitate the decision makers (government officials) and system providers (SPV), the continuous improvement in the city governance by allowing the analytics to bring out the multiple systems' behavioral patterns and policies that leading to those patterns. The various analytics methodologies bring out the gaps in the current system and the possible places to improve upon to close the identified gaps.

As it is said, *"You Can't Manage What You Don't Measure, if You Can't Measure It, You Can't Improve It, and if You Don't Improve Then It Will Not Sustain"*.

The goals of the CCC are:

1. Centralized control centre infrastructure designed and deployed at the place provided and approved by the Mangaluru Smart City Limited, the SPV.

KUIDFC has proposed the approach of an Integrated Centralized Command and Control Centre (CCCC) that will be hosted and managed by KMDS in Bangalore where the CCC / IoT Platform facilitating the aggregation of the Smart Systems will be procured and made available by KUIDFC. Mangaluru will participate in the Centralized Architecture under which the System Components such as Intelligent Transit/Transport Management System, Disaster Management (Emergency Response) System, Smart Parking, Unified Messaging System including Variable Message Display (VMD), Public Announcement (PA) System, Dashboard & Analytics, One Touch App etc. will be deployed at the CCCC. The storage and network bandwidth intensive applications such as Video Surveillance and Video Analytics will be deployed at City-level Operations Centre (CoC). All the Application Software Systems except the CCC Platform will be responsibility of the SI selected by Mangalore Smart City SPV. The responsibility matrix for the stakeholders, Data Centre Service Provider (KMDS), the Master System Integrator (MSI: SI of Centralised CCC) and the Local System Integrator (LSI: City SI) is given in Annexure I.

2. Project's Service Level Agreements (SLAs) and corresponding Metrics defined and approved by the stakeholders. For example business continuity to ensure the availability of the system 99.9% of the time (TIA942 rating for Tier 3).
3. The SLAs to be abided by the SI and monitored by the PMC and SPV.
4. The future extensibility and adaptability to be ensured by the design decisions.
5. Backward compatibility to be provided for the systems that have lower maturity level.

To achieve these goals and attain to the vision of the project the core subcomponents will be Business Intelligence and Data Analytics System which will project the Information and Inferences drawn by the analytics techniques in the CCC Dashboard.

2.1.1. Business Intelligence and Data analytics

Business Intelligence (BI) refers to technologies, applications and practices for the collection, integration, analysis, and presentation of information / inferences drawn. The purpose of Business Intelligence is to facilitate effective decision making. Data Analytics is how you get to Business Intelligence.

Data Analytics is multidisciplinary. There is extensive use of mathematics and statistics, the use of descriptive techniques and predictive models to gain valuable knowledge from data mining and analysis. The insights from data are used to recommend action or to guide decision making rooted in business context.

In CCC platform, the tools for BI will be getting inputs from all the smart solutions:

1. Feed from CCTV Surveillance System, from Environmental Sensors, from Solid Waste Management Vehicles, from the Buses in Transit, from eToilet Sensors, Street Lighting, Parking Slot Sensors etc.
2. Data from certain eGovernance Services, SCADA Systems, Smart City Projects such as Smart Schools, Skill Development Centre, Tourism related Portals etc.
3. System Health Monitoring Details of the complete infrastructure setup across the City.

The Dashboard will then project based on the various system configurations and rules defining the Events to be Notified, the System health of the Smart City and Operational Executions:

- a) Event-based Notifications:
 - Alerts
 - Pattern Detection
 - Social media Integration
 - Analytics and Reports
- b) Real Time Monitoring:
 - Performance Indicators
 - Impact Analysis
 - Line of Sight
 - Decision Support
- c) Field Operations
 - Collaboration
 - Standard Operating Procedures
 - Smart Routing

Smart City applications are developed with the goal of improving the management of urban flows and allowing for real time responses to challenges. The use of digital information and communication improve the urban services w.r.t. quality, performance and human wellbeing. The CCC Platform contributes by facilitating the collaborative efforts of city officials which may result in reduction of cost and resource consumption and in effective and active engagement with the citizens.

2.1.2. GIS

The basic idea behind integrating GIS with CCC platform is that augmenting IoT data with interactive GIS mapping can significantly improve understanding of the data. There are efforts being made in numerous aspects of business to gain a better understanding of geographical areas and patterns. And doing so armed with GIS can yield more useful information. This calls to mind the efforts of to gain a better understanding of where to build new facilities, where to store resources to minimize waste, and even where to lay down power lines or electrical cables if necessary. Many critical concerns can be addressed by way of geographical analysis.

For example, as per the report published in April 2017, almost 17 percent properties in the Pune Municipal Corporation (PMC) area were found unauthorized during an ongoing survey of tagging buildings through geographic information system (GIS) — that could be much higher than the 2012 figure of 17.54 lakh square feet calculated by the civic body.

MSI will facilitate the GIS integration with CCC which in turn is integrated with Mangalore Smart City projects and the spatial parameters may enhance the effectiveness of the data analytics and subsequent decision making by the city authorities.

2.1.2.1. City Level SI (LSI) Scope

One of the goals of the smart city initiative is to create a single citizen interface where all data and applications are available on a GIS platform.

The broad scope of LSI shall be:

- Creation of GIS data layers
- Collection of required GIS/CAD data from various line departments and conversion to GIS ready format
- Mapping of ICT related or Smart city assets with detailed attribute details
- Provide the all required GIS data in standard format to MSI for Application Development
- To provide necessary API/Inputs to MSI to integrate various City wide applications.

2.1.2.2. GIS Database Creation

The MSI (State Level System Integrator) will create standard data formats in coordination with stakeholder and will provide it to City SI in which the data layers are required to develop city specific GIS application. The MSI will develop the GIS application for city using the data provided.

City SI is responsible to collect the required data from concerned departments. The City SI is also responsible for data layer creation or mapping of ICT related assets and sensor systems (like locations of streetlight poles, CCTV cameras, utilities, Smart bus shelters, environment sensors). If this requires field survey, it needs to be done by City SI. If such a data is already available with city, it shall facilitate to provide the same to the MSI.

The LSI has to regularly update the GIS data as per standard formats given by MSI.

For data creation activity, City Level SI will use the advanced ArcGIS Desktop 10.5 software (1 No.) with Extensions (3D Analyst, Spatial Analyst, Network Analyst, Data Interoperability) and it is already available with city.

Using the above said data, the MSI will develop the GIS application for the city.

2.1.2.3. Integration with State Wide GIS Platform

City SI shall coordinate with MSI for any integration with GIS platform for Citywide applications which will be developed for different Smart Solutions and are not limited to Intelligent Traffic Management System or Intelligent Transport System, solid waste management system, Smart water, Smart Electricity, Solar, Smart Parking, Smart lighting and Smart Energy Management, Smart UGD and Emergency Management services. Which will require real time location based GIS services shall be integrated to state wide GIS platform.

2.1.2.4. *Centralised CCC SI (MSI) Scope*

One of the goals of the smart city initiative is to create a single citizen interface where all data and applications are available on a GIS platform. An initial effort was conducted by KUIDFC to create the GIS based Citizen Application development and now it is proposed to take the initiative forward for uniformity in the usage of the same for Smart City Project Use-cases.

The broad scope of MSI shall be:

- Develop state wide GIS platform for all the 5 cities
- Develop city specific GIS application.
- Integrate developed GIS with city wide application (developed by LSI) to view in Dashboard of City Operation Platform.
- Integrate with state wide e-governance application.

2.1.2.5. *GIS Integration*

Each city will have their own Citywide applications for different Smart Solutions which are not limited to Intelligent Traffic Management System or Intelligent Transport System, solid waste management system, Smart water, Smart Electricity, Solar Rooftop, Smart Parking, Smart lighting, Smart Energy Management, Smart UGD and Emergency Management services which will require real time location based GIS services.

For data creation activity, City Level SI will use existing ArcGIS Desktop software available with SPV's and MSI shall do upgrades as needed

The MSI shall carry out Design, Development and Maintenance with regard to Data Services, Integration of Data and Application Development services for five City Specific GIS applications using the statewide GIS enterprise platform.

Existing Citizen Portal Web Application:

- a) A Single Window information portal for all the information related to the smart city.
- b) Enable users to view multiple data layers on a map and perform various functionalities like search, query and data analysis.
- c) It provides advanced Search and Query tools for users to search for specified features like landmarks, cultural & heritage sites, tourist spots etc. based on the map layers.
- d) It has tools and capabilities to find the route between two selected locations on the map.

GIS modules for GIS based citizen portal are as follows:

- Map Visualization Module
- POI Based Information Module
- Search and Query Module
- Map Tools
- Around Me/Near By
- Ward Information
- Public Grievance Application*
- Public Announcement
- Feedback
- Help

- City Events
- Admin portal
- User Management for Admin Portal application
- Social Media Integration

While ESRI's public grievances module is not functional as of now and its needs to be standardized and developed by MSI with SOPs defined in coordination with the concerned line departments to get the grievances addressed. MSI has to enhance/develop module with standard workflow to get the real time status of grievances which shall be updated on admin dashboard. The SMS notification and acknowledge system shall also be created. The same shall be integrated with State Wide Grievances redressal system (Janahitha) in future, if required.

#Admin portal application for the administrator & officers for monitoring, tracking and management of the categories such as Grievances, Feedbacks and Contact us shall be standardized with SOPs for real time status update on how many Grievances, Feedbacks and Contact us are addressed and what is the current status.

Note: the navigation and live traffic module shall be added to the above modules.

The MSI shall review the above modules and shall redevelop or revamp existing modules on new GIS platform using existing database and shall build new functions, modules & tools as per requirement of the cities. MSI shall regularly coordinate with the City Level System Integrator and collect the data layers. The City Level System Integrator shall collect and provide the same.

The GIS System shall provide efficient decision support system by enabling the following facilities, but not limited to:

a. Data Updation System

The MSI shall develop the Standard Operating Procedures (SOPs) to get data from the city level SI for regular updation of the data. The developed system for real time data updation shall be shared to the City Level System Integrator, where city's SI can update the data using the credentials.

b. Data Services for GIS Applications

Revamp existing data & collect additional data as per the business and operational requirements from City SI in standard formats. Integrate ICOP data and other systems data with GIS Applications.

c. Application Services

- Carry out application development to Revamp existing and build new functions & tools as per requirement of the cities.
- Development of web-services for Integration with other systems.
- Develop design document and hold workshop for the city and state agency stakeholders of the application
- Develop a full-fledged GIS application that shall form the single point of access for location based needs of the city and potentially all citizen services.
- Develop test plans & procedures, use-case analysis, etc.
- Support system testing and acceptance before deployment of the system.
- Provide maintenance and updates for the period of the project.

2.2. Project Implementation Model and Timelines

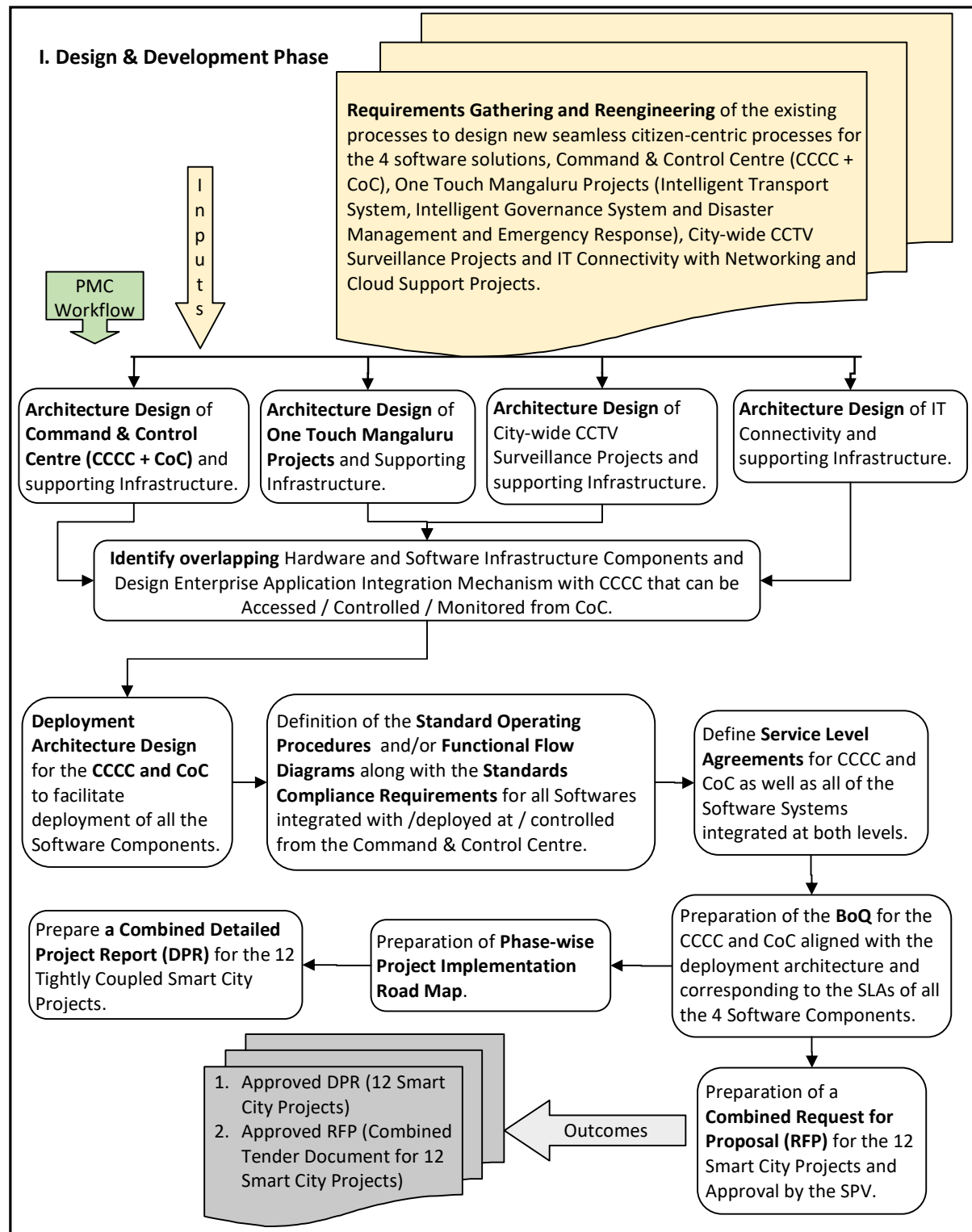


Figure 1. Design Phase Workflow

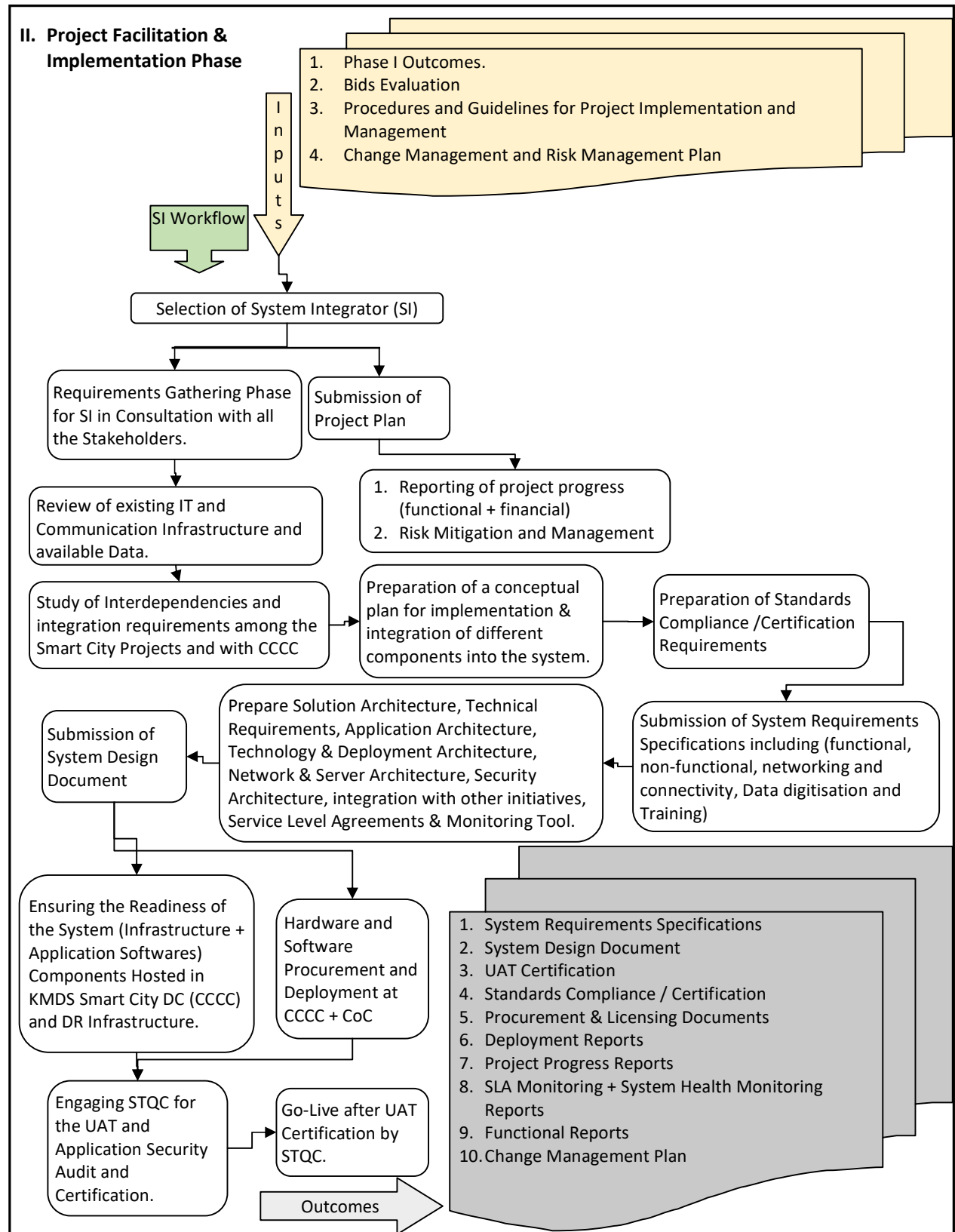


Figure 2. Implementation Phase Workflow: SI

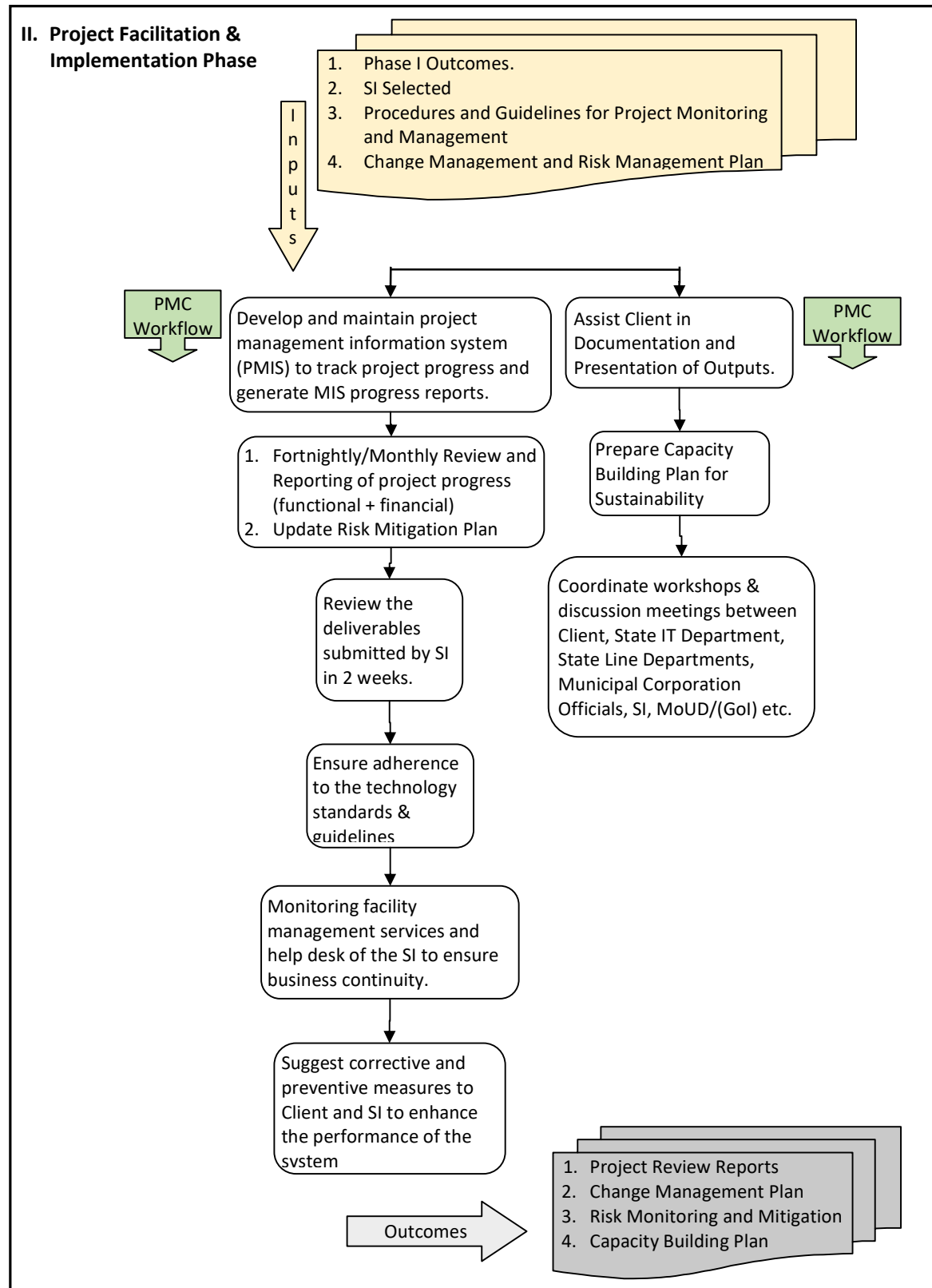


Figure 3. Implementation Phase Workflow: PMC

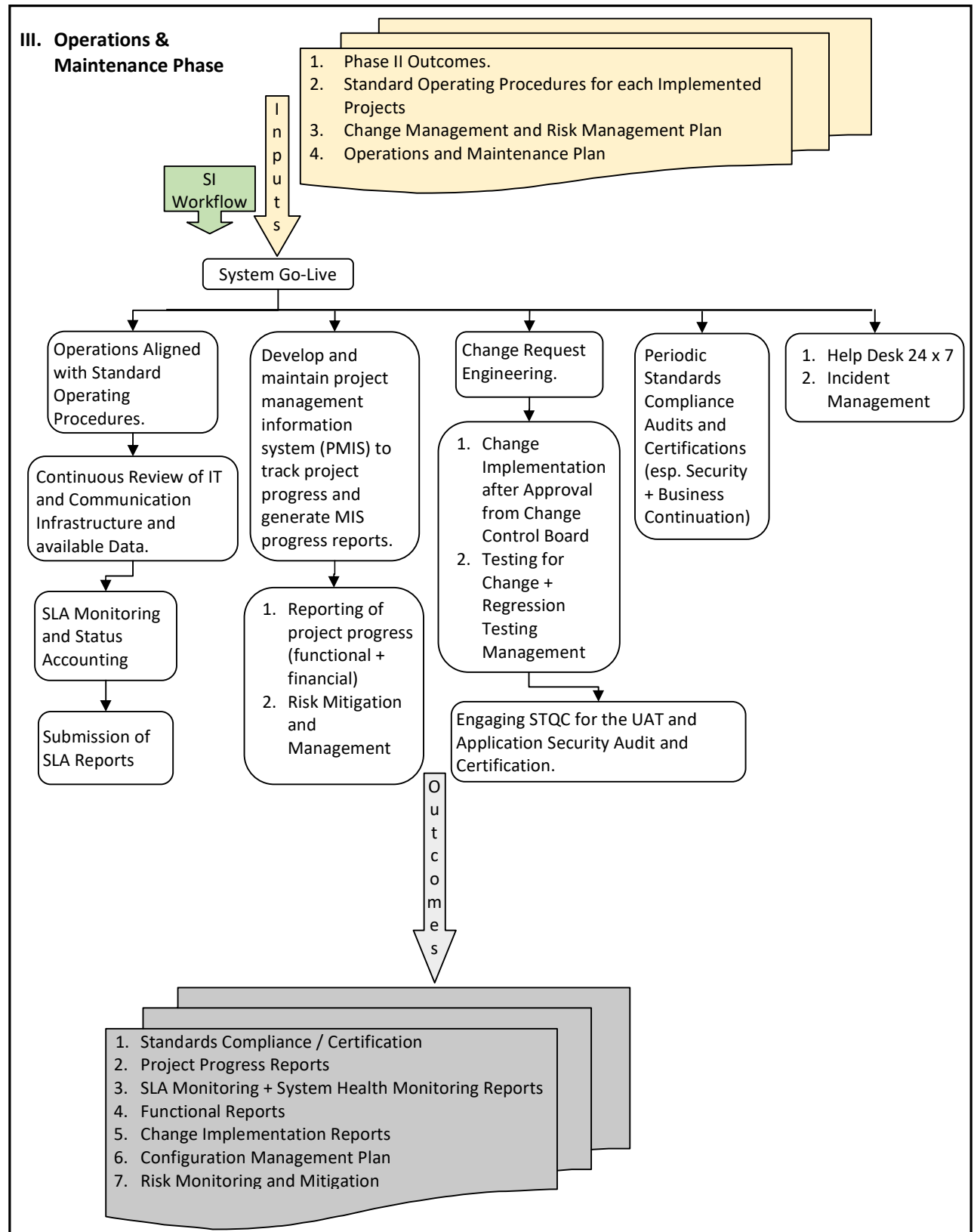


Figure 4. O & M Phase Workflow

Table 2. CCC + One Touch Mangaluru Timelines

Timelines						
Task no.	Task	Predecessor	From Time	Duration	Deliverable	Responsible
Design & Development Phase (SI Workflow)						
1.	Requirements Phase					
1.1	Requirements Gathering	-	T ₀ ¹	4 Weeks	Functional Requirements Specifications (FRS)	SI
1.2	Requirements Analysis	1.1	T ₀	6 Weeks		
1.3	Requirements Specification	1.2	T ₀	7 Weeks		
1.4	SRS Approval	1.3	T ₀ + 7 Weeks	1 Week	Approved SRS	SPV + PMC
2.	Design Phase					
2.1	Design Analysis	1.4	T ₀ + 8 Weeks	2 Weeks	Entity Relationship Diagram (ERD)	SI
2.2	Data Design	2.1	T ₀ + 8 Weeks	1 week		
2.3	Architecture Design	2.1	T ₀ + 9 Weeks	1 week		
2.3.1	Security Architecture Design	2.2, 2.3	T ₀ + 9 Weeks	1 week		
2.3.2	CCC Deployment Architecture Design	1.4, 2.1, 2.3.1	T ₀ + 10 Weeks	1 week		
2.3.3	DC Deployment Architecture Design		T ₀ + 10 Weeks	1 week		
2.4	Application Integration Design	1.4, 2.2, 2.3	T ₀ + 11 Weeks	2 weeks		
2.4.1	Application Integration Architecture Design for CCC (CCCC + CoC)	2.2, 2.3.1	T ₀ + 11 Weeks	1 week		
2.4.2	Application Integration Architecture Design for One Touch Mangaluru	2.2, 2.3.2	T ₀ + 11 Weeks	1 week		
2.4.3	Enterprise Application Integration Design	2.4.1, 2.4.2	T ₀ + 11 Weeks	2 weeks		
2.5	Design Documents Approval	2.4.3	T ₀ + 12 Weeks	2 weeks	Approved Design Document	SPV + PMC
2.6	Onboarding In-Line Departments and their Service Integrators / Implementers for Application Interfacing.	2.4, 2.5	T ₀ + 11 Weeks	3 weeks	APIs	SI + In-Line Departments
3.	Implementation Phase					
3.1	Hardware & Software Procurement	2.3.1, 2.3.2, 2.5	T ₀ + 14 Weeks	8 weeks	Purchase Orders	SI + SPV + PMC
3.2	DC + DR Hosting Facility	2.4	T ₀ + 14	8 weeks	Tripartite	SI + SPV + State

¹ T₀ – Time when SI is awarded the contract.

Timelines						
Task no.	Task	Predecessor	From Time	Duration	Deliverable	Responsible
	Readiness		Weeks		Agreement with the Hosting Facility	Data Centre Facility Providers
3.3	Hardware & Software Deployment	2.5	T ₀ + 22 Weeks	2 weeks	Deployment Reports	SI + Hosting Agency
3.4	Integration of One Touch Mangaluru Web Portal and Mobile Apps with Service Providers	2, 3.3	T ₀ + 22 Weeks	2 weeks	Integration + System Testing Reports	SI + In-Line Departments
3.5	Application Integration with CCC (CCCC + CoC)	2, 3.3, 3.4	T ₀ + 22 Weeks	4 weeks		
3.6	Application Integration with any Future Smart City Components	2, 3.3, 3.4		4 weeks	Integration + System Testing Reports	SI + KMDS + In-Line Department(s)
4.	Testing & Certification Phase					
4.1	Onboarding of STQC for UAT + Security Testing + ISMS Compliance Certification		T ₀ + 10 Weeks	12 weeks		SI + SPV + PMC
4.2	UAT Testing	2.5, 3.3	T ₀ + 22 Weeks	4 weeks	Test Plan + Test Reports	SI + Testing Agency (STQC)
4.2.1	Functional Testing	2.5	T ₀ + 22 Weeks	2 weeks		
4.2.2	Application Security Audit and VAPT	3.1.1	T ₀ + 24 Weeks	1 Week	Application Security Audit + VAPT Certification	
4.3.2	ISMS Compliance Certification	4.2.2	T ₀ + 22 Weeks	4 weeks	ISMS Certification	SI + ISMS Certification Agency (STQC)
5.	CCCC (Mangaluru instance) and CoC Commissioning (Go-Live)	4	T ₀ + 26 Weeks	4 weeks	Go-Live Certification	SI + SPV + PMC
5.1	Standard Procedures Definition and Approval	1, 2	T ₀ + 12 Weeks	12 weeks	SoPs	SI + SPV + In-Line Departments
5.2	CCC Staff Recruitment	-	T ₀ + 12 Weeks	12 weeks	Staff List	SI
5.3	Training CCC Staff	1, 2.5, 5.1	T ₀ + 24 Weeks	2 weeks	Training Reports	SI
5.4	Training and Capacity Building Sessions for SPV Staff.	1, 2.5, 5.1	T ₀ + 24 Weeks	2 weeks	Training Reports	SI
6.	Operations and Maintenance Phase	3, 4, 5	T ₀ + 26 Weeks	47 months	O & M Reports + Audit Reports + (Re)Certifications	SI + SPV

Timelines						
Task no.	Task	Predecessor	From Time	Duration	Deliverable	Responsible
7.	Project Monitoring and Management Activities	5, 6	T ₀ + 26 Weeks	47 months	O & M	PMC + SPV

2.3. Expected Outcomes

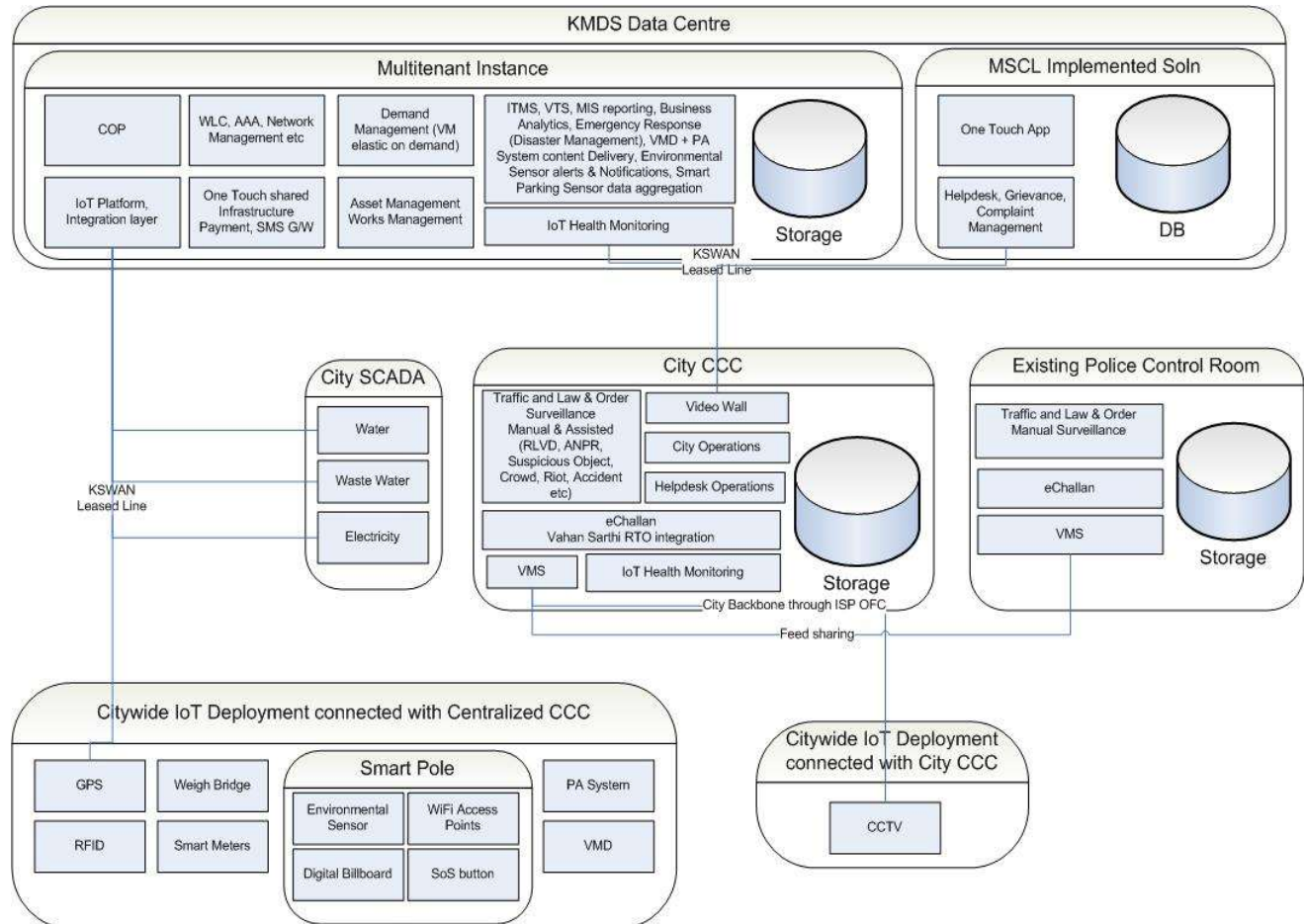


Figure 5. Command and Control Centre Distributed Architecture

2.4. Proposed Interventions

CCCC includes the dashboard and analytics components that get inputs from all the smart city projects and provide the different stakeholders with statistically and/or empirically analysed information to support the decision making process. Also the 24x7 helpdesk will be connected to the citizens to provide them assistance in context of all the connected smart city components, for example, the eGovernance Services, the Safety Surveillance, the Traffic Management etc. The other smart city projects will be integrated with the CCC to strengthen the centralized decision support framework.

2.5. Problems/ Issues Addressed

1. The multiple systems that are deployed at distributed locations need to integrate with CCC for providing the required data for analytics.
2. The data acquired at CCC is of varied sizes and types, for example, road surveillance data has a large magnitude due to video streaming at real time whereas data from environmental sensors will be of smaller magnitude and collected at a fixed and low frequency.
3. Real time analytics require high CPU power.
4. The CCC connectivity requirement to the number of locations may become a point(s) of failure.
5. Data storage, analytics capabilities and connectivity requirement sustaining for a long period of time requires the architecture design to anticipate growth and provide for the extensibility without reengineering.
6. Integrating with multiple systems having varied technology platforms and maturity levels pose a challenge for interoperability.
7. Sustaining the seamless execution of this integrated system of systems which have been working in silos and ensuring the large number of stakeholders get the results delivered is the real challenge.
8. Power failure may lead to data loss as the backend system could have the DR infrastructure support but the distributed wireless sensors may have constraint to the magnitude of the data storage capacity these individual devices may have.
9. Concurrent connections of the citizens in peak hours with CCC and DC designed based on distributed architecture may create connectivity issues.
10. Dependency on GPS tracking devices for Intelligent Transport Systems.

2.6. Technology Principles

- Requirements-Based Change - Only in response to process/service needs are changes to applications and technology made.
- Technological diversity is controlled to minimize the non-trivial cost of maintaining expertise in and connectivity between multiple processing environments. Policies, standards and procedures that govern acquisition of technology must be tied directly to this principle.
- Software and hardware should conform to defined standards that promote interoperability for data, applications, and technology.

Standards help ensure consistency, thus improving the ability to manage systems and improve user satisfaction, and protect existing IT investments, thus maximizing return on investment and reducing costs. Standards for interoperability additionally help ensure support from multiple vendors for their products, and facilitate supply chain integration.

The CCC setup implementation at Central as well as City level needs to follow the State-of-the-Art standards while deciding every component within their architecture. The quality parameters that are the first priority for such a complex system are:

- ✓ Ergonomics design

- Complaint to ISO 11064
- ✓ Cyber Security
 - IT Act 2000 and subsequent amendments, time-to-time notified guidelines, rules and regulations.
 - Cyber Security Model Framework (as per the directives given by MoUD),
 - Other international or industry framework(s), ISO 27000 Series, NIST 800 Series, FIPS, ENISA.
 - Standards Compliance
 - Information security Management system; ISO 27001
 - Payment transaction; PCI DSS
 - Critical component(s) (as identified/required); Common Criteria evaluated (ISO 15408), Cryptographic; FIPS 140-2 Level 3 and above (e.g. PKI key, devices), ISO 19790
 - SCADA; NERC, ISA-99, NIST
 - Cloud; ISO 27017, ISO 27018
 - Health information; ISO 27799
 - Guidelines for Indian Government Websites: An Integral Part of Central Secretariat Manual of Office Procedure, January 2009 (Section 6).
- ✓ Privacy and Civil Liberties
 - IT Act 2000 and subsequent amendments, time-to-time notified guidelines, rules and regulations.
 - Data Security Council of India privacy framework
 - Standards compliance
 - ISO 29100, ISO 29101
- ✓ Interoperability
 - Technical Standards for Interoperability Framework for E-Governance in India, IFEG: 01, Version 1.0, May 2012
 - e-Praamaan: Framework for e-Authentication, e-Praamaan: 01, Version: 1.0, October 2012.
- ✓ Smart City Indicators (ICS 13.020.20)
- ✓ All guidelines, advisories of any form released by Government of India will be binding during the course of project duration

2.7. Best Practice Alignment

- Core needs and priorities of beneficiaries, as related to proposed project, have been directly and formally identified and documented.

Stakeholders

1. Citizens
2. Mangaluru Smart City Limited (SPV)
3. Mangaluru City Corporation
4. Karnataka Municipal Data Society (MRC)
5. Centre for eGovernance (CeG)
6. State NIC (National Informatics Centre)

7. Karnataka Urban Infrastructure Development and Finance Corporation (KUIDFC)
 8. Mangaluru Electricity Supply Company Limited (MESCOM)
 9. Mangaluru City Police
 10. Regional Transport Office (RTO), Mangaluru
 11. Karnataka State Pollution Control Board (KSPCB), Mangaluru
 12. Karnataka State Electronics Development Corporation Limited (KEONICS)
 13. State Government Departments
 14. Mangaluru Smart City Projects' System Implementers (once selected)
 15. Mangaluru Smart City PMC
- Accountability features have been designed into the proposed service delivery systems to allow target beneficiary identification, validation and feedback on satisfaction with services and to publicize compliance with pre-defined service levels.
 - If the project will affect an entire city, relevant pilot implementation has to be completed and documented or equivalent learning has to be derived from another source.

A smart city needs to be instrumented, interconnected, and intelligent. All the governing, and civic bodies running the city need to be on a centralized command and control centre. This enables regular monitoring of public services and facilities through a unified system for governing public administrations by technology providers. This requires a robust physical infrastructure powered by a future-proof, secure, and scalable IoT technology platform for managing millions of varied devices, networks, connectivity, analytics, and industry- specific applications.

2.8. Processes

Command and Control Centre is the centralized component that holds all the smart city projects together and give the decision makers a complete picture of the issues currently being faced by different stakeholders.

The supporting processes that are to be designed and executed within CCC are:

- Definition of Role Based Access Mechanism
- Definition, Logging and Periodic Review of Standard Operating Procedures.
- System Health Monitoring for each of the Smart City Components integrated with CCC
- Periodic Review of Risks Identified under Monitoring and Mitigation Plan
- System Backup and Archival Process Execution
- ISMS Audits and (Re)certifications

The final smart city components that are to be integrated with the Centralized CCC are:

- (i) Project Progress Monitoring of:
 - a. Skill Development and Safety Training Centre
 - b. Implementation of e-Smart Schools in All Government Schools
- (ii) Smart Parking
- (iii) System Health Monitoring of 100% IT Connectivity
- (iv) Water Quality Monitoring and SCADA.
- (v) Waste Water SCADA
- (vi) Air Quality Monitoring
- (vii) eToilets

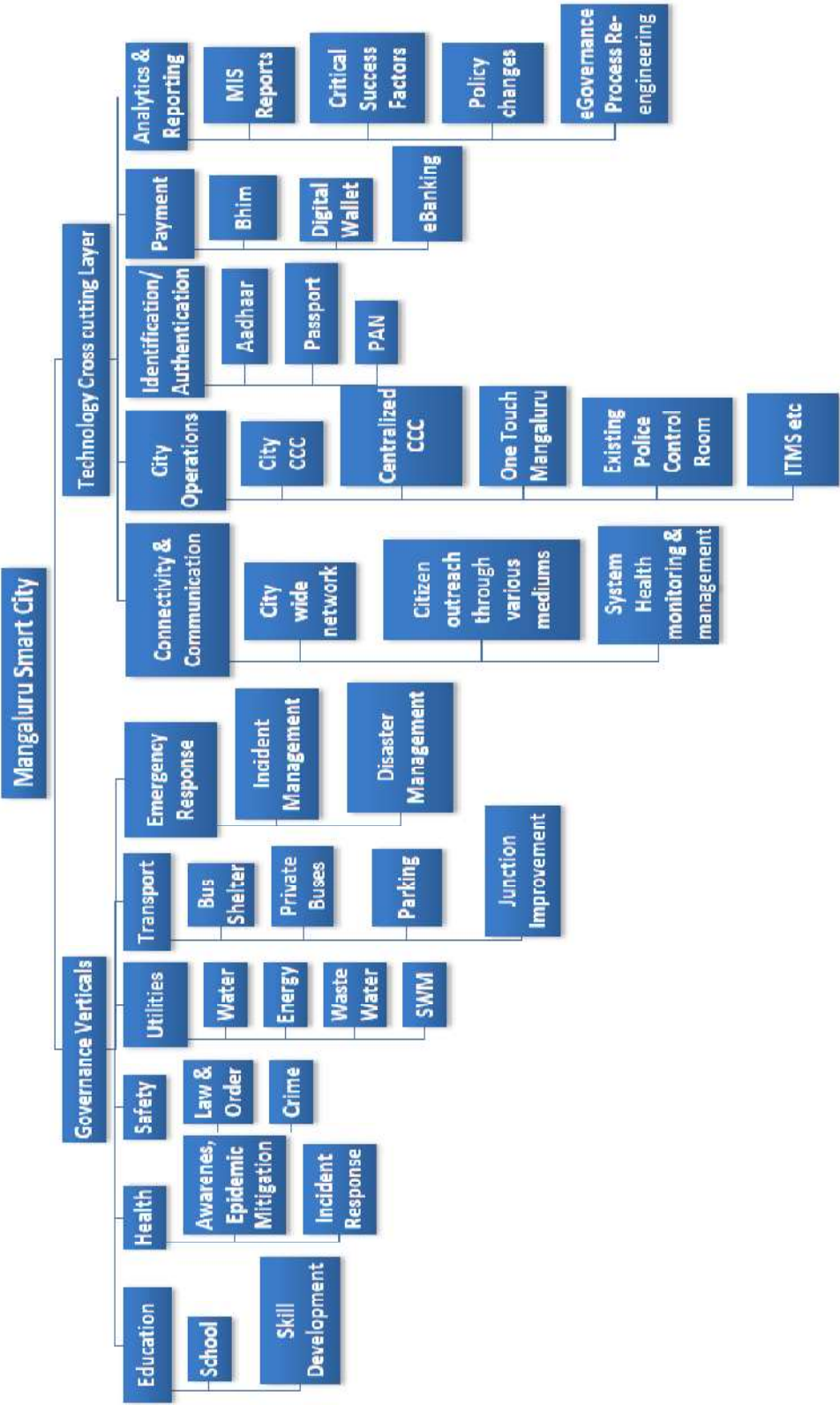
- (viii) Smart Bus Shelters
- (ix) ICT and Disaster Safety Components
 - a. Emergency Response
 - b. Incident Management
 - c. Helpline
- (x) Intelligent Transport Management
 - a. Public Mobility App
 - b. GPS Tracking of Public Transport (presently buses that can extendable to multimodal transport in future, for example, the ferries)
- (xi) Intelligent eGovernance Service Delivery
- (xii) Tracking of Vehicles of SWM collection
- (xiii) Smart Bins Tracking

The final smart city components that are to be integrated with the City Level operations Centre (CoC) are:

- (i) CCTV Surveillance
 - a. Road Surveillance
 - b. Safety Surveillance
 - c. Transport Surveillance
 - d. Traffic Rule Violation Detection (Red Light Violation, Speed Limit Violation)
 - e. eChallan generation with Automated Number Plate Recognition (ANPR) with possible integration with RTO Database
- (ii) Tracking of Patrolling Vehicles

The Data Centre will host the following IT Components among the ones listed above:

- (i) Web Portal of Skill Development and Safety Training Centre
- (ii) Web Portal of e-Smart Schools
- (iii) Web-based Application + Mobile App of Smart Parking Solution
- (iv) ICT and Disaster Safety Components
 - a. Emergency Response
 - b. Incident Management
 - c. Customer Relationship Management (CRM) Solution for Helpline
- (v) Intelligent Transport Management
 - a. Public Mobility App
 - b. GPS Tracking of Public Transport (presently buses that can extendable to multimodal transport in future, for example, the ferries)
- (vi) One Touch Mangaluru Web Portal and Mobile App
 - a. eGovernance Service Integrations including Project/Works Management System and Asset Management System.



2.9. Use Cases

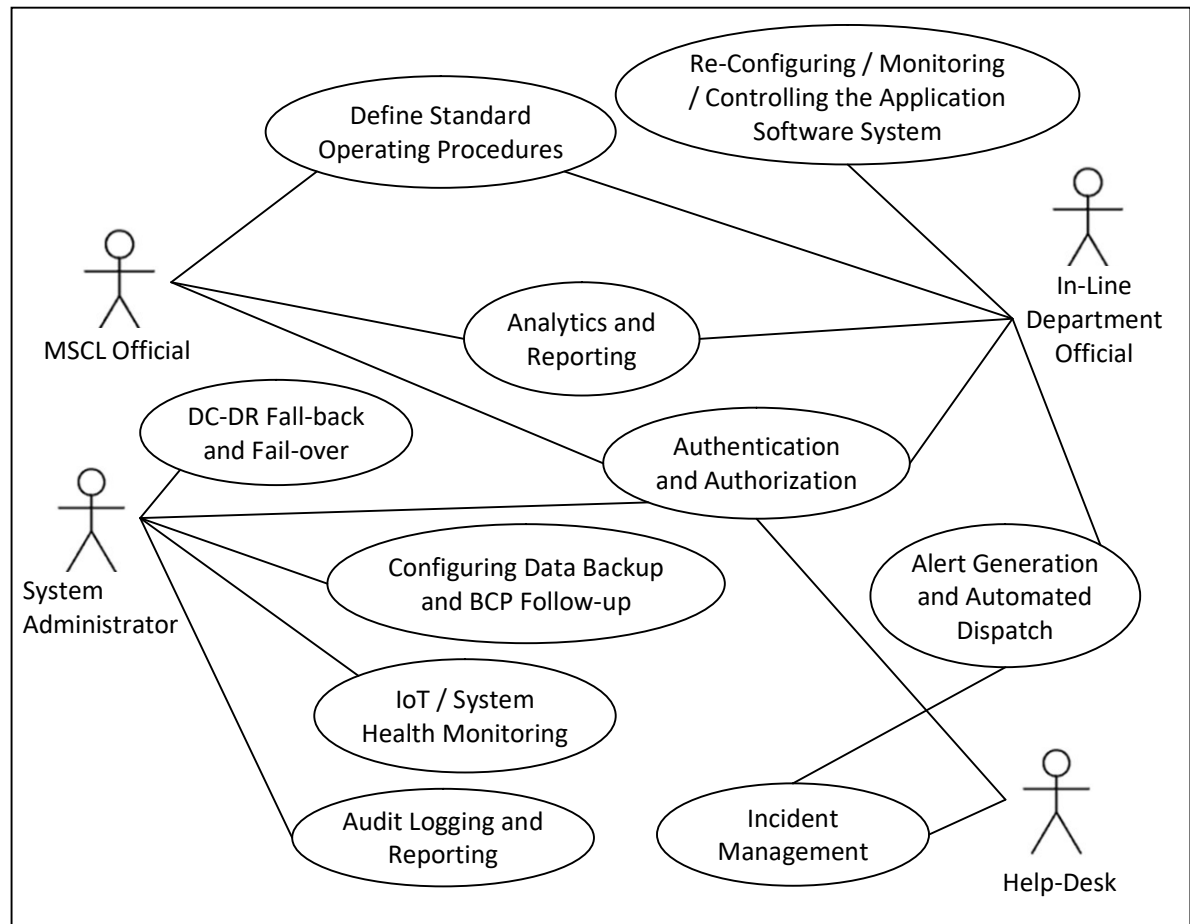


Figure 6. Use-Cases (I) for CCC (Centralized Command and Control Centre + City-level Operations Centre)

The use case diagram depicts the interfaces offered by the system, in this case the Command and Control Centre that is distributed across the Centralized Component at KMDS and City Operations Centre set up in Mangaluru. The various software systems deployed in CCC will require the respective in-line department officials to own up the activities, for which the MSCL officials deployed in the CCC will provide support to. For example, the Intelligent Transport Management System deployed at Centralized CCC will provide an interface to the RTO officials so that they can define the Standard Operating Procedures including various workflows, the responsibility hierarchy and the approval authorities for various tasks under the ITMS. The MSCL official sitting in the CoC may provide support if and when required. The availability of the hardware and software infrastructure on which the various systems are deployed is ensured by the System Administrators of CCC whereas the Helpdesk members ensure that the requests/complaints received from the citizens are forwarded for resolution through the appropriate responsibility matrix.

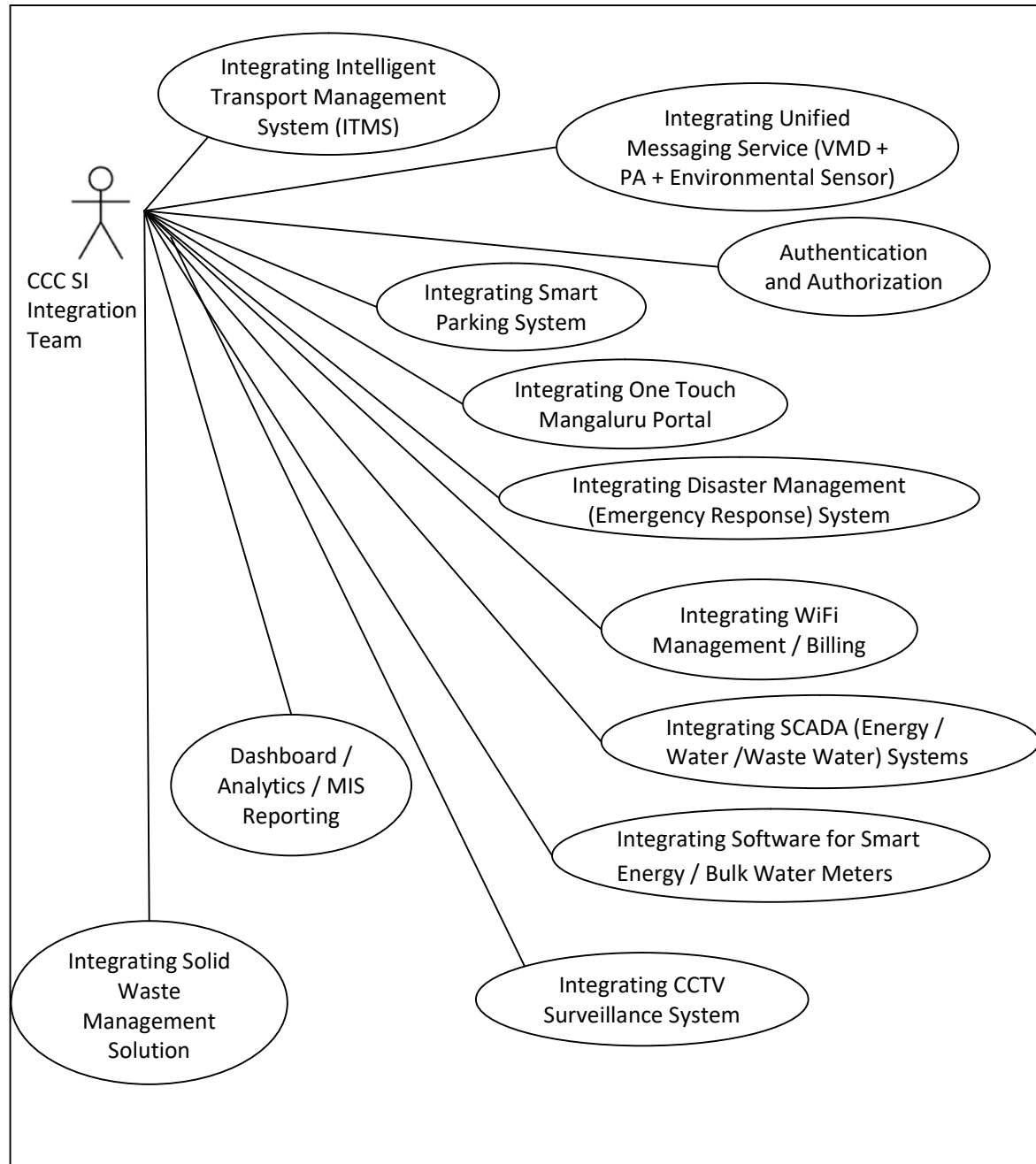


Figure 7. Use-Cases (II) for CCC (Centralized Command and Control Centre + City-level Operations Centre)

The CCC Platform that will be made available by KUIDFC in the Centralized CCC at KMDS will be integrated with the various Application Software Components that are part of various Smart City Projects of Mangaluru. ITMS including Vehicle Tracking System, Unified Messaging System including Variable Message Display and Public Announcement System, Disaster Management including Emergency Response System, CCTV Surveillance including Traffic Surveillance as well as Safety Surveillance are a few of such systems. For the seamless functioning of each of these the respective department official will be provided support by the CoC team systems, as explained in the previous use-case diagram.

Table 3. Use-Cases for CCC (Centralized Command and Control Centre + City-level Operations Centre)

Use Case ID	Use Case	Actor	Benefit / Impact	Priority	Phase
UC_CCC_1	Define Standard Operating Procedures	<ul style="list-style-type: none"> MSCL Official In-Line Department Official 	Facilitations of Business Process Reengineering based on user feedback.	1	I
UC_CCC_2	Analytics and Reporting			1	I
UC_CCC_3	Re-Configuring / Monitoring / Controlling the Application Software System	In-Line Department Official	Continuous improvement by making each system user/citizen centric.	1	
UC_CCC_4	Alert Generation and Automated Dispatch	<ul style="list-style-type: none"> In-Line Department Official Help-Desk 	Immediate action on the incident / event reporting.	1	I
UC_CCC_5	Incident Management	Help-Desk		1	I
UC_CCC_6	IoT / System Health Monitoring	System Administrator	Continuous monitoring and ensuring high availability of all smart city IT / ICT components.	1	I
UC_CCC_6	Audit Logging and Reporting			1	I
UC_CCC_7	Configuring Data Backup and BCP Follow-up			1	I
UC_CCC_8	DC-DR Fall-back and Fail-over			1	I
UC_CCC_9	Authentication and Authorization	<ul style="list-style-type: none"> In-Line Department Official Help-Desk System Administrator MSCL Official CCC SI Integration Team 	Role-based Access Framework to facilitate reconfigurable workflows	1	I
UC_CCC_10	Integrating Intelligent Transport Management System (ITMS)	CCC SI Integration Team	<ul style="list-style-type: none"> Easy Public Transport Transparent Transactions 	1	I
UC_CCC_11	Integrating Unified Messaging Service (VMD + PA + Environmental Sensor)	CCC SI Integration Team	<ul style="list-style-type: none"> Citizen Involvement G2C Interface Awareness 	1	I
UC_CCC_12	Integrating Smart Parking System	CCC SI Integration Team	Disciplined Parking and Road Usage	2	II

Use Case ID	Use Case	Actor	Benefit / Impact	Priority	Phase
UC_CCC_13	Integrating One Touch Mangaluru Portal	CCC SI Integration Team	One Stop eGovernance Service Interface	1	I
UC_CCC_14	Integrating Disaster Management (Emergency Response) System	CCC SI Integration Team	Disaster Reporting at Multiple Levels and Automated Service Dispatch Process to be Implemented for quick and transparent action to be taken by the Authorities	1	I
UC_CCC_15	Integrating Wi-Fi Management / Billing	CCC SI Integration Team	Public free Wi-Fi (200 MB/day, after that chargeable)	1	I
UC_CCC_16	Integrating Dashboard / Analytics / MIS Reporting	CCC SI Integration Team	Decision Support Framework with Role-based Access to decide the Data Access Rights.	1	I
UC_CCC_17	Integrating SCADA (Energy / Water /Waste Water) Systems	CCC SI Integration Team	Decision Support Framework	2	II
UC_CCC_18	Integrating Software for Smart Energy / Bulk Water Meters	CCC SI Integration Team	Decision Support Framework	2	II
UC_CCC_19	Integrating Solid Waste Management Solution	CCC SI Integration Team	Monitoring the Solid Waste Collection	1	I
At City Level Operations Centre					
UC_CCC_20	Integrating CCTV Surveillance System	CCC SI Integration Team	Safety and Road Surveillance to ensure fewer violations at traffic level as well as at citizen safety level.	2	II

2.10. Standard Operating Procedure

Standard operating procedures – SOPs are a set of standardization procedures necessary for seamless and effective execution / operationalisation of all the processes under the scope. SOP for City Level CoC is to be defined in finality by the selected LSI (Local SI chosen for Implementation and O &M of the City Level CoC) in consultation with the client and stakeholder departments as well as the MSI (Master SI chosen for Implementation and O &M of the Centralized CCC).

- Compliant with ISO 27001:2013
 - Procedure for liaison with
 - Stakeholder Departments for Data and Control Interface and Definition of the Role Based Framework for Responsibility Identification
 - District Collector's Office
 - MCC
 - Traffic and Crime Subdivision of City Police
 - RTO
 - Water Board
 - MESCOM
 - Disaster Management Cell
 - Department of Public Instruction (DDPI) & BEOs
 - Government ITIs
 - KSPCB
 - Centralized CCC SI for
 - CCC Platform Interface
 - IoT Health Monitoring
 - Centrally Deployed Components' SLA Monitoring
 - Procedure For Group Internal And E-mail Usage Procedure
 - SOP For Software Configuration Management
 - Procedure for Server Hardening
 - Procedure for the Management of Removable Media
 - Procedure for the Handling of Virus Attacks
 - Information security incident management Procedure
 - Standard Operating Procedure for Audit trails
 - SOP for Business Continuity Plan to ensure the system availability of 99.99%.
- Technology infrastructure monitoring, reporting and support services for service providers.
- 24x7 Help-Desk provides a hands-on approach to incident resolution for Multiple Components deployed at
 - City-level CoC
 - Centralized CCC
- Data Back –up policy and process for Video Storage and it's Archival to be applied in
 - Even-based Storage beyond 90 Days
 - Regular Storage of 90 days

2.11. People

The seamless working of CCC and DC requires Role based Framework defined along with the Responsibilities associated with each of the Roles. The teams required in CCC + DC are:

Sr. no.	Team	Role	Responsibilities
1.	Integration Team	Lead	Leading the Activities for Integration with all Smart City Projects across the O & M Phase.
		System Analyst	Requirements analysis the integration of every smart city project components (backend and/or frontend) with CCC
2.		Solution Architect	Designing the integration of every smart city project components (backend and/or frontend) with CCC
3.		Implementation Team	Programmers' team to execute the integrations based on different approaches (APIs / Web services / RPCs) as appropriate in every scenario of integration.
4.		Integration Testing Team	Integration + Regression Testing for every Integration with CCC.
5.	Operations and Maintenance Team	Lead	Leading the Activities in the O & M Phase.
6.		Network Engineer	Network connectivity monitoring to ensure the high availability of all Smart City Project Components as defined in the SLAs.
7.		IT Support Engineer	System health monitoring to ensure the business continuity of all Smart City Project Components as defined in the SLAs.
8.		MIS Specialist	MIS Reporting facilitating the decision support.
9.		Business Intelligence Specialist	Applying data mining and other business intelligence techniques for statistical information retrieval.
10.	Change Management Team	Lead	Leading the change management and change impact analysis activities in the O & M Phase.
11.		Change Implementation Team	Implementing the Changes approved by the Change Control Board.
12.	Project Management Office	PMO Office	Leading the complete SI lifecycle phases of Design, Implementation, O & M and Integration Phases of the CCC.

2.12. Technology

The role of technology providers, especially those who can bring together an end-to-end IoT platform through Command and Control Centre (CCC) is very crucial. For proper functioning of a smart city a future-ready, industry-proven integrated platform optimized for delivering M2M (machine to machine) communications services, which include online connectivity management, cloud-based application enablement platform, analytics, and more is essential.

The platform will facilitate seamless flow of information through a centralized command and control centre, and enable the transformational needs of smart cities across areas such as energy consumption, transportation, healthcare, connectivity, sustainability, and environment management. Such a system will deliver smart access to public services and also create a maintainable infrastructure.

Sr. no.	Software Infrastructure for CCC
CCC.1	CCC Dashboard & Analytics Software with Business Intelligence.
CCC.2	Workflow Management System
CCC.3	SLA Monitoring
CCC.4	System Health Monitoring for Integrated Systems
CCC.5	Reporting
CCC.6	Project Management Office

Civil and Electrical Infrastructure along with the safety infrastructure makes the basic prerequisites of the CCC setup.

DC and DR will be the collocation facility with the data centre that will be set up by KMDS. Site engineers at the NOC will be required to be positioned to ensure the business continuity.

The **CCC** software and/or hardware infrastructure will be **rolled out in phases** based on the systems integrations happening in phases due to their dependency on other projects and/or approvals from certain authorities.

2.13. Capacity Building & Training Plan

Sr. no.	Training	Team to be Trained	Duration	Topics Covered
1.	Technology Training	CCC integration Team	2 weeks	<ul style="list-style-type: none"> CCC Hardware + Software Infrastructure Application Integration Architecture
2.	Operations	SPV team deployed at CCC	2 weeks	<ul style="list-style-type: none"> CCC Hardware + Software Infrastructure Standard Operating Procedures
3.	O & M	CCC O & M Team	2 weeks	<ul style="list-style-type: none"> CCC Hardware + Software Infrastructure Standard Operating Procedures Change Management

2.14. Non-Functional Requirements

Violations and Associated Penalties (for Service Levels in O & M)	
The service level metrics defined for the O & M phase have associated violations for non-performance and non-compliance. These violations will be reported on a monthly, quarterly, or yearly basis, depending on the service level goals and the measurement methods used for the metrics. Accordingly, the cumulative violations in a quarterly period will be considered. This table summarizes the penalties associated with the violations, and which will be applied to the O & M payments (made as Equated Quarterly Installments for a period of 60 months).	
Number of Violations (in a quarter)	Penalty (to be applied as percentage reduction to the EQI)
1 to 4	5% reduction in the quarterly payment of the corresponding period.
5 to 9	10% reduction in the quarterly payment of the corresponding period.
10 to 14	15% reduction in the quarterly payment of the corresponding period. Suitable corrective action plans will also need to be produced by the SI for reducing the number of violations.
15 and above	20% reduction in the quarterly payment of the corresponding period and additional reduction of Rs. 1,000,000 (10 lakhs) for breach of service level commitments. Immediate corrective measures will also need to be put in place by the SI for reducing the violations.

2.14.1. Performance Requirements

Performance		
These metrics are for ensuring that the CCC infrastructure and supported applications meet the existing and future performance, scalability and capacity requirements of its users.		
Throughput and Response Times	The systems will have to achieve a consistent response time less than the threshold of 3 seconds as initial launch requirement. However, based upon increase in the transaction volumes, the systems will be scalable to achieve a throughput without exceeding the response time threshold of average 3 seconds. At least 95% of the transactions should exhibit a response time average 3 seconds else it will constitute a violation.	The SI will: define baseline capacity model to determine demand or resource/capacity constraints, work with Service Providers and Service Consumers to identify current & future transaction volumes, and perform trend analysis of the environment and its use, predicting future usage. The SI will provide measurement tools for testing and monitoring the baseline capacity requirements as defined by the metrics. The tools will also demonstrate the performance levels and any associated degradation in service delivery levels, based upon the transaction volumes, response times, and number of concurrent connects. Performance related metrics will be measured on a weekly basis and reported monthly.

2.14.2. Deployment & Provisioning Requirements

Deployment & Provisioning of Smart Solutions

These Service Level Metrics ensure the timely Provisioning of the Smart Solutions infrastructure by the SI. The parameters are based upon the mandatory activities that need to be performed to enable a successful implementation and deployment of the CCC and One Touch Mangaluru infrastructure. In case of a violation in the metrics, the SI is liable for penalties. The penalties associated with the violations will directly be applied to the actual payments made to the SI. These Service Levels are in effect till 'Go-Live'. They will not be effective during the Operations and Maintenance phase of the project.

Service Level Metric	Service Level Commitment / Goal	Measurement Method
Successful Deployment, Acceptance and Provisioning of entire CCC and One Touch Mangaluru solutions infrastructure up to Go-live.	<p>The SI will deploy and provision the smart solutions under the smart city projects, CCC and One Touch Mangaluru as per the specifications and timelines that will be laid out in the RFP.</p> <p>Every additional week beyond due date laid out in the RFP will result in a penalty of 0.5% of the associated payment on pro-rata basis.</p>	<p>The System Integrator (SI) is responsible for the demonstrable and successful provisioning of all the services related to CCC and One Touch Mangaluru, Core and Non-core/Support services. The SI shall have completed the quality assurance, user acceptance and performance testing of the Smart Solutions under the scope of this DPR before 'Go-Live' Provisioning.</p> <p>The SI is also responsible to provide a conformance to the Standards specified. This feature should be made available at 'Go-Live'. The SI has also to demonstrate complete integrated system that includes the list of services approved by the SPV before 'Go-Live'.</p>

2.14.3. Operational Requirements

Service Level Metrics – Operations & Maintenance

These Service Level Metrics specify the range and level of support and operational services that will be available to the stakeholders (which include the MSCL, in-Line Departments, and citizens) in respect of the Smart City Project offering. The metrics are based on the industry best practices for IT Service Management (ITIL/ITSM), and are recognized as essential in providing a scalable, consistent, manageable and reliable service that meets user expectations.

In case of violations of the service level goals, the System Integrator (SI) is liable for penalties. The penalties associated with the violations will directly be applied to the actual payments made to the SI during the Operations & Maintenance (O&M) Phase. These Service Levels come into effect after 'Go-Live' and shall be in effect throughout the O&M phase.

Sr. No.	Service Level Metric	Service Level Commitment / Goal	Measurement Method
---------	----------------------	---------------------------------	--------------------

Service Management

These metrics are related to the delivery and quality of IT services providing day-to-day operation and support of the smart solutions in the scope of this DPR, ensuring that these services are in alignment with the current and future needs of the CCC + One Touch Mangaluru and its customers.

1	Management Information reports to MSCL, and all Departments (connected to the CCC and/or DC) on a monthly basis.	<p>The SI will provide the Management Information Report before 7th calendar day of each month</p> <p>Non-submission of the report by 15th of each month will result in a violation</p>	<p>The Management Information report to be provided by the SI to all concerned on a monthly basis and will include operational and performance achievements against targets and utilization indicators for services provided for each stakeholder. It will provide information on: Availability, Incident & Problem Management, Change Management, Payments, Alerts, Security Management, etc.</p> <p>A repository of all these activities especially the problems /incidents, their locations and the troubleshooting methods / methodologies undertaken, etc. shall be developed for the CCC and One Touch Mangaluru. The details of the repository content can be mutually agreed between SI and MSCL.</p>
2	Smart City Review Meetings	Smart City Project Review Meetings will be conducted one per quarter, involving the presence of key stakeholders of the project.	The purpose of these meetings will be to review and assess the quality and delivery of the services provided as per SLA. The SI will be responsible for conducting these meetings involving key stakeholders of the Mangaluru Smart City project. Frequency of these meetings will be reviewed between SI and MSCL.
3	ISO 27001 Compliance to the CCC infrastructure	SI will demonstrate compliance to ISO 27001 standards. 5% of the remaining Capex payment shall be withheld until the compliance is completed.	The SI will implement and maintain an ISMS system as per ISO 27001 standards and as per the security requirements defined by the government from time to time.
4	Integrations of the Service Providers (SPs - Departments) for connecting to the CCC)	<p>Baseline requirement is that of integrating existing services that may be distributed across various government sites in the 1st year of operations.</p> <p>Less than a number of existing services, as decided by MSCL, by the end of the 1st year will constitute a violation of the service level commitment.</p>	<p>The SI will aggressively promote the smart solutions' usage by various Service Providers and government departments.</p> <p>The formal agreement document would be taken as proof of the enrolment of Service Provider.</p>
5	Training and Knowledge Transfer of	Positive feedback regarding quality of training and knowledge transfer, and speed of response	The SI will develop and administer the requisite training and knowledge transfer regarding various Smart City related

	Smart City related interface operations to back-end Government Departments.	from SI, and transfer of documents as per RFP. Below 3 may be considered as poor) regarding Smart City related training, knowledge transfer to back-end government depts. and/or non-responsiveness of SI constitutes a violation of the service level goal.	operations to the stakeholders, and back-end government departments. The success of the Smart City initiative will be critically dependent upon continuous engagement with connected stakeholders.
--	---	---	--

Availability

These metrics related to the Availability Management are to ensure uninterrupted operation of the CCC and DC / DR infrastructure.

Sr. No.	Service Level Metric	Service Level Commitment / Goal	Measurement Method
6	Availability of critical Smart City Services and Infrastructure Components	<p>The critical services such as: Interfaces with the various departments, Intelligent Transport System, etc. along with its associated infrastructure components; will be available all the time on a 24x7 basis.</p> <p>Any individual outage in the first year in excess of 2 hours or sum of outages exceeding 4 hours per month will invite penalty of 0.1 % of quarterly payment per hour subject to a maximum of 5 % of quarterly payment amount. From second year onwards the individual outages in excess of 45 minutes or sum of outages exceeding 2 ¼ hours per month shall be taken for above penalty calculations. Planned outages, maintenance windows, Data Centre downtimes, or force majeure events will not invite penalty, however continuity of service during above should be ensured by SI.</p>	<p>The SI will set-up automated methods and tools for measurement of critical Smart City services and infrastructure availability on a weekly basis, and reporting on a monthly basis. The availability reporting will include all incidents of scheduled and unscheduled outages.</p> <p>Every occurrence of an individual outage > 2 hrs is a separate violation.</p> <p>Similarly, every time the sum of outages exceeds 4 hours, it will constitute a separate violation.</p>

7	Availability of non-critical Services and Infrastructure Components	Any individual outage in excess of 4 hours or sum of outages exceeding 10 hours per month will constitute a violation Planned outages, maintenance windows, Data Centre downtimes, or force majeure events will not constitute a violation, however continuity of service should be ensured by SI.	The SI shall set-up automated methods and tools for measurement of non-critical services availability on a weekly basis, and reporting on a monthly basis. The availability reporting will include all incidents of scheduled and unscheduled outages. Every occurrence of an individual outage in excess of 4 hours is a separate violation. Similarly, every time the sum of outages exceeds 10 hours, it will constitute a separate violation. The list of the non-critical services shall be mutually finalized between MSCL and SI.
---	---	---	---

2.14.4. Security and Confidentiality Requirements

Security Management			
These metrics are necessary to ensure proper security management of the CCC and DC infrastructure, as per ISO27001 standards.			
Sr. No.	Service Level Metric	Service Level Commitment / Goal	Measurement Method
8	Security compromises and exploited vulnerabilities or threats and resolutions, in relation to the CCC and DC solution infrastructure	All security related exploits and resolutions captured through the ISO 27001 compliant ISMS. Security related exploits and resolutions not captured OR ISMS ineffective, would constitute a violation of the service level commitment.	The SI will design and implement appropriate ISMS (Information Security Management System) for the CCC and One Touch Mangaluru Projects in accordance with the code of practice for information security management. Security related exploits & resolution etc. will be measured on a weekly basis and reported monthly. Every breach of security, and every attempt to breach security or exploit a vulnerability or risk, will be reported in the Service Management process.

2.14.5. Data Conversion Requirements

Change Management			
These metrics are necessary for tracking and reviewing all change activities related to the Smart City components from time to time, ensuring quality of the system is maintained.			
Sr. No.	Service Level Metric	Service Level Commitment / Goal	Measurement Method
9	Responsiveness to Requests for Change (RFC)	<p>The SI will provide feedback on the status of the request:</p> <ol style="list-style-type: none"> 1. Within 4 hours of requesting a planned change, during working hours, 99% of the time each month. 2. Within 4 hours of requesting an emergency change, 24 x 7, 99% of the time each month. <p>SI will implement RFC's after conducting suitable impact assessments, according to one of the following categories:</p> <ol style="list-style-type: none"> 1. Within 72 working hours of requesting a planned change. 2. Within 8 hours of requesting an emergency change, 24 x 7. 	<p>The SI will ensure that suitable impact assessments are completed for changes requested, and ensure quality approval is obtained and appropriate testing is performed on the testing environment, before implementing the change in the production environment. The RFC's shall be centrally logged, tracked and status updates provided to the Project Head. RFC's must be assigned and tracked based on impact level and priority level.</p>

2.14.6. Maintenance and Technical Support Requirements

Service Desk & Incident Management			
These metrics are related to the 'situation management' of all major production incidents occurring during the operations of the CCC.			
Sr. No.	Service Level Metric	Service Level Commitment / Goal	Measurement Method
10	Responsiveness and mobilization of the concerned team for the resolution of Reported Outages and Critical Service Incidents	<p>The Service Desk will respond to critical service incidents within 30 minutes, resolve the problem within 2 hours, and update status every 1hour. Missing on any of these metrics on an incident will constitute a violation. Every 1hour taken extra for incident resolution in this case will also constitute a separate violation.</p>	<p>The SI will set-up a Service Desk with contact telephone numbers and emails, and provide it to all the relevant stakeholders. Service Desk functions will include assistance in technical matters pertaining to service interfaces and performance issues. The responsiveness and resolution for the Project availability will be as per the Availability metrics defined above.</p> <p>The SI will also implement an incident and problem management mechanism (appropriate software and database for same to be provided) with priorities assigned to every incident raised, either on the production or testing environments.</p>

11	Responsiveness and mobilization of the concerned team for the resolution of Non-Critical Service Incidents	The Service Desk will respond to non-critical service incidents within 3 hours, resolve the problem within 24 hours, and update status every 5 hours. Missing on any of these metrics on an incident will constitute a violation. Every 24 hours taken extra for incident resolution in this case will also constitute a separate violation. A non-critical incident is defined as a service incident that has no impact on the service quality if not answered or acted upon promptly.	All the service incidents reported, response times, resolution times and status updates will be measured on a weekly basis and reported monthly. Incident reports will be created that track actions with timestamps. These will be measured against the time thresholds.
----	--	---	---

2.14.7. Business Continuity Requirements

Service Continuity			
These metrics are necessary to ensure that critical smart city components and services can be recovered within required and agreed time lines as per the Service Continuity plan.			
Sr. No.	Service Level Metric	Service Level Commitment / Goal	Measurement Method
12	Time taken for re-establishment / replacement of services and/or components in case of failure	In case of a failure, the services will be re-established / components replaced as per Service Continuity Management Plan developed by the SI. Non-compliance to the agreed Service Continuity Management Plan will result in a violation.	The SI is responsible for developing and implementing a Service Continuity (Business Continuity Plan) Management plan to ensure that critical smart city components and services can be recovered within required and agreed time scales. It will provide appropriate contingency management plans containing appropriate resilience strategies, recovery and crisis management, based on minimum service requirements, following an interruption to the CCC service delivery. The Service Continuity (Business Continuity Plan) will be approved by the MSCL.

Sr. No.	Service Level Metric	Service Level Commitment / Goal	Measurement Method
13	Time taken to exercise Business Continuity Plan (BCP)	Contingency measures in place as per BCP. If the contingency measures do not work / not in place, causing continued service interruption, it will constitute a violation.	

2.15. Solution Architecture

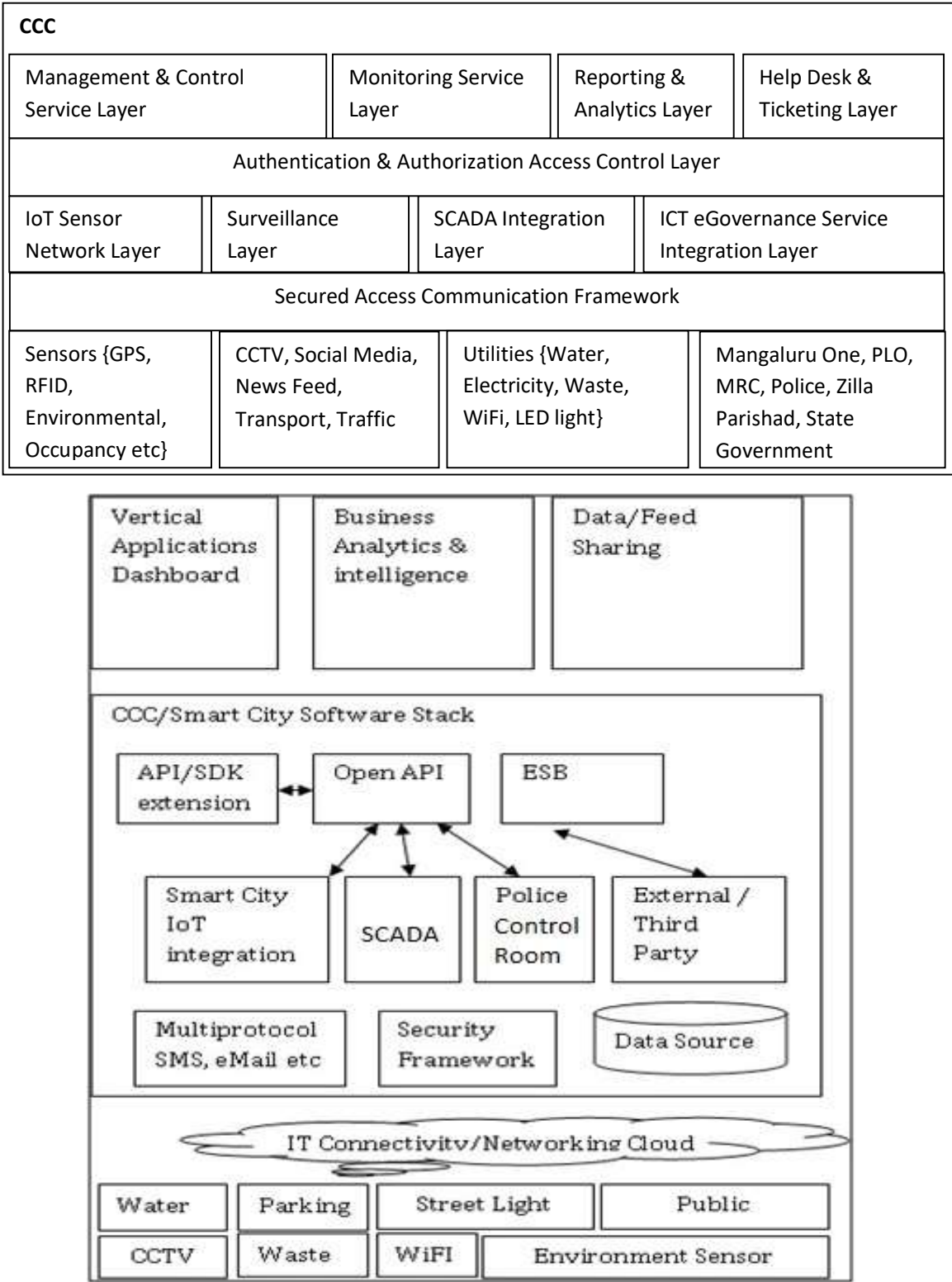


Figure 8. Application Architecture of CCC

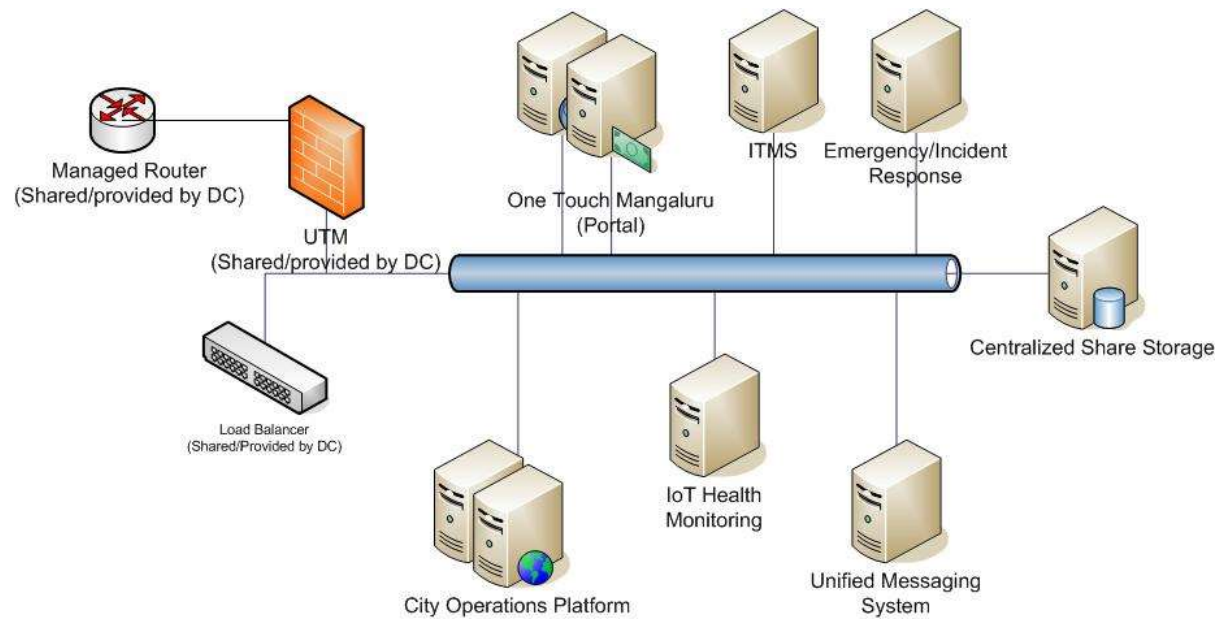


Figure 9. Deployment Diagram of KMDS Data Centre Hosting CCC Platform, One Touch Mangaluru and Supporting Applications

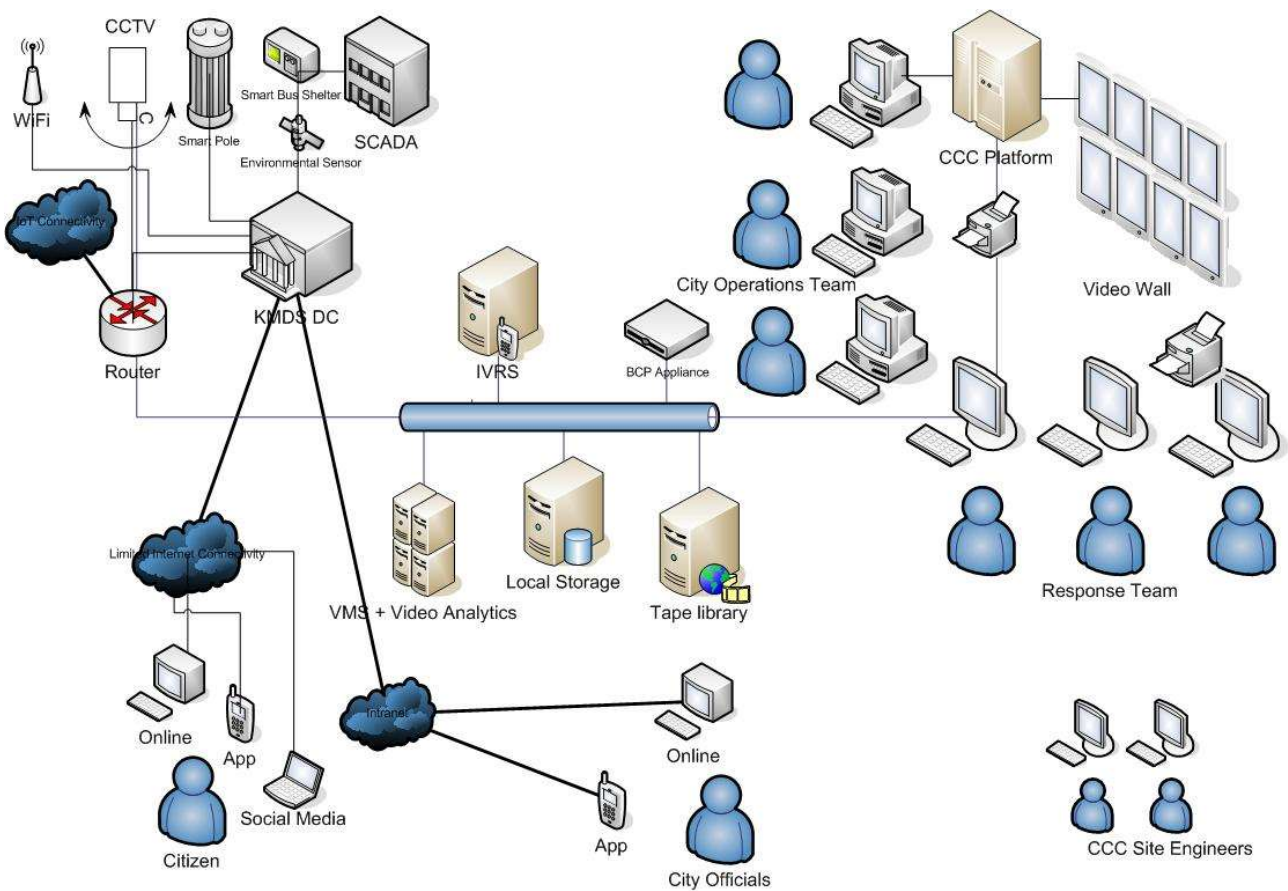


Figure 10. Deployment Diagram of CCC (CCCC + CoC)

2.16. Cost Estimates

Please note that these estimations are work in progress because of following reasons

- KUIDFC recommendation states utilizing KMDS DC services for which rates are not yet communicated. The decision to take VMs for deployment of non-CCC components such as One Touch Mangaluru etc. as against placing servers on collocation will depend upon cost benefit analysis against rates that will be charged per VM vis a vis collocation charges.
- KUIDFC has verbally communicated a tentative charge of INR 10 crores for the Centralized CCC software. A formal communication with cost breakup against features applicable will be required for us to do relative sizing and scoping of implementation.
- KUIDFC recommendation on temporary utilization of DR over cloud for period of 2 years and then migration to DR identified by State is yet to be detailed out.
- City CCC is under civil construction at MCC office. Floor plan with total usable space as well as timelines for its readiness will be taken from MCC before RFP rolling out.

ASSUMPTIONS

- Feed sharing between Police Control room at Kadri and City CCC will be unidirectional and on demand. Necessary arrangements will be made by existing vendor/supplier for Police Control room with no cost to be borne by MSCL/SPV.
- Police officials will be designated to be part of City Operations team at City CCC for city surveillance.
- DR site selected by Karnataka State will be a government Data Centre and along the lines of SDC, will offer DR hosting free of cost. MSCL investment will be on DR software for necessary replications, recoveries and fall back.
- There is no DR setup in terms of City CCC operations. If for any reasons, City CCC becomes unoperational, city operations cannot be moved or migrated to any alternate office. City Surveillance in terms of real time monitoring will become unoperational with CCTV cameras will store feeds locally for the duration the City CCC becomes active again.
- DR services will available for Centralized CCC and will be offered through KUIDFC as it will be uniform for all cities for cloud as well as physical DR site for the duration of the project.
- DR services for One Touch Mangaluru and other Infrastructure components put up by MSCL will be responsibility of MSCL, SI and PMC. Only those cost components are considered as part of DR sizing in this document.
- KSWAN should be having inbuilt redundancy.

(Rupees in Lakhs)						
Costs	Year 1	Year 2	Year 3	Year 4	Year 5	Total
City Level Command & Control Centre (CoC)						
ICT Infrastructure	1259.27965			125.92797	188.819948	1574.10
Smart City SW	235.338	23.5338	23.5338	35.3007	35.3007	353.01
Consumables (Electricity, Phone, printing etc)	20	22	24.2	26.62	29.282	122.10
Manpower	115	126.5	139.15	153.07	168.37	702.09
SubTotal						2751.30
Deployments by City SI at KMDS DC						
Software Development + Application Integrations + O & M Cost of <ul style="list-style-type: none"> • One Touch Mangaluru Portal and App • Intelligent Transport System • Public Information System • Emergency Response System 	264.5	110.25	120.83	132.46	145.25	773.29
Total (CCC + DC + DR)						3524.59

3. Air Quality Monitoring

According to the World Health Organization (WHO), many people worldwide die each year due to air pollution. Many of these deaths occur in cities where exhaust from cars, factories and power plants fills the air with hazardous particles.

In response to a growing concern about the effects of air pollution, many cities have improved their efforts to measure pollution using the Internet of Things (IoT)—networks of connected sensors that gather and send data.

Using this data, cities can map areas of high pollution, track changes over time, identify polluters and analyze potential interventions.

Agenda of smart city should not be just to measure air quality only, but many other factors including traffic, climate and noise, justifying the deployment of an advanced sensor network.

The detailed project report aims to address the rationale behind implementation of air quality sensors in ABD area and connecting the same to Command Control Centre under Mangaluru Smart City Project.

The air quality sensors will be deployed at the locations chosen by Karnataka State Pollution Control Board (KSPCB) in ABD area of Smart City Mangaluru for a period of five years including the operation and maintenance of hardware and integration of software with One Touch Mangaluru Application.

The budget allocated for installation of air quality sensors in ABD area is one crore for a period of five years.

3.1. Project Vision

Air quality monitoring sensors can provide quick data and enable real-time analysis of ambient air pollution that various government officials can leverage for a variety of applications, ranging from adjusting traffic flow in congested areas to providing fitness recommendations based on air quality to other actions.

3.2. Goal of the Project

- The Sensor network established over fundamental of IoT can help in leveraging sensors and analyze data for citizen to understand their exposure to poor air quality.
- The model of air quality monitoring chosen should match that city's needs and capabilities. For example, large scale implementation of low intensity environmental sensor may be able to be considered as a good fit in a city.
- This kind of initiative for an air quality monitoring effort may be a useful first step for such a city to bring awareness to pollution or boost public support for a proposed environmental reform.
- Agenda of smart city should not be just to measure air quality only, but many other factors including traffic, climate and noise, justifying the deployment of an advanced sensor network.
- Technological up-gradations need to be continued to enable sensors to measure more parameters in long run at lower cost, making sensor-based data ever more accessible and useful to cities.

3.3. Smart Objectives

S.M.A.R.T refers to the acronym that describes the key characteristics of meaningful objectives, which are **Specific, Measurable, Achievable, Realistic and Time Bound**

- ✓ **Specific:** MSCL along with KSPCB can propose the locations where environment sensor can be deployed to measure the eight pollutants according to National Air Quality Index so as the common citizen can get information about air quality.
- ✓ **Measurable:** AQI has proposed six categories where the eight pollutants can be classified based values recorded for each pollutant.
- ✓ **Achievable:** Data captured by the Sensors can be mapped with AQI index to help understand common man about the air quality.
- ✓ **Realistic:** Open Web service API can be exposed by the sensor where data logged by the sensor can be transmitted to Command Control Centre which can be displayed on digital signage an integrated with One touch Mobile App /Portal.
- ✓ **Time Bound:** On Hourly basis, data logged by the sensors about the eight pollutants can be processed and various reports can be generated by doing analysis on the real time data.

3.4. Project Overview

3.4.1. Stakeholder's Analysis

3.4.1.1. *Mangaluru Smart City Limited (SPV)/Mangaluru City Corporation*

With real-time alerts generated by environment sensor, government officials can issue warnings and alerts to citizens and other local government bodies to take necessary actions.

Based on the locations proposed by Karnataka State Pollution Control Board of air quality sensors, the feasibility of implementing the same should be decided by the MSCL. MSCL should also take in consideration of the underground cabling work required not only for Environment sensor but also the position of Variable Messaging Display systems in the city.

MSCL can decide whether the sensors can be positioned in phases by selecting the site where both VMD and environmental sensor can be positioned.

3.4.1.2. *Karnataka State Pollution Control Board*

- KSPCB officials will propose the locations where the environmental sensors are to be positioned in the areas densely populated.
- SI who will be emplaned for implementation for One Touch Mangaluru application can integrate the data captured by sensor and project the same on VMD's as per the National Air Quality Index (AQI) launched by the Environment Minister, AQI under 'Swachh Bharat' should be implemented as 'One Number- One Color-One Description' to judge the Air Quality for Common Man.
- KSPCB can direct the SI to generate reports about the pollutants captured by environment sensor emitted by vehicles or commercial establishments.

- KSPCB can issue directions to various local government bodies such as MCC, RTO, Police based on the data captured by the sensor about permissible noise levels at particular decibels and ensure strict implementation of noise rules.

3.4.1.3. *Regional Transport Office, Mangaluru*

RTO based on the data captured by environment sensor can conduct pollution under check initiative of the vehicles which are emitting the pollutants.

3.4.1.4. *Hospitals in Mangaluru*

Health advisory can be issued by Hospitals to people suffering from lung and respiratory diseases like asthma based on data captured by environment sensor aligned with AQI Index.

3.5. **Problems /Issues Addressed**

- Karnataka State Pollution Control Board (KSPCB) has decided to set up continuous ambient air quality monitoring station (CAAQMS) at Kadri in Mangaluru.
- Setting up of such monitoring stations will help in constantly monitoring the levels of air pollution transmitted by various modes of transport.
- Differences between traditional air quality monitoring station and environment sensor are listed below :

3.5.1. **Traditional Air Quality Monitoring station**



Figure 11 : Air Quality Monitoring Station

- **Permanent Infrastructure:** Considerable amount of space is required to set up the monitoring station and cannot be dismantled and ported to other locations.
- **Significant Power Requirements:** considerable amount of power is consumed by station.

- **Large Form factor:** Hard Disk drive Storage required for data captured.
- **High Cost and time required to deploy and service:** Civil works required to deploy the station.
- **Requires onsite monitoring:** Man power is supposed to be deployed for continuous monitoring for the working of the equipment deployed in the monitoring station.

3.5.2. Environment sensor



Figure 12 : Environment Sensor

Compact Size: Environment sensor can be mounted on any pole.

Remote Monitoring: No man power is required to guard the sensor and gather the data captured by sensor. The data can be transmitted through GSM, Wi-Fi to command and Control Centre.

Low Cost: Cost of the environment sensor is approximately 1/10th of traditional air quality monitoring stations.

3.6. Sources of Funding

Table 4. Source of Funding

Smart City Component ID	Smart City Component Name	Budget Estimated in the Smart City Proposal in INR
34	Installation of air quality monitoring sensors and connecting them to command and control centre	1 Crore

3.7. Project Details and Implementation Model

3.7.1. Process and Technology

Step 1: Identification of locations where both environment sensors and VMD's can be positioned based on the inputs from KSPBC and Approval by MSCL (SPV) in consultation with local Departments like MESCOM (For power supply), UGD and Traffic Police.

Step 2: Inspection of locations proposed by various stakeholders for carrying out civil works like erection of poles where the environment sensor can be mounted or VMD where the data captured by environment sensor is supposed to be displayed.

Step 3: Survey of the site by PMC if recommended by MSCL (SPV) based on inputs of KSPCB, Traffic Police and MESCOM.

Step 4: Mounting of environment sensors on the poles and accessing the data captured by the sensor and transmitting the same through GSM/Wi-Fi to Command Control Centre.

Step 5: Processing the data captured by the environment sensor in Command Control Centre and displaying the same in line with AQI on Variable Message Display i.e. digital signage to citizens of Mangaluru and officials to take necessary course of action if any of the parameters captured by environment sensors exceeds the prescribed limit.

3.7.2. People

While approving the locations where the environment sensors have to be positioned based on the locations suggested by KSPCB, MSCL has to consult other local government departments dealing with electricity and underground cabling.

3.7.3. Non-IT Infrastructure

Electrical Wiring and Equipment

The selected SI will have to undertake electrical wiring for environment sensor to be fitted on pole.

3.7.4. Policy Interventions

- MSCL (SPV) along with other authorities should approve the necessary approvals required for civil, cabling and electrical work to be undertaken for deploying the environment sensor.
- RTO and Traffic Police should be notified about the areas where the pollutants emitted by vehicle are at peak and the offenders should be fined for the same.
- The SI would require support for displaying the content in Kannada language.
- The SI would require support from domain experts KSPCB so as to categorize what kind of alerts, reports and messages are to be displayed on digital signage adhered to Air Quality Index.

3.7.5. Capacity Building and Training Plan

- The SI will provide support to install the environment sensor and establishing remote connectivity to command control centre through Wi-Fi or GSM. . The SI will expose Web Service API on the protocols such as HTTP/REST/MQTT as per the Cyber security Model Framework proposed by Ministry of Urban Development. The Web Service which gives real time data of air quality will be integrated with One Touch Mangalore Web Application and Portal.

3.8. Solution Architecture

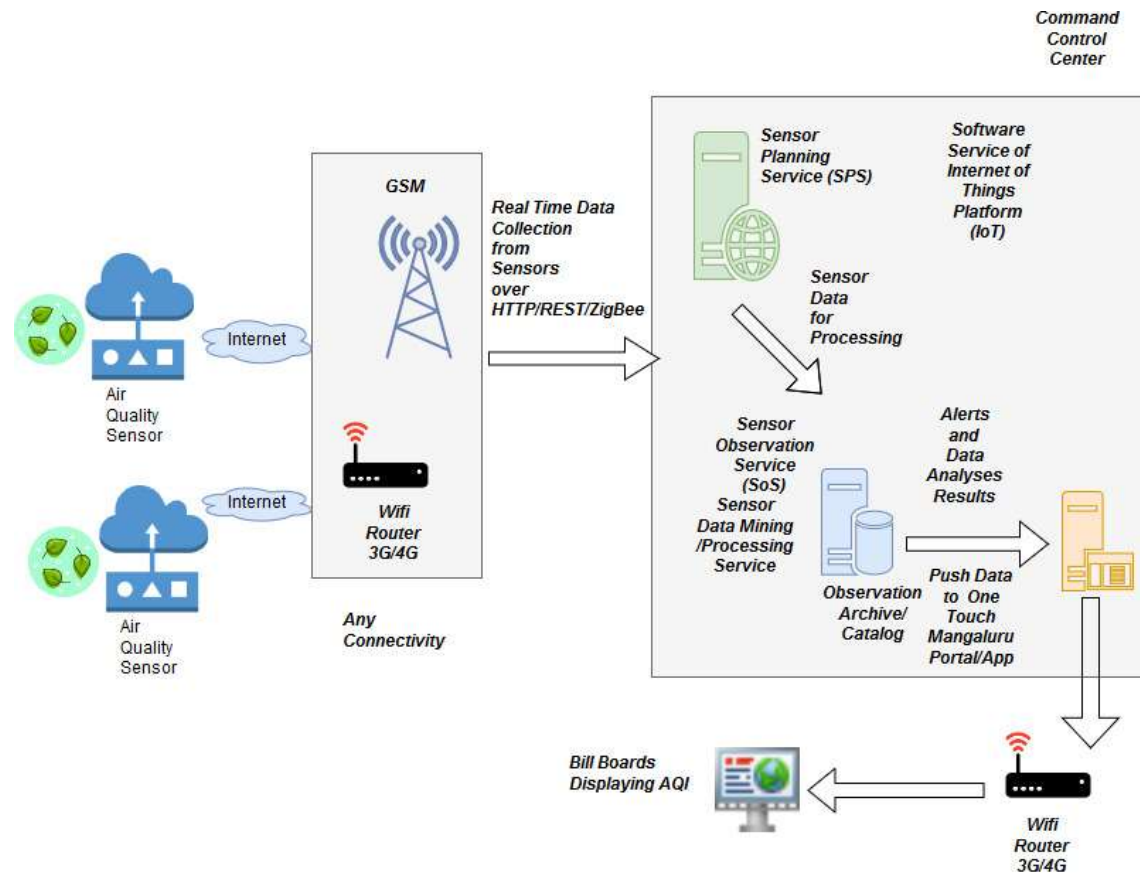


Figure 13 : Architecture of Environment Sensor connecting to CCC

3.9. Technical Solution

This section describes the technical details of the proposed air quality monitoring sensor.

3.9.1. Application Architecture

- The software management platform of environment sensor should allow the configuration of the sensor to the network and also its location details.
- The environment sensors should be able to be monitored and calibrate remotely. This includes sensors being updated with calibration parameters, software upgrades.
- Sensors must also provide updates and detect faults with self-diagnosis functionality.
- Any environment sensor failure should alarm and generate an event that should be linked with Incident Management system automatically and should be capable to schedule the automation of sending the failure report to the SI.
- The environment sensor must ensure data is transmitted securely and have security measures from sensors to the software platform. It must also ensure tamper alerts are provided in cases of wreckage, security breaches, etc.

3.9.2. Data Architecture

- The sensors provided should be 99% accurate and should of industry standards

- Calibration system should be provided for the calibration of the air quality analyzers, data acquisition system.
- The data collected should also be available on permitted mobile devices as necessary
- Generation of reports for pollution load, wind etc. should be available.
- Real time or averaged data can be viewed quickly and easily client interface on the central computer.
- It should have a feature for viewing instantaneous and historical data in the form of tables and graphs either locally or from a remote client.
- Data collection by environment sensor is done every minute and transmission is configurable in time intervals like 1 min, 15min, 30min, and 1hr.

3.9.3. Network Architecture

- The internet connectivity for the solutions will be provided with through wireless or wired connections.
- The IP of the sensor will be white listed in the Wi-Fi router placed in the smart pole.
- The IP of the Wi-Fi routers will be white listed in the server where the data captured by environment sensor is stored and processed and displayed on the digital signage.

3.9.4. Deployment Architecture

- Environment sensor should be shock resistant and hard-wearing enough to be deployed in open air areas, on streets and Parks.
- Area covered by environment sensor depends on the weather and wind parameters, obstruction and buildings surrounding the area of interest etc. However it is assumed that one device covers 1 sq. km.
- Environment sensor should be positioned 15 meter away from source and other interferences. The height where the environment sensor should be positioned should be greater than 3m (Preferably between 3 to 10m). Double the height of nearby wall/obstructed, free from obstruction with free flowing air.
- They should withstand high temperature not more than 50 degree Celsius and less than -10 degree Celsius.

3.9.5. Security Architecture

The sensor deployed and the API exposed by the sensor for data transmitting to Command Control Centre will undergo security audit.

- The IT components used in the sensor,
 - will undergo hardening.
 - will have least privileged access
- Latest stable version of the necessary software patches should be updated and installed without physical access.
- Ensure proper backups and system and event logs are generated as per the defined SOP's.

- Monitoring the health of the system.
- Report any intrusion/incident occurred while using the sensor and report to SI.

3.9.6. Interfaces

- Open API's Interface will have to be exposed by SI by using HTTP/MQTT/REST/XML to enable quick integration with One Touch Mangaluru application, thereby providing access to data and displaying the same on digital signage.
- Integration of environmental monitoring system with Variable messaging system to be displayed wherever possible.
- RESTful APIs, System Integrator can fetch the data using these APIs and store in their database. Based on the frequency the data and alerts to the user can be displayed on the VMD. Location wise data is available. Device can be configured for a particular location. Same details can be displayed on the VMD.

3.9.7. Linkage with Core Infrastructure

- ✓ Data captured by the environment sensor will be stored in the server present in Command Control Centre.
- ✓ The internet connectivity (GSM-3G/4G or Wi-Fi) of environment sensor at field level will to Command Control Centre internet will be provided through the smart city component 100% IT connectivity in ABD areas.

3.10. Organization Structure

Staffing and Deployment Strategy

The selected SI will have to depute personnel at site within 24 hrs in case of any incident related to software and hardware occurs. If any of the device or part of sensor malfunctions, the SI with his OEM's support should replace the same within stipulated time.

3.11. Monitoring and Evaluation

Monitoring and evaluation (M&E) is a method that helps improve performance and get results. Its goal is to improve current and future management of outputs, outcomes and impact. It is mainly used to assess the performance of projects and programs set up by governments. It establishes links between the past, present and future actions.

The Air Quality Index is proposed under Swachh Bharat One Number- One Color-One Description' to judge the Air Quality for Common Man is a perfect solution for monitoring the data captured by environment sensor and improve the future by taking necessary steps to further evaluation.

AQI (Air Quality Index) formulated by the Central Pollution Control Board along with State Pollution Control Boards is an effective tool for dissemination of air quality information to people. There are six AQI categories, namely: Good, Satisfactory, Moderately polluted, Poor, Very Poor, and Severe. The range and associated health risks for each category are as follows:

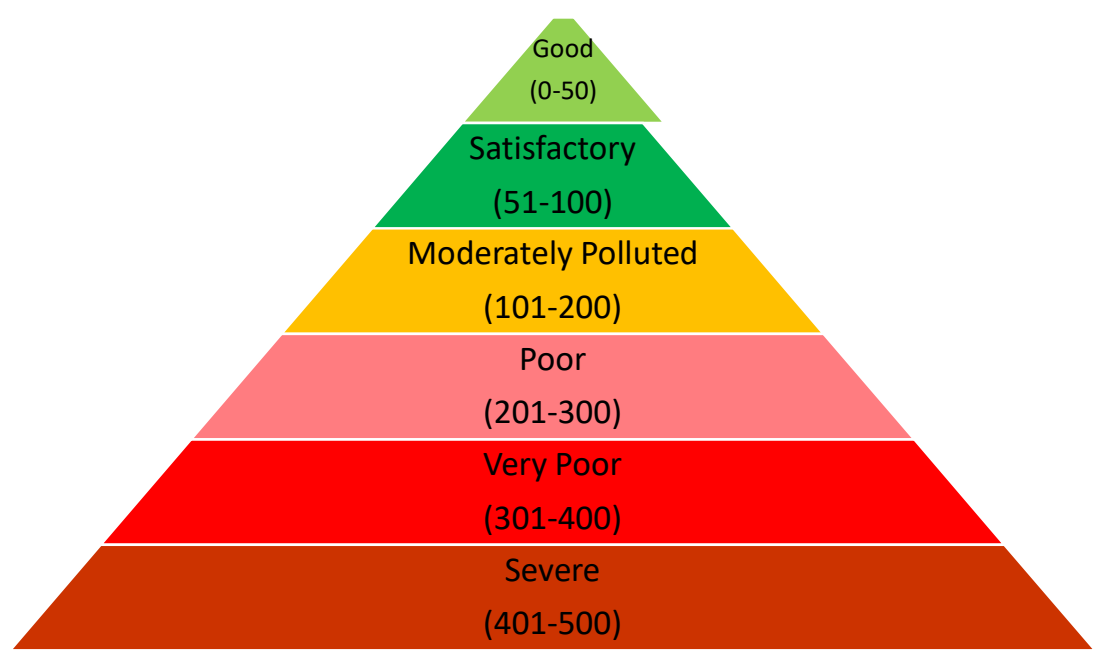


Figure 14 : AQI Index



Figure 15 : Associated Health Impacts as per AQI

3.12. Assumptions & Risk Management

Assumptions are factors that have an influence on the achievement of project objectives. They need to be managed for achievement of activities, outputs and objectives.

Risk is the potential for unwanted happenings impairing the achievement of objectives and outputs.

The risk mitigation measures that would be planned and executed should be indicated against each of the risks identified. Also, the stakeholders/ personnel involved in performing these mitigation activities are listed.

Risk Assessment Matrix

Table 5. Risk Assessment Matrix

Risk	Stakeholders involved	Description of Risk	Risk mitigation measure
Management of Environment Sensor at Street Layer	SI,MSCL	Since the Environment sensor will be mounted in street pole or integrated with VMD, SI may refuse to repair the sensor in case of any failure.	Technical Support Escalation Matrix will be in place so as to contact SI/OEM in case of any disruption or failure in IT service.
Power Outage	MSCL,SI	Due to Power failure, sensor might not work.	Proper SLA's need to be defined so as to resolve the incident by concerned party (if it is power outage local government body dealing with electric supply should be responsible).
Poor Internet Connectivity	MSCL,SI	Due to poor IT connectivity, data captured by environment sensor will not be transmitted back to Command Control Centre.	Offline storage or temporary storage should be present in environment sensor device by the SI.
Hacking of the environment sensor and misusing the IT connectivity supplied to the sensor	SI	Internet and IT assets might be compromised by any kind of security breach.	White listing of IP or MAC ID of the sensor device should be white listed in the internet router. Stringent IT policy should be laid down. Logs of the router should be checked by SI so as to check the Internet usage by the sensor.

3.13. Project Costs and Financing

Table 6. Cost Estimate

Capex + Opex (Budget INR Lakhs)	Year 1	Year 2	Year 3	Year 4	Year 5	Total cost	GST (28% on hardware devices)	Total cost including GST
Cost of One Environmental Sensor	8	1.6	1.6	1.6	1.6	14.4	4.032	18.432

Operating Expenditure (Opex) per year - 20% of the Capex cost of one environment sensor

GST for IT Services (Software) (18%) - <http://meity.gov.in/gst-it-ites>

GST for Electronics Sector Hardware(28%) -<http://meity.gov.in/GST/gst-electronics-sector-hardware>

Development of Software in O&M phase:

- *Development of API's based on the MSCL requirement of integration with Web or Mobile Application.*
- *Customized events and report generation.*
- *User specific roles and access to be allocated to monitor sensor.*
- *Development of dashboard which would give real time analytics of the data trend over period of time.*
- *Device status - online ,offline, error prone*

Hence GST is calculated on total cost of one Environmental Sensor (Capex+Opex).

Costing of IT Connectivity from Edge Level Devices on field to Command Control Centre will be taken from budget allocated to Smart City Component ID 27 : 100% IT Connectivity. GSM/ Low power Long range wireless WAN or connectivity provided for smart poles can be taken.

The proposed total count of sensors is 5. The exact location where the sensors can be positioned on smart poles will be listed at time of floating RFP.

3.14. Geographic Locations of Environment Sensors in ABD area

Table 7. Sensor Locations

Sl. No.	Locations	Coordinates
1.	Jyothi Circle, Hampankatta	12.87261, 74.84853
2.	Clock Tower, Balmatta	12.86555, 74.84017
3.	Nireshwalya Road, Bunder	12.85879, 74.83403
4.	Crescent English Medium School, Bunder	12.86897, 74.83236
5.	B E O Office South,Bolar	12.84724, 74.84465

Environment Sensor Locations in ABD Area of Mangaluru

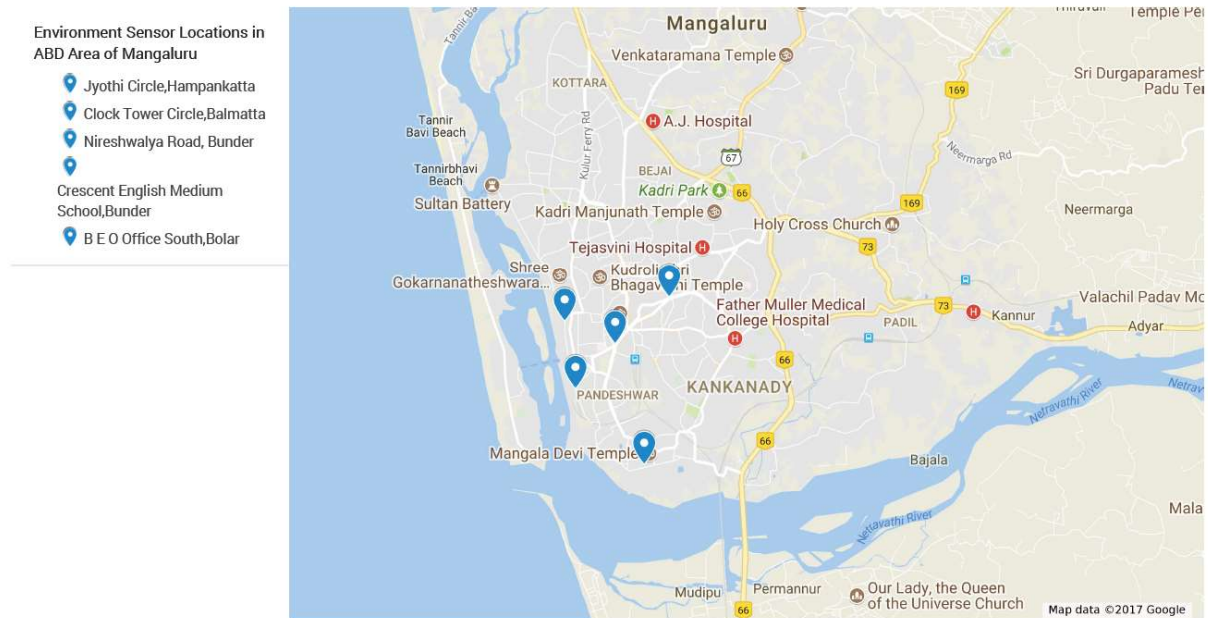


Figure 16 : Location of Environment Sensor

3.15. Technical Specification of Environmental Sensor

Category.	Features	Range	Resolution / Remarks
Gas Sensors	Particulate Matter PM 2.5	0 – 500 µg/ m ³	± 5 µg/ m ³
	Particulate Matter PM 10	0 – 1000 µg/ m ³	± 5 µg/ m ³
	Carbon Monoxide (CO)*	0 – 31000 ppb	100 ppb
	Nitrogen Dioxide (NO ₂)*	0 – 300 ppb	10 ppb
	Ozone (O ₃)*	0 – 400 ppb	10 ppb
	Sulphur Dioxide (SO ₂)*	0 – 700 ppb	10 ppb
	Nitric Oxide (NO)* (Optional)	0 – 300 ppb	10 ppb
External Mount Sensors (Optional)	CO2	0...5000 ppm	
	UV	0-30 UVI	
Environmental Sensors	Humidity	20% – 80% RH	
	Temperature	-40°C – +85°C	
	Sound	40 dBA – 75 dBA	
	Light	1 – 188000 Lux	
Connectivity	GSM/GPRS	3G	Either GSM / Wi-Fi
	WIFI	2.4GHz and 5 GHz	Either GSM / Wi-Fi
	Ethernet	10 / 100 baseT	
	USB 2.0		
Physical Attributes	Ruggedness	IP 6X compliant, High durability, ingress and shock protection	

Category.	Features	Range	Resolution / Remarks
	Power supply	110VAC – 264VAC or 9 – 16 V DC	
	Ambient Operating Temperature	-20°C – +50°C	
	Humidity	15% – 85% RH	
	Enclosure	UV shielded industrial housing molded fiberglass reinforced polyester	
	Color	RAL 7035 light gray	
	System weight	< 6 kgs	
	Dimension (L x W x H)	L 30cm x W 25cm x H 15cm	Compact housing
	Certifications	CE, FCC, PTCRB	
	Warranty	1 year	
Software	Cloud Connectivity / Infra	Optional	
	API Interface		
	OTA update		
	Data uplink rate to cloud	Configurable (1 Min to 1 Hour)	
	Device Management	Clients and Universality	
	Data backup	Configurable up to 5 days	
	Remote monitoring, fault detection and self-diagnosis		
External Interfaces / add-on accessories	Mounting	Pole or Wall mount	
	Splash guard and Sun shade		
	Battery power pack	DC power provisions	Optional external battery (12V / 40Ah / 36W)
	Solar power pack	12V DC power from Solar panel	Optional

Mangaluru being part of the coastal environment the environment sensor should undergo salt spray test, humidity test in accordance to IEC 60068-2-52, ISO 16750-4, and IEC 60068-2-78.

3.16. Sustainability Plan

- To maintain constant process of generating periodic evaluation of air pollution situation in city.
- To determine status and trend in ambient air quality and effects of air pollution in city.
- To estimate the future worsening or improvement of air quality and to obtain the knowledge and understanding necessary for developing preventive and corrective measures.
- To determine whether the prescribed ambient air quality standards are violated and to assess health hazard, damage to resources and to control and regulate pollution from various sources.

3.17. Expected Outcomes and Benefits of the Project

- Mangaluru One Touch Portal can show the real time air quality of the area as depicted below:

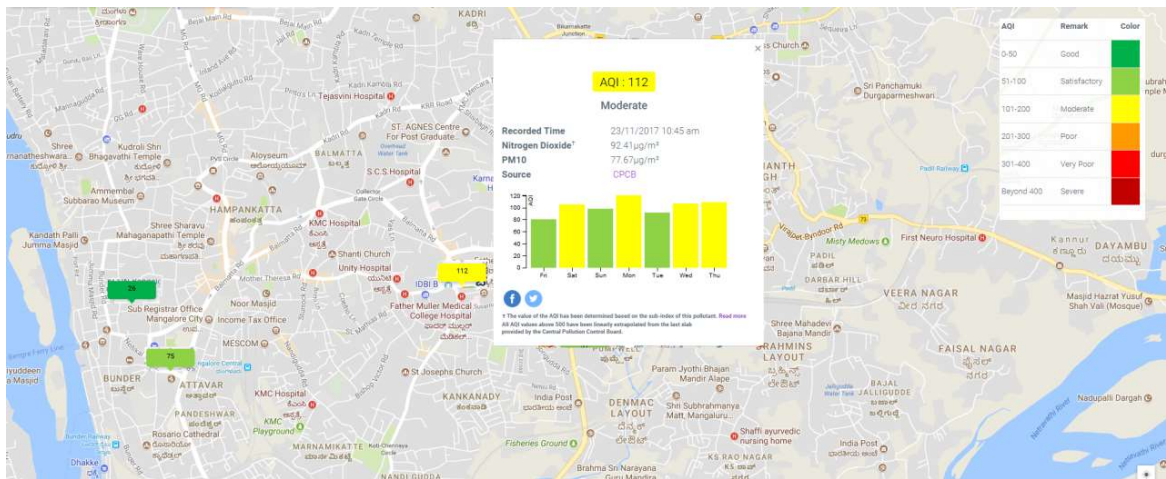


Figure 17 : Proposed snapshot of the real time AQI displayed on One Touch Mangaluru Portal

- Similarly Mangaluru One Touch Web App can depict the status of air quality in real time and get forecasts for the next day. Health advisory can be issued based on the readings recorded by the sensor as shown below :

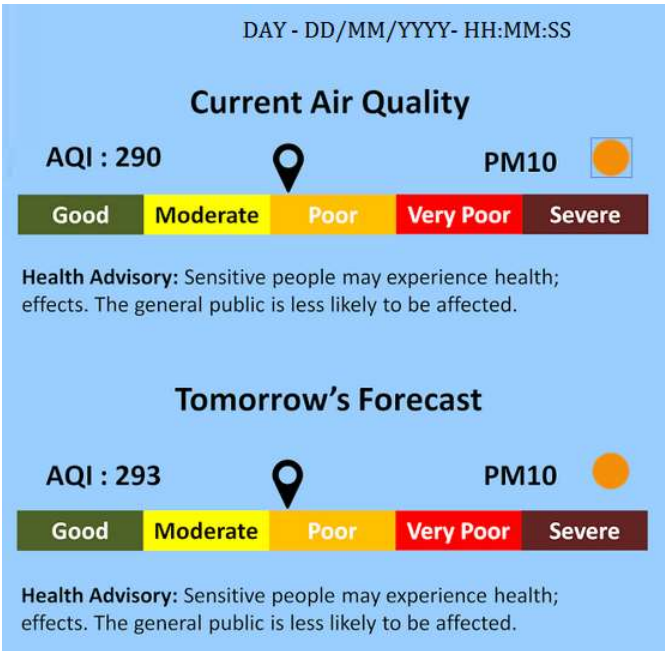


Figure 18 : Proposed snapshot of real time AQI displayed on One Touch Mangaluru App

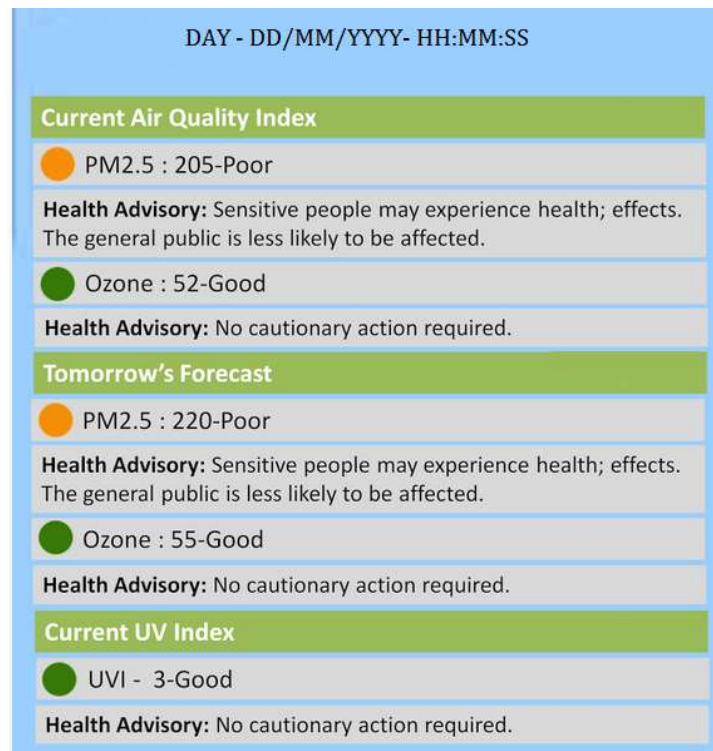


Figure 19 : Health advisory issued to citizens based on current value of AQI

- Notices/advisories can be issued to industrial outlets like hotels ,factories which are emitting the pollutants like PM 10 and PM 2.5
- RTO in collaboration with KSPCB can regulate the traffic flow and fine the vehicles which fail to surpass the Pollution under check criteria.
- Citizens can choose the least polluted route to office using the air quality and weather forecasting using One Touch Mangaluru app.
- It will protect public health on a daily basis from the negative effects of air pollution and help public understand what the air quality around them means to their health.
- One Touch Mangaluru App/Portal can provide alerts on extreme weather events and extreme pollution day if the sensors deployed in the various locations of Mangaluru City are integrated with App/Portal deployed in the Command Control Centre.
- Digital display board will display the AQI information in both English and Kannada.



Figure 20 : Variable Message Board displaying values of Particulate Matter PM2.5 and PM10 and Current value of Air Quality Index along with Color Code and Value understood by citizens

4. One Touch Mangaluru

The vision of these smart city projects is to address a number of weaknesses of the city that were identified by the authorities in consensus with the citizens in the Mangaluru Smart City Proposal. The weaknesses that are intended by the project to be taken care of are:

- Connectivity
 - Public Transport System inefficiency
 - Poor walkability and street safety
 - Lack of ICT initiatives, automated services and monitoring systems for service delivery
- Urban Form & Infrastructure
 - No CCTV surveillance to enhance safety
- Environment & Tourism
 - Under-developed Tourism Sector

Intelligent Transport System will cover the public mobility support by providing the information on bus transport with possible future enhancements such as portable ticketing as well as synchronized signaling etc.

Intelligent eGovernance Service Delivery will provide the services provided by multiple in-line departments through a single window app as well as portal so that the knowledge of available services as well as the services themselves could be given to the citizens seamlessly.

ICT and Disaster Management System will automate the real-time information flow as well public awareness and proactive alerting in case of occurrence of any disastrous incident mitigating the impact of the disaster on the citizens and public property.

The project needs to clear the four broad eligibility tests for smart city project proposals. These tests probe the project alignment with (i) eGovernance Standards (<http://egovstandards.gov.in/>); (ii) Cyber Security Requirement for Smart City - Model Framework (iii) Best practices (iv) Karnataka Transparency in Public Procurements Act 1999 and Rules 2000 and Procurement Reforms.

The project aims to attain following principles in its own conceptualization as well as to propagate the same principles in the implementation of the project by the selected implementation agency.

4.1. Organizational Principles

- Maximize benefit to the Government as a whole
 - All decisions relating to information management are made to provide maximum benefit to the Government as a whole. Some organizations may have to concede their own preferences for the greater benefit of the entire Government.
 - Applications and components should be shared across organizational boundaries.

- Information Management is Everybody's Business. Enterprise Architecture is Architecture of Architectures.
 - All organizations in the Government participate in information management decisions needed to accomplish business objectives, and implement such decisions with full commitment, devoting the right and adequate resources. Smart City has a federated structure. It will focus on guidelines, mandates, standards, interoperability and integration.
 - The option of designing Smart City projects as a single, monolithic architecture is infeasible and hence REJECTED. Respective Domain Owners and Managers shall develop their own sub-architectures following these principles, and federate the same to the CCC.
- Common Use of Applications
 - Development of applications used across the Government is preferred over the development of similar or duplicative applications, which are only specific to a particular department or organization. Given below are the existing applications developed under the varied government agencies' umbrellas aiming to automate a part of citizen service delivery.

Table 8. eGovernance Services to be Integrated with One Touch Mangaluru

Sr. no.	Existing Citizen Applications to be Integrated in One Touch Mangaluru
	MRC Online Services
1.	Janahitha (Grievance Application)
2.	Vyapar (Trade License Application)
3.	Nirmana (Building License Application)
4.	Jalanidhi (Water Connection Application)
5.	Property Tax Calculator
6.	E-Aasthi
7.	Birth-Death Registration
8.	Search Property (Property Tax MIS Reports)
9.	FBAS (Fund Based Accounting System)
10.	MIB (Monthly Information Booklet)
11.	SLB (Service Level Benchmarking)
12.	Street Vendor
13.	Scheme for ULBs and CCs
14.	AKM (Asha Kirana Mahithi)
15.	OVP (Official Vacancy Position in ULBs)
	MangaloreOne Online Services
16.	Mangaluru City Corporation – Water Tax

Sr. no.	Existing Citizen Applications to be Integrated in One Touch Mangaluru
17.	Mangaluru Electricity Supply Company (MESCOM)
18.	RPO - Generate ARN
19.	CellOne
20.	Bharat Sanchar Nigam Limited (BSNL)
21.	E-Filing of Returns
22.	Airtel (Mobile Post-Paid)
23.	Airtel Landline Bills
24.	Vodafone (Mobile Post-Paid)
25.	Exide Life Insurance
26.	KSRTC
27.	Bangalore University
28.	PUC Applications
29.	Mangaluru City Corporation– Property Tax
30.	Karnataka Building and Other Constructions Workers Welfare Board
31.	E-Procurement
32.	Govt/Private Job applications
33.	Police Verification Services
34.	DISH TV
35.	RTO
36.	EPIC CARD
37.	UIDAI
38.	Government Department Forms
39.	IDEA
40.	MTS
41.	Food and Civil Supplies
42.	Karnataka Housing Board
43.	CSC Services
44.	Reliance Communications Services
45.	EESL
	MCC Software Systems
46.	Malaria Control Management System
47.	Property Tax Management
48.	Smart SWM

Sr. no.	Existing Citizen Applications to be Integrated in One Touch Mangaluru
49.	Biometric Attendance
50.	PLO (eOffice with Citizen Services)
	Department Software Applications
	MESCOM
51.	Urja Mitra Applications
	Mangaluru City Police
52.	Traffic Notifications
53.	Report Incident
54.	Missing Persons
	Transport Department, Karnataka
55.	PUC Checking Record
	eBiz Karnataka
56.	Karnataka Udyog Mitra (KUM)
	Karnataka Housing Board
57.	Sakala (Building Plan Approval, Sale Deed, Refund, GSC Status Check)
	Department of Public Instruction
58.	School Report Cards
	Public Works Department
59.	Geographical Information System (GIS) based Road Information System (RIS) for PWP & IWT Road Network
	Department of Ports and Inland Water Transport
60.	Sustainable Coastal Protection and Management Investment Program (SCPMIP)
	Department Food, Civil Supplies & Consumer Affairs
61.	Online Ration Cards Processing System
	Commercial Taxes Department
62.	VATSoft for Commercial Taxes
	Rural Development and Panchayat Raj
63.	Pancha Tantra
	Atalji Janasnehi Kendra Project
64.	Nada Kacheri
	High Court of Karnataka
65.	High Court LMS
	Revenue Department

Sr. no.	Existing Citizen Applications to be Integrated in One Touch Mangaluru
66.	BHOOMI
67.	Bhoomi-BhooSwadeena(Integration with Land Acquisition Department)
	Women and Child Development Department
68.	Bhagyalakshmi
	Panchayati Raj Institutions
69.	e-Yojane
	Karnataka Mobile One
70.	Utility
71.	Banking
72.	Police
73.	Child Labor Tracking
74.	Transport
75.	Telecom
76.	Healthcare
77.	Travel
78.	Passport
79.	Employment
80.	Taxation
81.	Registrations
82.	Safety
83.	Grievance
84.	Municipal
85.	Agriculture
86.	B2C
87.	SAKALA
88.	EDUCATION
89.	POST
90.	Foreigner
91.	HRMS
92.	E-Procurement
93.	Backward Classes
94.	Khajane II
95.	Aadhaar

Sr. no.	Existing Citizen Applications to be Integrated in One Touch Mangaluru
96.	Election Commission of India
97.	Legal

- Service Orientation
 - The enterprise architecture is based on a design of services which mirror real-world activities required to conduct the business of Government. Service orientation places unique requirements on the infrastructure, and implementations should use open standards to realize interoperability and location transparency. Adherence to the eGovernance Standards published by Ministry of Electronics and Information Technology does ensure that.
 - The every smart city solution should provide the Application Programming Interfaces (APIs) for the easy integration with other systems and for the use of future stakeholders that require data exchange and/or service provision from the solution.

4.2. Data Principles

- Data should circulate among the entities as freely as possible, following the principle of seamless access to all those authorized to use it.
- All data should conform to the data definition standards notified, so as to promote interoperability and to minimize the ETL efforts.
- A well-designed Data Governance Model should be put in place, specifying the 'owners' and 'users' of each dataset.
- Above all, data should be secure from loss, corruption, unauthorized access, theft and misuse.
- Data is an asset that has a specific and measurable value to the Government and is to be managed accordingly.
- Users have access to the data necessary to perform their duties; therefore, data is shared across enterprise functions and organizations. It is less costly to maintain timely, accurate data in a single application, and then share it, than it is to maintain duplicative data in multiple applications. Shared data will result in faster and improved decisions since we will rely on fewer sources (ultimately one virtual source, i.e. the Single Source of Truth) of more accurate and timely managed data for our decision-making.
- Each data element has a trustee accountable for data quality. As the degree of data sharing grows and departments rely upon common information, it becomes essential that only the data trustee makes decisions about the content of data, and authorizes its modification. Information should be captured electronically once and immediately validated as close to the source as possible. Quality control measures must be implemented to ensure the integrity of the data.
- Data is defined consistently throughout Government, and the definitions are understandable and available to all users. Defining Metadata and Data Standards (MDDS) within each domain assumes great significance. Ministry of Electronics and Information Technology has

published standards for Metadata as well as other key priority areas in eGovernance Service Delivery such as:

- Policy on Open Standards
 - Metadata & Data Standards
 - Localization and Language Technology Standards
 - Information Security
 - Technology Standards on Interoperability
 - Biometrics
 - Digital Signatures
 - Enterprise Architecture
 - Quality & Documentation
- Data Security - Data is protected from unauthorized use and disclosure. In addition to the traditional aspects of national security classification, this includes, but is not limited to protection of pre-decisional, sensitive, source selection-sensitive and proprietary information.
 - Open sharing of information and the publication of information as per extant legislation must be balanced against the need to restrict the availability of classified, proprietary and sensitive information.

4.3. ICT and Disaster Safety Components

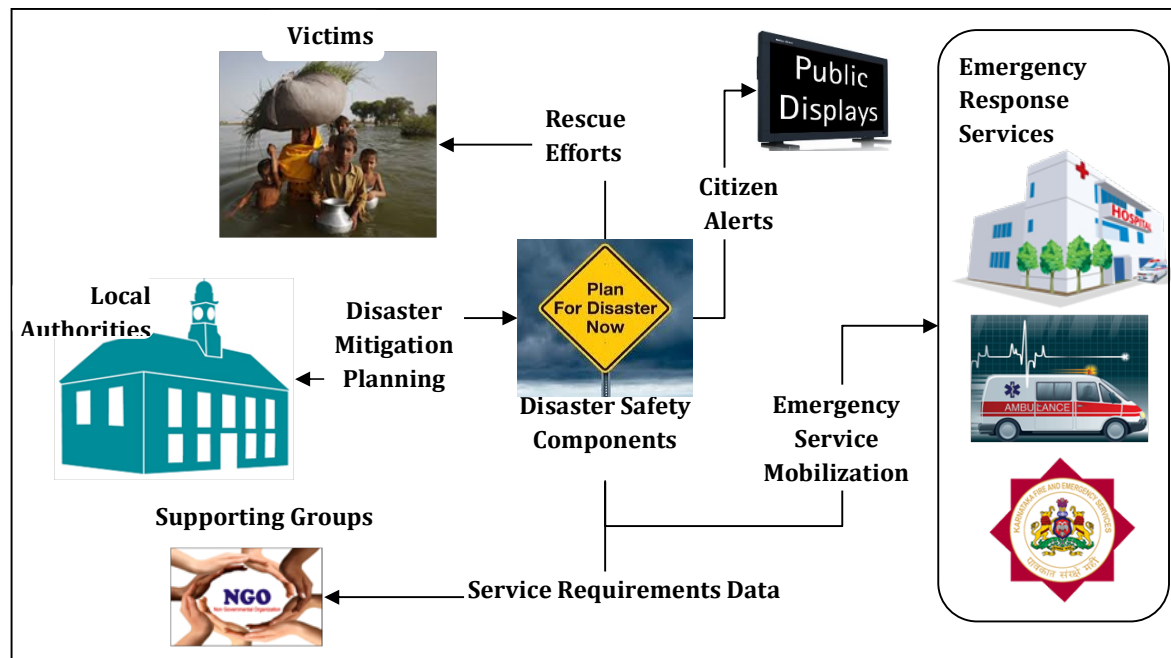


Figure 21. Disaster Management and Emergency Response

The disasters happen due to catastrophic events resulting into a major disruption of services and complete normal life cannot be achieved for a substantial period of time. Some examples of such events are war, earthquakes, acts of terrorism, etc. They happen due to disastrous events where overall city infrastructure may have total shut down and complete processing capability of all business processes may be down. Some examples of such events are floods, rain, fire, riots, power

shutdown, etc. The Disaster Management Act 2005 reiterates paradigm shift in Disaster Management from rescue, relief centric approach to Preparedness, Early Warning approach. The first important steps towards reducing disaster impact are to correctly analyze the potential risk and identify measures that can prevent, mitigate or prepare for emergencies.

ICT plays a significant role in highlighting risk areas, vulnerabilities and potentially affected populations by producing geographically referenced analysis through geographic information system (GIS). There are a number of initiatives taken by the governments such as:

- National Database for Emergency Management (NDEM) which is a GIS based repository of data to support disaster/emergency management in the country.
- India Disaster Resource Network (IDRN) is a nation-wide electronic inventory of resources that enlists equipment and human resources, collated from districts, states and national level line departments and agencies.
- Karnataka State Natural Disaster Monitoring Centre (KSNDMC) has objectives: (i) Hazard mapping and vulnerability studies; (ii) Monitoring and impact assessment of Natural Hazards; (iii) Human Resource Development; (iv) Natural Disaster Early Warning System.

The System providing for the requirements of the project, “ICT and Disaster Safety Components” will be part of CCCC and will be integrated with the Portal, One Touch Mangaluru, on which the Role-based Access will be provided to the Stakeholders at CoC.

Incident Management

- Citizen reports incident through following mediums: One Touch Mangaluru, Land line number of City Operations Team etc
- City Operations Official to be able to validate incident using CCTV footage, News reporting, Social media outlets (Twitter, facebook etc)
- City Operations Officials, as per SOP, invokes Automated Vehicle Dispatch of Ambulance, Police Patrolling vehicle. Communication will also be shared with officials over email, sms and whatsapp and through One Touch Mangaluru Notifications
- City Operations Official to mark incident response as closed or completed in accordance with SOP the incident reported is addressed to its logical end.
- Citizen to file grievance, complaint about the way the incident was managed.
- MSCL to get daily, weekly, monthly report on the incidences, grievance etc

Disaster Management

- City Operation Official will be notified of Disaster (Flood, Epidemic, Refinery spillage etc) by external agencies such as National Disaster team, State Disaster team, Weather Dept, Health Dept, Coast Guard, Refinery, NRSC etc
- City Operations Official, in accordance with SOP, will notify city officials through One Touch Mangaluru notification, whatsapp, email, sms and also initiate automated vehicle dispatch as deemed necessary.
- Advisories are issued to citizens through Unified Messaging System (VMD, PA, etc.) One Touch Mangaluru, SMS, Whatsapp, Social Media outlet (Facebook, Twitter etc).
- Field team undertakes operations and reports progress to the City Operations team through One Touch Mangaluru
- Lessons learnt are recorded and preventive as well as corrective action plans are updated in the SOP
- MSCL to get consolidated report at the completion of the disaster management.

ICT Interventions

- GPS in Emergency Response vehicles such as Police Patrolling vehicles, Ambulance, MCC Response vehicle etc
- API integrations with Social Media outlets, News outlets
- CCTV at critical locations
- Environmental Sensors at critical locations
- One Touch Mangaluru
- API integrations with National Disaster Management system, State Disaster Management System

4.3.1. Use Cases

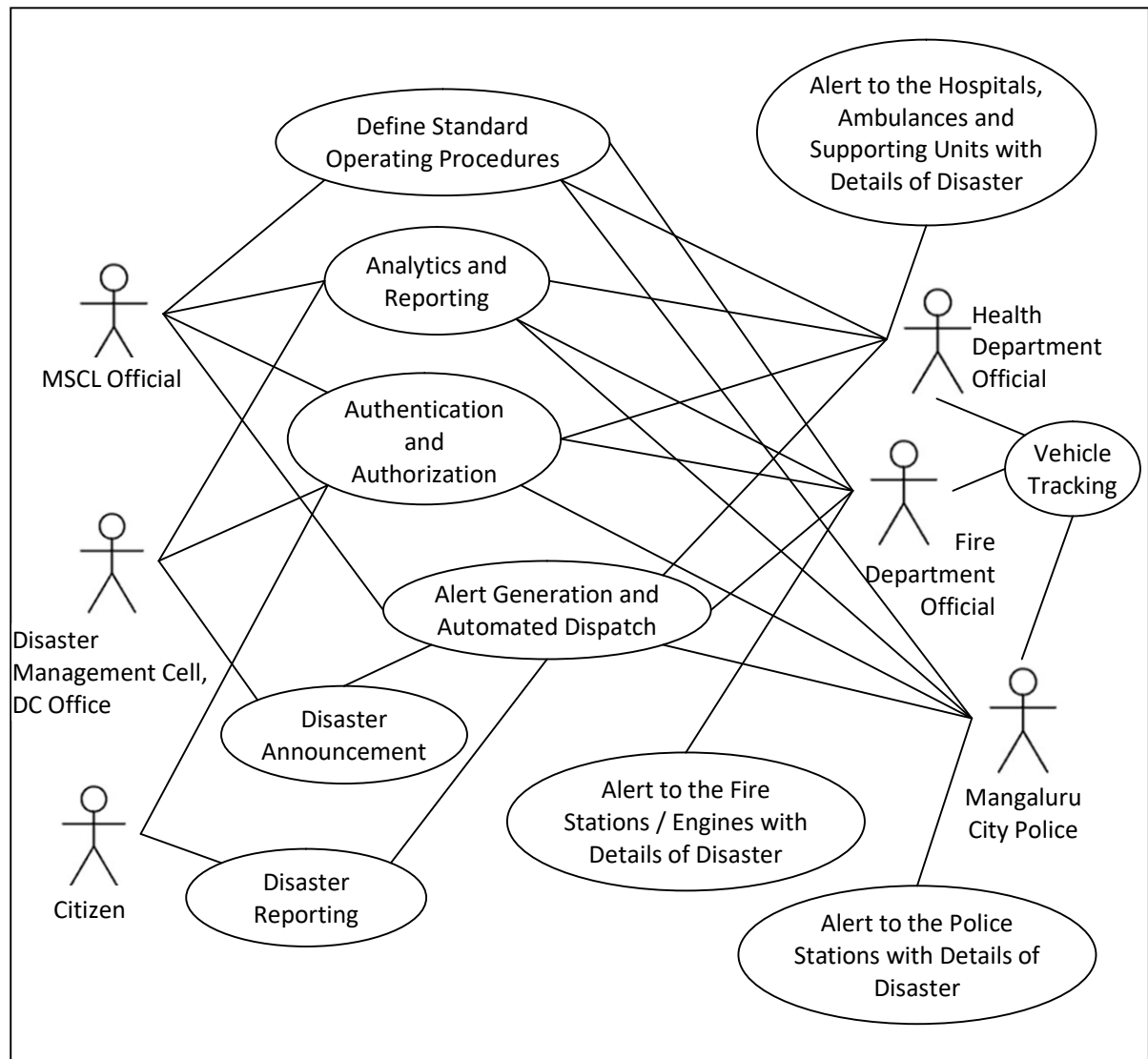


Figure 22. Use-Cases for Disaster Management (Emergency Response) System (part of One Touch Mangaluru)

The use-case diagram depicts the interfaces provided to each of the stakeholder involved in the Disaster Management and Emergency Response System of the Mangaluru Smart City. The disaster based on the impact will be required to be announced by the authority, DC Office.

A disaster is classified under two main categories, Natural Disaster and Manmade Disaster. The disaster can be identified proactively or reactively. The proactive disaster management will require predictive analysis to be submitted by the concerned departments, for example the warning about cyclone by the weather department. The reactive disaster management will need to initiate a firefighting process for mitigation of its impact. Citizens reporting incidents using emergency call numbers 100/108 will be also handled under the scope of this project.

The smart city project, “ICT and Disaster Safety components” will have two distinct components:

1. Proactive (Predictive) Disaster Management

2. Reactive Disaster Management

Table 9. Use-Cases for Disaster Management (Emergency Response) System (part of One Touch Mangaluru)

Use Case ID	Use Case	Actor	Benefit / Impact	Priority	Phase
UC_DM_1	Disaster Announcement	Disaster Management Cell, DC Office	Disaster announced along with the details such as the type and impact.	1	I
UC_DM_2	Define Standard Operating Procedures	<ul style="list-style-type: none"> MSCL Official Fire Department Official Mangaluru City Police Disaster Management Cell, DC Office 	Facilitations of Business Process Reengineering based on user feedback.	1	I
UC_DM_3	Analytics and Reporting			1	I
UC_DM_4	Alert to the Hospitals, Ambulances and Supporting Units with Details of Disaster	Health Department Official	Proactive Readiness of the hospitals and supporting institutions such as Blood Bank etc.	1	I
UC_DM_5	Alert Generation and Automated Dispatch	<ul style="list-style-type: none"> Health Department Official Fire Department Official Mangaluru City Police 	Immediate action on the incident / event reporting.	1	I
UC_DM_6	Vehicle Tracking		Emergency Response Vehicle Tracking and ensuring timely service provision.	2	II
UC_DM_7	Alert to the Police Stations with Details of Disaster	Mangaluru City Police	Immediate action on the incident / event reporting.	1	I
UC_DM_8	Alert to the Fire Stations / Engines with Details of Disaster	Fire Department Official		1	I
UC_DM_9	Authentication and Authorization	<ul style="list-style-type: none"> Health Department Official Fire Department Official Mangaluru City Police Disaster Management Cell, DC Office 	Role based Access Framework	1	I
UC_DM_10	Disaster Reporting	<ul style="list-style-type: none"> Citizen 	Emergency	1	I

Use Case ID	Use Case	Actor	Benefit / Impact	Priority	Phase
			Reporting Call		

4.3.2. Standard Operating Procedure

To comply with:

- Standard Operating Procedure for Disaster Management (www.ndma.gov.in/images/policyplan/NDMA-SOP-for-Disaster-Management.pdf)
- National Disaster Management Plan (NDMP), published by National Disaster Management Authority, Government of India.
- Manual on Administration of State Disaster Response Fund (SDRF) and National Disaster Response Fund (NDRF) (<http://dm.karnataka.gov.in/circulars.php>)

Standard operating procedures will be finalized by the selected LSI in consultation with the client and stakeholder departments.

4.4. Public Mobility (Intelligent Transport Management System)

Public Mobility App is part of the One Touch Mangaluru Smart City Project. It includes the effective provisioning of various services to the citizens as seamlessly as possible. The objective thus essentially includes the higher level of automation and integration of multiple technologies leading to an integrated platform such as an Intelligent Transportation System (ITS). ITS provides innovative services relating to different modes of transport and traffic management and enable various users to be better informed and make safer, more coordinated, and 'smarter' use of transport networks.

The Intelligent Transport System will include following components:

1. Transport Data Updation with possible integration with the Regional Transport Office (RTO) Mangaluru.
2. Public Mobility App
3. GPS based vehicle tracking of the local transport buses to give availability of buses across a number of routes.
4. Bus tracking data to be displayed to the Public Display Boards positioned at Smart Bus Shelters as well as other traffic junctions.
5. Tourist information dissemination at the selective Public Display Boards.

The System providing for the requirements of the project, “Public Mobility App” will be deployed at CCCC and will be integrated with the Portal, One Touch Mangaluru, on which the Role-based Access will be provided to the Stakeholders at CoC.

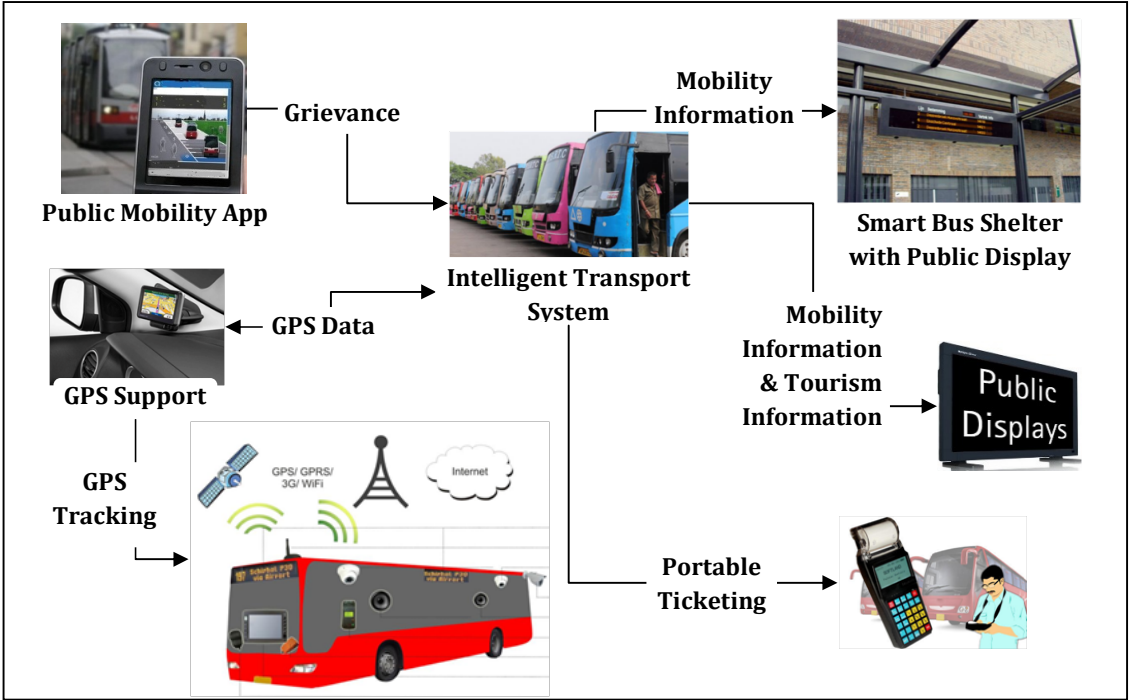


Figure 23. Public Mobility in Mangaluru Smart City

4.4.1. Use Cases

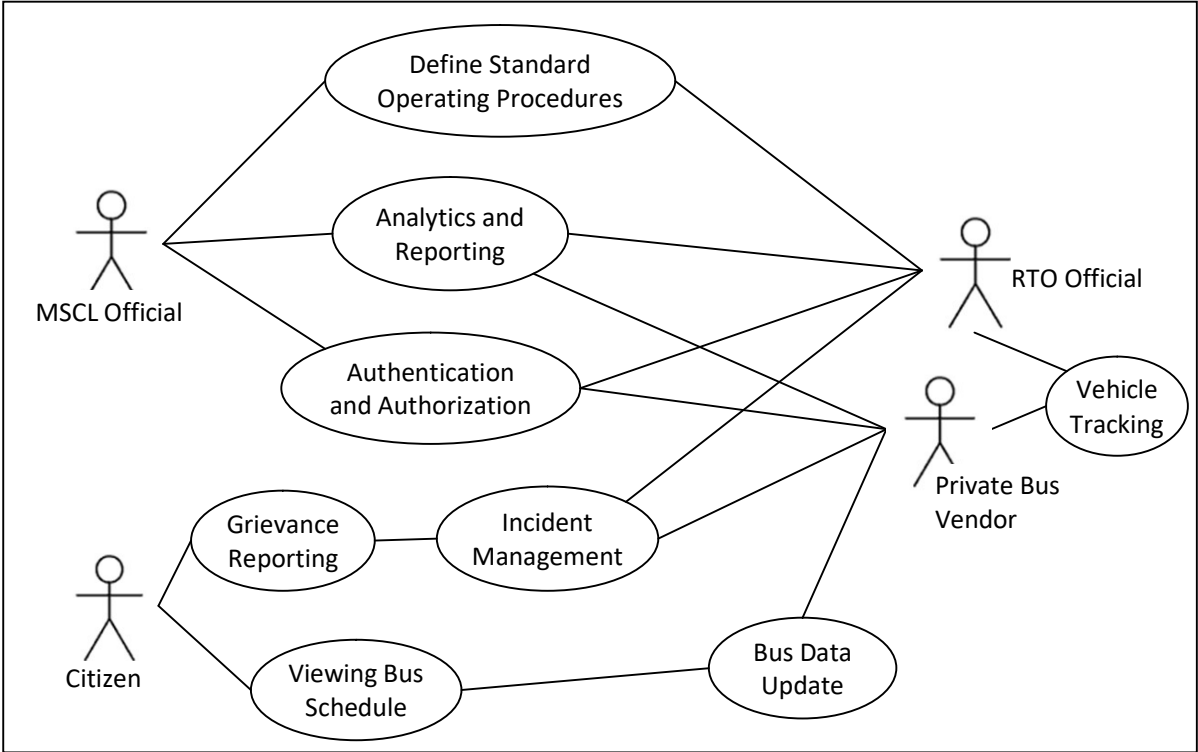


Figure 24. Use-Cases for Intelligent Transport Management System (ITMS) (Part of One Touch Mangaluru)

Table 10. Cases for Intelligent Transport Management System (ITMS) (Part of One Touch Mangaluru)

Use Case ID	Use Case	Actor	Benefit / Impact	Priority	Phase
UC_ITMS_1	Define Standard Operating Procedures	<ul style="list-style-type: none"> MSCL Official RTO Official 	Facilitations of Business Process Reengineering based on user feedback.	1	I
UC_ITMS_2	Analytics and Reporting			1	I
UC_ITMS_3	Authentication and Authorization	<ul style="list-style-type: none"> MSCL Official RTO Official Private Bus Vendor 	Role-based Access Framework.	1	I
UC_ITMS_4	Vehicle Tracking	<ul style="list-style-type: none"> RTO Private Bus Vendor 	Ensuring the transport availability for citizens.	1	I
UC_ITMS_5	Viewing Bus Schedule	Citizen	Ease in Travel Planning.	1	I
UC_ITMS_6	Grievance Reporting		Immediate action on the incident / event reporting.	1	I
UC_ITMS_7	Incident Management	<ul style="list-style-type: none"> RTO Private Bus Vendor 		1	I
UC_ITMS_8	Bus Data Update	Private Bus Vendor	Data Updation in ITMS.	1	I

Bus Shelter

- Citizen to be able to see the upcoming buses with estimated time of arrival on the PIS
- Citizen to be able to locate closes bus shelter on One Touch Mangaluru App
- Citizen to be able to use eToilet with prepayment at select bus shelters
- Citizen to be able to file complaint/grievance about bus shelter, etoilet

Private Buses

- Private bus movements to be tracked and monitored on One Touch Mangaluru by officials and bus owners
- Bus Operator/Owner to be able to see the status of video feed sync on One Touch Mangaluru
- Bus Operators/Owners/Citizen to be able to issue SOS and request for emergency support in event of breakdown or accident/incident etc
- Citizen to be able to file complaint about Rash driving, Bus not halting at Bus Shelter, Harrassment etc through One Touch Mangaluru

Parking

- Citizen to be able to see the vacant parking space available on One Touch Mangaluru in the MLCP
- Citizen to get Towing notification on One Touch Mangaluru for parking in noparking zone.
- Citizen to make online payment for challan, parking etc

Junction Improvements

- City Officials to configure automated schedule for switching on, off and dimming of Street lights
- Citizen be able to invoke SOS button from Smart Poles
- City official to get notification for SOS along with location details and be able to alert Incident Responding team through automated dispatch system and/or One Touch Mangaluru in accordance with SOP

ICT Interventions

- Upgradation of Street lights with controllers configurable for scheduled and remote on, off and dimming facility
- Implementation of Smart Poles with WiFi, CCTV, SOS button etc at few select junctions, Landfill site.
- GPS devices along with GSM modules in Buses to be procured by Bus owners
- Integration of GPS with ITMS and One Touch Mangaluru
- Integration with Payment Gateway
- Integration with automated dispatch for Tow Vehicle, Police vehicle, ambulance etc
- MIS report about number of trips by bus in the day

4.4.2. Standard Operating Procedure

Intelligent Transport Systems (ITS) are globally proven to optimize the utilization of existing transport infrastructure and improve transportation systems in terms of efficiency, quality, comfort and safety. Having realized the potential of ITS, Government bodies and other organizations in India are presently working towards implementing various ITS services across the country. The first steps taken for creation and implementation of ITS was a National Workshop titled “*User Requirements for Interactive ITS Architecture*”, which was conducted as a collaboration between SIAM and ASRTU on 26th -27th February 2015. This was primarily for Public Bus Transportation. The workshop helped to create the “*National Intelligent Transport System Architecture and Policy for Public Transport (Bus)*”, which was submitted by ASRTU and SIAM to the government.

Association of State Road Transport Undertakings (ASRTU) is an apex coordinating body working under the aegis of Ministry of Road Transport & Highways Govt. of India. Society of Indian Automobile Manufacturers (SIAM) is the apex Industry body representing leading vehicle and vehicular engine manufacturers in India.

To comply with:

- Appendix I of ‘Intelligent Transportation Systems (ITS) - Requirements for Public Transport Vehicle Operation’, AIS-140/D1, July 2016,
https://araiindia.com/hmr/Control/AIS/82201693742AMDraftAIS140_DraftD1_26July2016.pdf.

The Standard Operating Procedures are to be finalized by the SI with the client and concerned Stakeholder Departments.

4.5. Hardware & GPS Support

A GPS tracking unit will use the Global Positioning System to determine and track its precise location, and hence that of its carrier, at intervals. The recorded location data will be then transmitted to the Intelligent Transport Management.

System server(s) using a cellular (GPRS or SMS), radio, or satellite modem embedded in the unit. This allows the asset's location to be displayed against a map backdrop either in real time or offline mode using GPS tracking software.

The ‘Hardware and GPS Support’ component of the pan city project ‘One Touch Mangaluru’ is an infrastructure component to facilitate the other 3 majorly software oriented components under the same project. The hardware will cover:

- a) the deployment architecture for:
 - a. ‘One Touch Mangaluru (dual access)’ project which includes the single window web portal as well as mobile app including:
 - i. MCC Citizen Interface App
 - ii. Public Mobility App
 - iii. ICT and Disaster Safety Components
 - b. Intelligent Transport Management supporting ease in Public Mobility
2. Public Display Boards

3. GPS Tracking Units and Supporting Devices

4.6. MCC Citizen Interface App (eGovernance Service Integrations)

ICT Based Intelligent Governance System will help citizen to access multiple governance services at the touch of a smart phone. Existing eGovernance Services offered by various Government bodies are:

- MRC Online Services (16 no.s) managed by KMDS
- MangaloreOne Online Services (30 no.s) managed by CeG
- MCC Software Systems (5 no.s) managed by various SIs
- Department Software Applications (19 no.s +) managed by State NIC and/or in-line State Departments
- Karnataka Mobile One (28 no.s Clusters) managed by CeG + SI

The Integrations based on the APIs which are to be published by the implementing agencies (CeG, state NIC, MRC and MCC) in consensus with the in-line departments have been discussed with the corresponding agencies. The integration with One Touch Mangaluru will be based on the SOA-based architecture.

The application will be designed for all three major mobile OS platforms and will be available for free download. The system will serve as a single electronic platform with 24x7 connectivity intending to avoid multiple visits to the administrative offices. There are a number existing services designed and developed by different agencies and deployed at multiple locations. To avoid duplication of efforts and to use the already developed components, the integration efforts at multiple levels will be put.

The System providing for the requirements of the project, “MCC Citizen Interface App” will be part of CCCC. The System APIs of the service providing departments will be integrated with the Portal, One Touch Mangaluru, on which the Role-based Access will be provided to the Stakeholders at CoC.

Other than the service listing given above the MCC requires two systems for “Projects/Works Tracking and Monitoring” and “Asset Management”. The KMDS has conveyed that they are working on these systems and they will be made available to the Municipal Corporations of the State of Karnataka. The interfacing with the systems will be based on the mechanism provided by KMDS, either having independent instance for each city or otherwise.

4.6.1. Use Cases

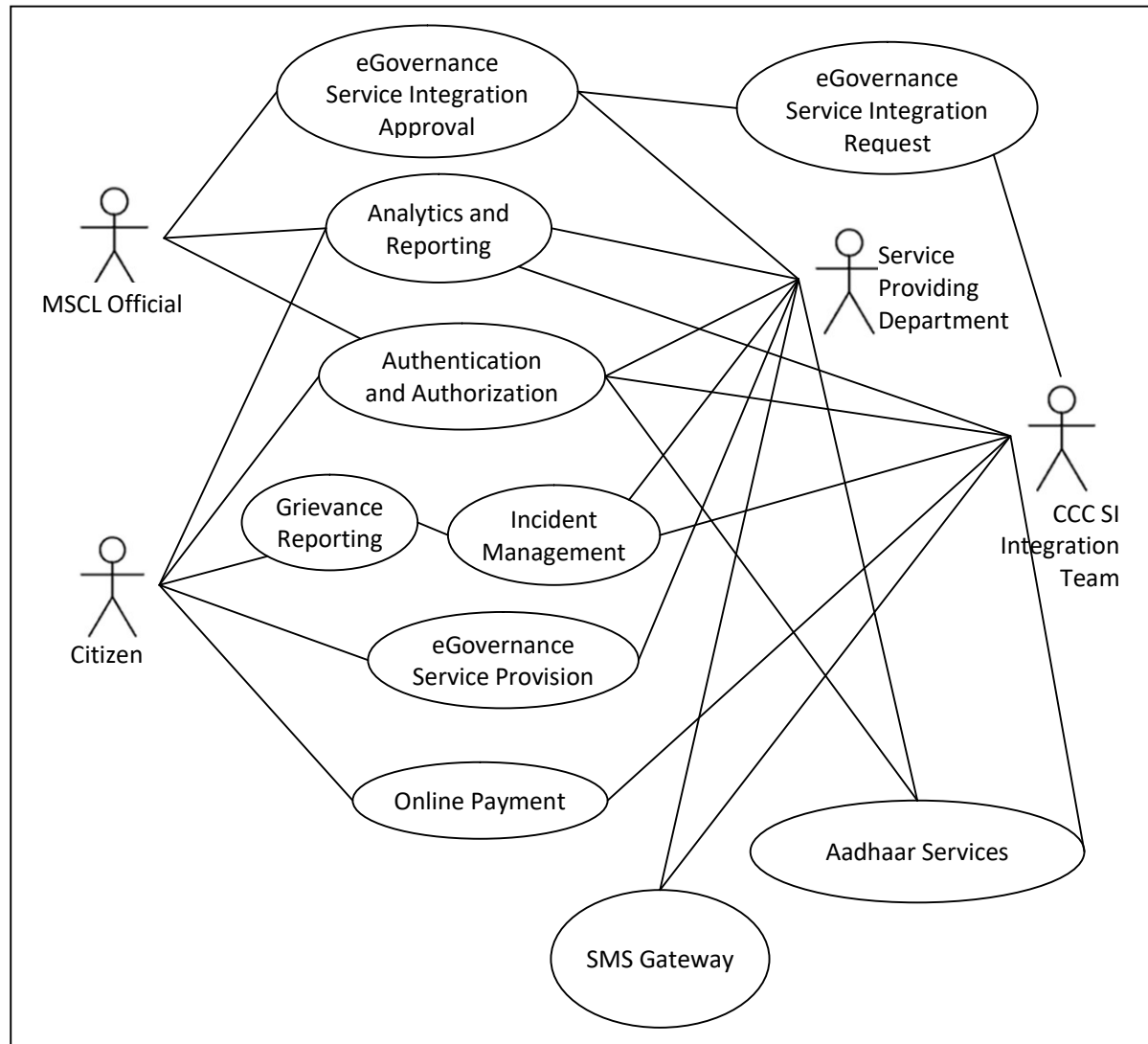


Figure 25. Use-Cases for eGovernance Service Interface (Part of One Touch Mangaluru)

Table 11. Use-Cases for eGovernance Service Interface (Part of One Touch Mangaluru)

Use Case ID	Use Case	Actor	Benefit / Impact	Priority	Phase
UC_eGov_1	eGovernance Service Integration Request	CCC SI Integration Team	Facilitations of eGovernance Service usage from one stop window	1	I
UC_eGov_2	eGovernance Service Integration Approval	<ul style="list-style-type: none"> MSCL Official Service Providing Department 		1	I
UC_eGov_3	Authentication and Authorization	<ul style="list-style-type: none"> MSCL Official Service Providing Department 	Role-based Access Framework.	1	I
UC_eGov_4	Analysis and Reporting	<ul style="list-style-type: none"> Citizen CCC SI Integration Team 	eGovernance Service Transaction Details	1	I
UC_eGov_5	eGovernance Service Provision	Citizen	eGovernance Service usage from	1	I

Use Case ID	Use Case	Actor	Benefit / Impact	Priority	Phase
			one stop window		
UC_eGov_6	Grievance Reporting		Immediate action on the incident / event reporting.	1	I
UC_eGov_7	Incident Management	<ul style="list-style-type: none"> Service Providing Department CCC SI Integration Team 		1	I
UC_eGov_7	SMS Gateway	<ul style="list-style-type: none"> Service Providing Department CCC SI Integration Team 	Status update, especially Aadhaar authenticated citizens	1	I
UC_eGov_7	Online Payment	Citizen	Facilitating Cashless Transactions	1	I
UC_eGov_7	Aadhaar Services	<ul style="list-style-type: none"> Service Providing Department CCC SI Integration Team 	AUA-ASA and/or KUA-KSA based services for authentication as well for eGovernance Service Provisioning.	1	I

4.6.2. Standard Operating Procedure

To comply with:

- Guidelines for Indian Government Websites, January 2009, NIC, Ministry of Electronics and IT, Government of India
https://darpg.gov.in/sites/default/files/Guidelines_for_Government_websites_0_0.pdf.
- 'Citizen Centric Administration: The Heart of Governance', Second Administrative Reforms Commission: Twelfth Report, February 2009
<https://darpg.gov.in/sites/default/files/ccadmin12.pdf>

The Standard Operating Procedures are to be finalized by the SI with the client and concerned Stakeholder Departments.

4.6.3. MCC: Projects/Works Tracking and Monitoring

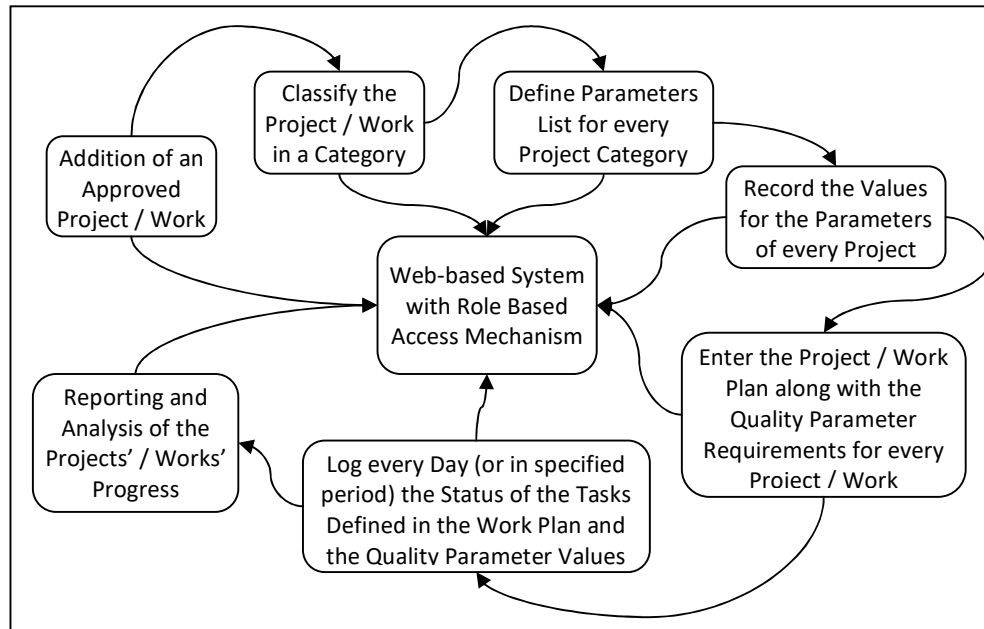


Figure 26. MCC Works Monitoring

Monitoring and Controlling Project Work involves tracking the actual project performance with the planned project management activities. It can mainly be looked as a Control function that includes continual monitoring of a project i.e. from Initiation through Closing. Project Management is more stringently required for large projects where the project manager requires a formal effort to monitor and control how the processes are going.

- This process of monitoring and controlling project work requires controlling of the progress, timelines, as well as the quality of the project. The desired quality levels cannot be compromised to complete the project on time.
- The time-level monitoring of the project work needs to measure the progress against the project / work plan submitted by the project implementer and approved by MCC.
- The quality level may be measured based on the performance metrics / SLAs defined for every project / work by MCC.

4.6.4 MCC Asset Management

The MCC Asset Management Software System includes the registry of both tangible assets (such as buildings, malls etc.) as well as intangible assets (such as human capital, intellectual property, and/or financial assets). Asset management is a systematic process of deploying, operating, maintaining, upgrading, and disposing of assets cost-effectively.

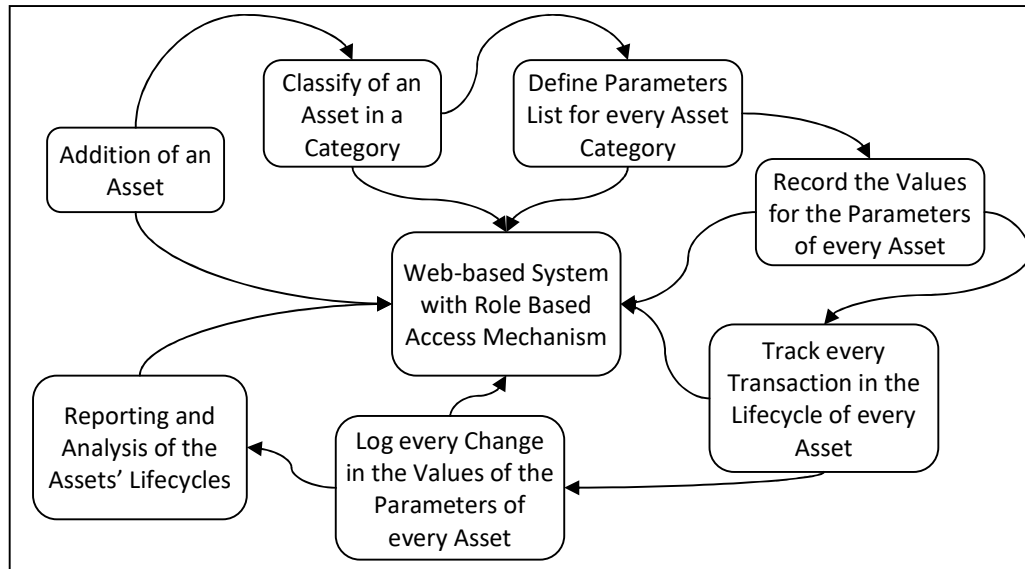


Figure 27. MCC Asset Management

The MCC Asset Management requires the assets of all the departments to be managed. Its short list of the possible assets may include:

- Physical asset management: the practice of managing the entire lifecycle of physical assets that are managed by each of the departments under MCC.
- Infrastructure asset management: in relation to public sector, utilities, property and transport systems. Management of the entire lifecycle of the infrastructure assets such as structures, production and service plant, power, water and waste treatment facilities, distribution networks, transport systems, buildings and other assets. It is related to asset health management. GIS data of the structures needs to be added too.
- Fixed assets management: an accounting process that seeks to track fixed assets for the purposes of financial accounting.
- IT asset management: the set of business practices that join financial, contractual and inventory functions to support life cycle management and strategic decision making for the IT environment.

The System providing for the requirements of the projects, “MCC: Projects/Works Tracking and Monitoring” and “MCC: Asset Management” will be deployed at CCCC. The System APIs of the service providing departments will be integrated with the Portal, One Touch Mangaluru, on which the Role-based Access will be provided to the Stakeholders at CoC.

KMDS/MRC is implementing Asset Management and Projects/Works Tracking and Monitoring. Details are awaited from them to understand scope of their implementation for necessary approval from MSCL/MCC/SPV on adopting same for MCC.

4.7. Project Implementation Model and Timelines

- **One Touch Mangaluru** will have **integrations at data level** with the in-line departments' back-ends through **programmatic interfaces**.
- The interface with **One Touch Mangaluru** though **web-based access or mobile app** for the citizen as well authorities needs to have **same usage scenarios**.
- **Intelligent Traffic Management** and **Emergency Response Systems for Disaster Management** will be implemented in **Prototyping Model** so that the authorities and the citizens can be involved to attain the maturity as well as appropriateness in the usage of the system. Once the pilot implementation is approved the citywide implementation has to be undertaken.
- **MCC Asset Management** and **MCC Projects/Works Management** software will be configured as per MCC's requirements.

Table 12. One Touch Mangaluru Timelines

Timelines						
Task no.	Task	Predecessor	From Time	Duration	Deliverable	Responsible
Design & Development Phase (SI Workflow)						
1.	Requirements Phase					
1.1	Requirements Gathering	-	T_0^2	4 Weeks	Functional Requirements Specifications (FRS)	SI
1.2	Requirements Analysis	1.1	T_0	6 Weeks	Software / System Requirements Specifications (SRS)	
1.3	Requirements Specification	1.2	T_0	7 Weeks	Approved SRS	
1.4	SRS Approval	1.3	$T_0 + 7$ Weeks	1 Week	Approved SRS	SPV + PMC
2.	Design Phase One Touch Mangaluru					
2.1	Design Analysis	1.4	$T_0 + 8$ Weeks	2 Weeks	Deployment Architecture + Software Design Descriptions (SDD)	SI
2.2	Data Design	2.1	$T_0 + 8$ Weeks	1 week		
2.3	Architecture Design	2.1	$T_0 + 9$ Weeks	1 week		
2.3.1	Security Architecture Design	2.2, 2.3	$T_0 + 9$ Weeks	1 week		
2.3.2	Deployment Architecture (Web + Mobile App) Design	1.4, 2.1, 2.3.1	$T_0 + 10$ Weeks	1 week		
2.4	Application Integration Design	1.4, 2.2, 2.3	$T_0 + 11$ Weeks	2 weeks		
2.4.1	Application Integration Architecture Design for CCC (CCCC + CoC)	2.2, 2.3.1	$T_0 + 11$ Weeks	1 week		
2.4.2	Application Integration	2.2, 2.3.2	$T_0 + 11$	1 week		

² T_0 – Time when SI is awarded the contract.

Timelines						
Task no.	Task	Predecessor	From Time	Duration	Deliverable	Responsible
	Architecture Design for One Touch Mangaluru		Weeks			
2.4.3	Enterprise Application Integration Design	2.4.1, 2.4.2	T ₀ + 11 Weeks	2 weeks		
2.5	Design Documents Approval	2.4.3	T ₀ + 12 Weeks	2 weeks	Approved Design Document	SPV + PMC
2.6	Onboarding In-Line Departments and their Service Integrators / Implementers for Application Interfacing with One Touch Mangaluru (Web Portal + Mobile App)	2.4, 2.5	T ₀ + 11 Weeks	3 weeks	APIs	SI + In-Line Departments + MRC + CeG + NIC + MCC
3.	Implementation Phase					
3.1	Software Procurement	2.3.1, 2.3.2, 2.5	T ₀ + 14 Weeks	8 weeks	Purchase Orders	SI + SPV + PMC
3.2	Hosting Facility Readiness	2.4	T ₀ + 14 Weeks	2 weeks	Tripartite Agreement with the Hosting Facility	SI + SPV + State Data Centre Facility Providers
3.3	Hardware & Software Deployment	2.5	T ₀ + 16 Weeks	2 weeks	Deployment Reports	SI + Hosting Agency
3.4	Integration of One Touch Mangaluru Web Portal and Mobile Apps with Service Providers	2, 3.3	T ₀ + 16 Weeks	2 weeks	Integration + System Testing Reports	SI + In-Line Departments + MRC + CeG + NIC + MCC
3.5	Application Integration (CCCC + Emergency Response System + Intelligent Transport Management + intelligent eGovernance Service Delivery + CCTV Surveillance + CoC)	2, 3.3, 3.4	T ₀ + 16 Weeks	4 weeks		
3.6	Application Integration with any Future Smart City Components	2, 3.3, 3.4		4 weeks	Integration + System Testing Reports	SI + KMDS + In-Line Department(s)
4.	Testing & Certification Phase					
4.1	Onboarding of STQC for UAT + Security Testing + ISMS Compliance Certification		T ₀ + 10 Weeks	12 weeks		SI + SPV + PMC
4.2	UAT Testing	2.5, 3.3	T ₀ + 22 Weeks	4 weeks	Test Plan + Test Reports	SI + Testing Agency (STQC)
4.2.1	Functional Testing	2.5	T ₀ + 22 Weeks	2 weeks		

Timelines						
Task no.	Task	Predecessor	From Time	Duration	Deliverable	Responsible
4.2.2	Application Security Audit and VAPT	3.1.1	T ₀ + 24 Weeks	1 Week	Application Security Audit + VAPT Certification	
4.3.2	ISMS Compliance Certification	4.2.2	T ₀ + 22 Weeks	4 weeks	ISMS Certification	SI + ISMS Certification Agency (STQC)
5.	One Touch Mangaluru (Dual Access) Go-Live	4	T ₀ + 26 Weeks	4 weeks	Go-Live Certification	SI + SPV + PMC
5.1	Standard Procedures Definition and Approval	1, 2	T ₀ + 12 Weeks	12 weeks	SoPs	SI + SPV + In-Line Departments
5.2	Training CCC Staff	1, 2.5, 5.1	T ₀ + 24 Weeks	2 weeks	Training Reports	SI
5.3	Training and Capacity Building Sessions for SPV Staff.	1, 2.5, 5.1	T ₀ + 24 Weeks	2 weeks	Training Reports	SI
6.	Operations and Maintenance Phase	3, 4, 5	T ₀ + 26 Weeks	47 months	O & M Reports + Audit Reports + (Re)Certifications	SI + SPV
7.	Project Monitoring and Management Activities	5, 6	T ₀ + 26 Weeks	47 months	O & M	PMC + SPV

5. City Wide Surveillance in Mangaluru

Safety is one of the key responsibilities of every city – feeling safe and secure is one of the main rights of any citizen. But as populations increase, and cities face new challenges, like environmental damage, criminal activity, creating a truly safe and smart city becomes harder.

Closed-circuit television (CCTV), also known as video surveillance is the use of video cameras to transmit a signal to a command and control centre, on a limited set of monitors. In Mangaluru the surveillance is focused on traffic monitoring and safety provisioning. CCTV systems hence are intended to operate continuously with a variety of quality and performance options and extra features such as red light/speed violation detection and video analytics.

There are about 350 million surveillance cameras worldwide as of 2016. About 65% of these cameras are installed in Asia.

By implementing an integrated, digital surveillance system, you can see what's happening across your whole city. The equipment can work as sensors, providing real-time insights and information.

Currently Mangalore City Police has setup 75 Cameras in the city. The project was awarded in February 2017 to Maurya Infotek Private Limited, Bangalore. The Installation, commissioning and setup of the system was completed by May-2017. The overall cost of the project is Rs. 79.20 Lakhs. Apart from this project Mangalore City police had setup 16 cameras so total operational cameras in city is 91.

The Major features of existing setup are as follows:

- Total 75 IP Based Cameras and 25 junctions are installed in city.
- All the Cameras are digital IP Based and PoE enabled.
- Central control room has been setup at Kadri traffic police station.
- Six 60" LED TV monitors were installed at control room for monitoring and viewing CCTV Feeds.
- Central Control room is equipped with Network Video Recorders (NVR) and Video Management System (VMS).
- The current system has facility to record and store videos for 20 to 30 days using NVR.
- Video Management System is used to access live or recorded video. Video Management System has facility to search, store, backup recorded videos based on camera locations and timeline.
- All Cameras are connected to control room using wireless technology (Radio Frequency).
- Make of Camera is – Avtron, USA
- Wireless Access points Used – Deliberant USA
- Existing Control room setup at Kadri can support up to 136 cameras. Currently 66 GB storage capacity is provided which can store videos of 20 days.
- For network connectivity 4 POP (Point of Presence) Access points are setup within the city. At Camera Junction a Device is installed which transmits the data to POP. Communication between Junction and POP is RF based, so these points are within line of sight. Currently there is no obstruction between the Junction and POP.

- From the POP it is again transmitted to Kadri Centre where camera feed is stored on NVR device (Network Video Recorder) and displayed on the video wall.
- For efficient wireless data transmission line of sight connectivity is required. Current network setup maintains the line of sight wireless connectivity.
- All the Cameras are ONVIF compliant. ONVIF is an open industry forum that provides and promotes standardized interfaces for effective interoperability of IP-based physical security products like Security Cameras.
- The detailed list of existing camera installation is given in Annexure E.

5.1. Need for Intervention

- The current Setup of 75 cameras is covering partial areas and major road junctions which were setup for Traffic Police.
- More cameras will be required for Law and Order and Public Safety purpose.
- The existing CCTV project does not involve advanced video analytics such as RLVD and ANPR.
- Some of the cameras are not night vision cameras and HD.
- As part of Smart City initiative, Marina Development and River front Development new Public Tourist places will be operational. CCTV Surveillance is required to cover these new upcoming tourist places.

5.2. Project Vision

Vision of the project is to implement holistic and integrated video surveillance system for Mangaluru city. The system shall help

- Support police to maintain Law and Order
- Acts as an aid to investigation
- Improve traffic management
- Detect Traffic violations
- Help in detecting criminal activities
- Attain faster turnaround time for response to criminal activities and emergency situations.
- Monitor suspected people, vehicle or activities with respect to maintaining law and order in the city
- Continuous monitoring of some vital public places for keeping watch on regular activities and for disaster management support.

The Proposed video surveillance system will enable the above by following:

- Providing alerts/ feedback to the Police Department about abnormal movements/ suspicious objects etc.
- Better Management of Security breaches based on alerts received from system
- Improved turnaround time in responding to any investigation case, faster access to evidence in case of security breach, law violation in the prescribed areas.

5.3. Project Implementation Model and Timelines

Table 13. CCTV Surveillance Projects Timelines

Task no.	Task	Predecessor	From Time	Duration	Deliverable	Responsible
1.	Requirements Phase					
1.1	Requirements Gathering	-	T ₀	2 Weeks	Functional Requirements	SI
1.2	Requirements Analysis	1.1	T ₀	3 Weeks	Specifications (FRS)	
1.3	Requirements Specification	1.2	T ₀	4 Weeks	Software / System Requirements Specifications (SRS)	
1.4	SRS Approval	1.3	T ₀ + 4 Weeks	5 Weeks	Approved SRS	SPV + PMC
2.	Design Phase					
2.1	Design Analysis	1.4	T ₀ + 5 Weeks	2 Weeks	Entity Relationship Diagram (ERD) Deployment Architecture + Software Design Descriptions (SDD)	SI
2.2	Data Design	2.1	T ₀ + 4 Weeks	1 week		
2.3	Architecture Design	2.1	T ₀ + 5 Weeks	1 week		
2.3.1	Security Architecture Design	2.2, 2.3	T ₀ + 5 Weeks	1 week		
2.3.2	Deployment Architecture Design	1.4, 2.1, 2.3.1	T ₀ + 7 Weeks	1 week		
2.4	Application Integration Design	1.4, 2.2, 2.3	T ₀ + 5 Weeks	2 weeks	Approved Design Document	SPV + PMC
2.5	Design Documents Approval	2.4.3	T ₀ + 8 Weeks	2 weeks		
2.6	Onboarding Police Department's existing surveillance system as well as RTO Database stakeholders	2.4, 2.5	T ₀ + 5 Weeks	3 weeks	APIs	SI + In-Line Departments
3.	Implementation Phase					
3.1	Hardware & Software Procurement	2.3.1, 2.3.2, 2.5	T ₀ + 8 Weeks	6 weeks	Purchase Orders	SI + SPV + PMC
3.2	Hardware (Infrastructure in CCC as well as Devices) + Software Deployment	2.5	T ₀ + 14 Weeks	2 weeks	Deployment Reports	SI + Hosting Agency
3.3	Application Integration	2, 3.3, 3.4	T ₀ + 14 Weeks	2 weeks	Integration + System Testing Reports	SI + In-Line Departments + MRC + MCC
4.	Testing & Certification Phase					
4.1	Onboarding of STQC for UAT + Security Testing		T ₀ + 5 Weeks	4 weeks		SI + SPV + PMC
4.2	UAT Testing (Functional, Application Security)	2.5, 3	T ₀ + 12 Weeks	4 weeks	Test Plan + Test Reports	SI + Testing Agency

Task no.	Task	Predecessor	From Time	Duration	Deliverable	Responsible
	Audit and VAPT)					(STQC)
5.	System Commissioning (Go-Live)	4	T ₀ + 16 Weeks	1 week	Go-Live Certification	SI + SPV + PMC
5.1	Standard Procedures Definition and Approval	1, 2	T ₀ + 10 Weeks	4 weeks	SoPs	SI + SPV + In-Line Departments
5.2	Training CCC + SPV + Police + RTO Staff	3, 2.5, 5.1	T ₀ + 16 Weeks	2 weeks	Training Reports	SI
6.	Operations and Maintenance Phase	3, 4, 5	T ₀ + 18 Weeks	60 months	O & M Reports + Audit Reports + Re)Certifications	SI + SPV
7.	Project Monitoring and Management Activities	5, 6	T ₀ + 18 Weeks	60 months	O & M	PMC + SPV

5.4. Expected Outcomes

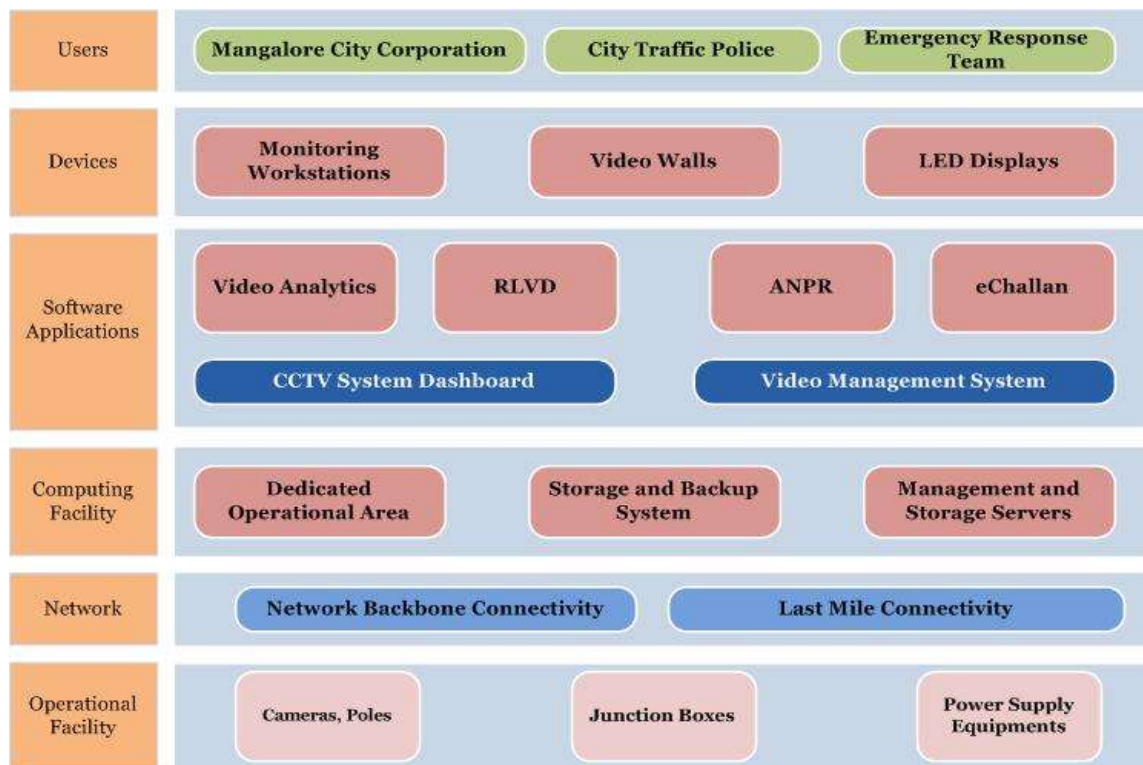


Figure 28. CCTV Surveillance Architecture Overview

The Base Layer is Operational Facility which includes the IP Cameras, Poles for cameras, Local Processing Unit for ANPR and RLVD Cameras, outdoor junction boxes, Power Supply, PoE Injectors, Switches, UPS, Network and power cable and other related infrastructure.

An IP camera combines a camera and image processing in one unit that includes the digitization and compression of the video. The video is transported over an IP-based network via switches, and recorded to a standard digital storage system with video management software. Some typical cameras used in surveillance systems are fixed cameras, fixed dome, PTZ, and IR imaging cameras.

Basic features required for Surveillance cameras is as follows

- The cameras should be equipped with IP-66 rated enclosures for protection against dust and water damage.
- In case the area under surveillance is under poor lightening, camera should have built-in IR illuminator for better video images in low light, night conditions. If the IR illuminators are not built in, camera should have facility to fit IR illuminator and capture video images in low light conditions.
- Cameras should be equipped with H.264 video compression for better clarity and efficient bandwidth and storage.
- Cameras should be ONVIF compliant for easy hardware and software integration with third party vendor equipment.

UPS connectivity till edge device is not mandatory however care should be taken to protect surveillance equipment from power surges. The System Integrator need to follow required earthing standards (e.g. IS-3043) and ensure that pole and the edge level components are protected against lightning.

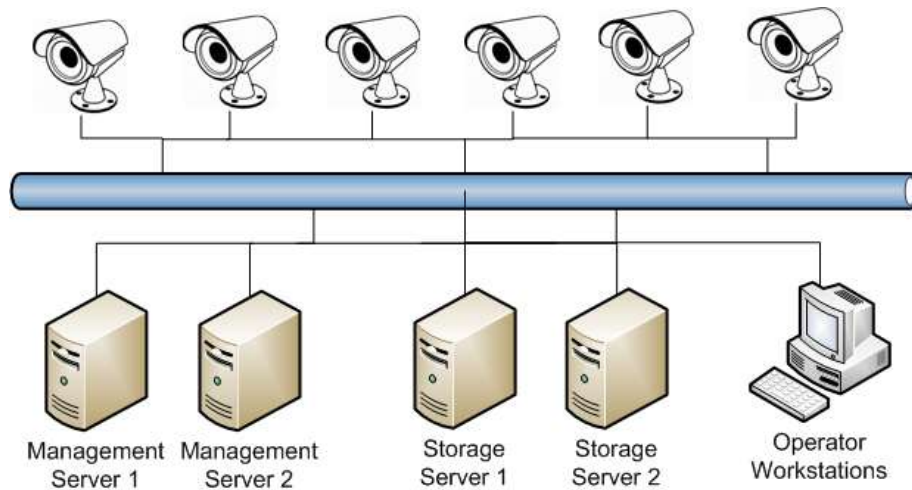


Figure 29. CCTV Surveillance: Technical Architecture

Law & Order

- Surveillance for Traffic violations
- Wrong direction movement detection
- Wrongful parking detection
- Accident identification
- Automatic dispatch of Police Patrolling, Ambulances and/or Towing Vehicle
- eChallan Generation, Reporting & Automated followup in event of defaulting

Crime

- CCTV surveillance at critical locations such as Communal sensitive area(s), places with high footfall.
- Suspicious object identification
- Mob activity identification
- Automatic dispatch of Police
- Face Recognition

ICT Interventions

- ISP managed backbone for connectivity from CCTV to the City CCC at select locations
- CCTV: PTZ for Junctions; Boxed Camera at Important locations
- Video Analytics in real time as well as batch mode
- Storing of feeds for a period of 30 days
- Storing of critical footages/video feeds beyond 30 days
- API Integration with Vaahan Sarathi and existing eChallan system
- API Integration with Vehicle dispatch system of Police Patrolling vehicles, Towing Vehicles, Ambulances
- API Integration with Unified Messaging System (VMD , PA, etc.)for guiding Traffic diversions by Police
- API integration with NCRB, CCTNS etc

5.5. Proposed Interventions

5.5.1. Use Cases

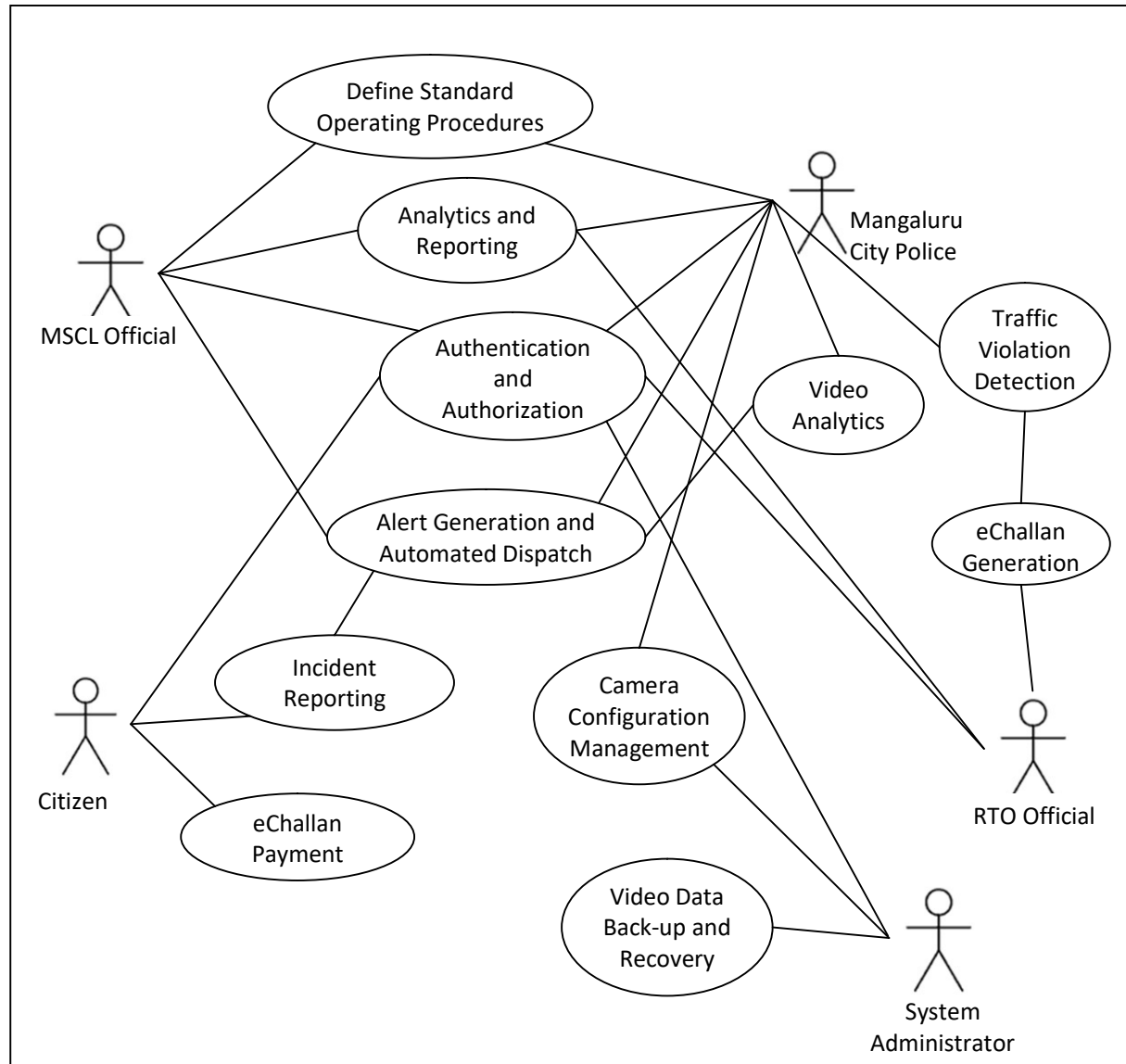


Figure 30. Use-Cases for City-Wide CCTV Surveillance System

Table 14. Use-Cases for City-Wide CCTV Surveillance System

Use Case ID	Use Case	Actor	Benefit / Impact	Priority	Phase
UC_CCTV_1	Define Standard Operating Procedures	<ul style="list-style-type: none"> MSCL Official Mangaluru City Police 	Facilitations of Business Process Reengineering based on user feedback.	1	II
UC_CCTV_2	Analytics Reporting and	<ul style="list-style-type: none"> MSCL Official Mangaluru City Police RTO Official 		1	II

Use Case ID	Use Case	Actor	Benefit / Impact	Priority	Phase
UC_CCTV_3	Authentication and Authorization	<ul style="list-style-type: none"> MSCL Official Mangaluru City Police RTO Official System Administrator Citizen 	Role-based Access Framework	1	II
UC_CCTV_4	Alert Generation and Automated Dispatch	<ul style="list-style-type: none"> MSCL Official Mangaluru City Police 	Immediate action on the incident / event reporting.	2	II
UC_CCTV_5	Video Analytics	<ul style="list-style-type: none"> Mangaluru City Police 	Immediate action on the incident / event reporting.	2	II
UC_CCTV_6	Traffic Violation Detection			2	II
UC_CCTV_7	eChallan Generation	<ul style="list-style-type: none"> Mangaluru City Police RTO Official 	Automation fining after ANPR camera detects a number plate of a car that has violated some traffic rule.	2	II
UC_CCTV_8	Incident Reporting	<ul style="list-style-type: none"> Citizen 	Emergency Reporting Call	2	II
UC_CCTV_9	eChallan Payment		Payment against the Challan received in your mail or on your registered phone number	2	II
UC_CCTV_10	Camera Configuration Management	<ul style="list-style-type: none"> Mangaluru City Police System Administrator 	Camera movements, etc. to be adjusted for capturing some even(s)	2	II
UC_CCTV_11	Video Data Back-up and Recovery	<ul style="list-style-type: none"> System Administrator 	Video Data Storage	2	II

5.5.2. Standard Operating Procedure

To comply with:

- LITD 26/T- 1 to7, January 2015. (http://www.bis.org.in/sf/ltd/LITD%2026_13012015.pdf)
 - LITD 26 (3534) / IEC 62676-1-1: 2013, “Video surveillance systems for use in security applications” - Part 1: System requirements Section - 1 : General 2
 - LITD 26 (3535) / IEC 62676-1-2: 2013, “Video surveillance systems for use in security applications” - Part 1: System requirements Section 2: Performance requirements for video transmission.
 - LITD 26 (3536)/ IEC 62676-2-1: 2013, “Video surveillance systems for use in security applications” - Part 2 : Video Transmission Protocols - Section 1 : System requirements

- LITD 26 (3537)/ IEC 62676-2-2: 2013, “Video surveillance systems for use in security applications” - Part 2 : Video Transmission Protocols - Section 2 : IP interoperability implementation based on HTTP and REST services
- LITD 26 (3538)/ IEC 62676-2-3: 2013, “Video surveillance systems for use in security applications” - Part 2: Video Transmission Protocols - Section 2: IP interoperability implementation based on web services.
- LITD 26 (3539)/ IEC 62676-3: 2013, “Video surveillance systems for use in security applications - Part 3: Analog and digital video interfaces.
- LITD 26 (3540)/ IEC 62676-2-4: 2014, “Video surveillance systems for use in security applications” - Part 4: Application guidelines.

SI has to finalize the Standard Operating Procedures after discussion with the client and department(s) involved.

5.5.3. Process and Technology

Step 1: Inspection of locations where existing cameras are positioned and Survey of the proposed locations.

Step 2: Approval by MSCL (SPV) in consultation with Police and Traffic police for selecting the locations as well as type of cameras to be deployed in the city.

Step 3: Meeting with Police and Traffic police to decide on the policy for storage of video feeds for specified duration.

Step 4: Meeting with RTO to share the data repository of vehicles registered for generating challan.

5.5.4. People

While approving the location and type of cameras to be positioned across the city, the data sharing of video feeds, policy and processes of operating e-challan and other video analytics activities like illicit crime, monitor crowds, catch traffic offenders and monitor traffic flows should be clearly laid out.

5.5.5. Non-IT Infrastructure

Electrical Wiring and Equipments facilitating the camera capture to be sent seamlessly and without any data loss to the storage infrastructure in the CCC.

5.5.6. Policy Interventions

- MSCL (SPV) along with other departments should approve the necessary approvals required for minor civil repairs electrical work to be undertaken for positioning CCTV.
- Authorities from respective civil, electrical departments should be notified for giving co-operation to carry out the civil work and electrical repairs.
- The SI would require support from IT connectivity vendor to transmit the video feed captured by CCTV position at place to Command Control Center.
- RTO and Police department inputs would be require in proposing the policies and procedures to be followed during the live operation of CCTV systems.

5.5.7. Implementation Strategy

1. Finalizing the camera locations, camera types and camera numbers in consultation with the Police, RTO and SPV officials.
2. System readiness requirements to be fulfilled:
 - a. Power supply readiness for cameras to be mounted.
 - b. Necessary statutory approvals for camera mounting
 - c. IT Connectivity readiness for the data streaming to the CCC from the cameras.
 - d. Setting up the control room infrastructure within CCC along with the storage infrastructure, backup infrastructure and backup policy.
 - e. Data replication strategy and procedures for disaster recovery mechanism to be defined in consensus with CCC stakeholders.
 - f. Defining the Standard Operating Procedures for each of the use cases / scenarios identified in the SRS.
3. Deployment of Hardware infrastructure and the Cameras.
4. PoCs to be carried out on sample locations with varying parameters, such as traffic junctions, crowded marketplace, tourist place etc. After successful PoC verification the system may go live.
5. The video surveillance data from various cameras deployed will be stored and monitored at Command control center.

Key Highlights of Scope of Work is as follows:

Locations:	15
No. of Cameras:	60
Smart City Components:	Command and Control Centre to host storage and computing equipment. IT Connectivity for connecting IP Cameras with Command and Control Centre.

The requirement analysis was done with the help of Mangalore City Traffic Police department. A Primary list of locations was identified which is listed in Annexure E. The list is indicative.

5.5.8. Process Re-engineering

Table 15. Process Re-engineering

Sr. No.	Activity Name	As -Is Process	To- Be Process
1.	Surveillance	At present, the CCTV are positioned at 75 locations with no analytics software running on the feeds captured.	With the introduction of video analytics software, illicit crimes, riots, camera destruction, un-attended object, regulation of traffic flow, crowd monitoring can be observed.
2.	Challan	Challans are generated manually.	With the positioning of ANPR and RLVD cameras and integrating the same with video analytics software, echallan can be generated.

5.5.9. Change Management

Table 16. Change Management

Sr. No.	Resistance Points	Stake Holders	Cause of Resistance
1.	Sharing of Video Feeds	MSCL, Police, SI, RTO	There might be a concern for sharing of the video feeds to concerned department due to the internet connectivity and extra hardware required to set up at the concerned department's premise.
2.	Sharing of details about vehicles registered in RTO	RTO,SI	Data sharing of the registered vehicles for the Integration of ANPR and RLVD software.
3.	Management of IT assets	MSCL, SI	If any civil electrical work needs to be undertaken for position of cameras, the respective department might not give clearance for the same. Also the backbone for IT connectivity might not be present in that area.

5.6. Cost Estimates

Table 17: Budget Estimate for City Wide CCTV Surveillance Projects

Sr. no.	Item	Rate (INR)	No's	Amount (INR Lakhs)
1	Fixed Edge based FHD IP Box Camera	58500	60	35.1
2	PTZ Camera	149874	15	22.48
3	Network Storage for 90 days, 15FPS @ 1080P resolution for complete cameras	88,92,111	1	88.92
4	42 U Rack	50000	1	0.5
5	Workstations with dual display	1,15,000	15	17.25
6	Video wall 3x3, 55" or 4X2/5X2 70" LED Display with Controller	30,06,000	1	30.06
7	Video Management Software Camera Licenses including failover & Edge storage license	3053905	1	30.54
8	Video Analytics Software	50000	2	1
Total (CAPEX)				225.85
Operations and Maintenance Cost for 1 Year (30% of CAPEX)				67.76
Operations and Maintenance Cost for 5 Years				338.78
Total (Capex + Opex)				632.38

6. IT Connectivity

100% IT Connectivity has been identified as an ABD project where the 1628 acres of area covering the Central Business District around Hampankatta, Bunder and Car Street is being considered. Two major activities under the scope of this DPR are:

- Providing Wi-Fi connectivity on quota basis to citizens across ABD area and through Bus Shelters in Pan City
- Connectivity for the communication channels of the Smart Solutions with the Centralized Command and Control Centre (CCCC) & City Operations Centre

All the governing, and civic bodies of the Mangaluru city shall be connected to the CCCC & City Operations Centre. The various public services and facilities shall be provided through these smart solutions and their control will be operated through CCCC. However the CCTV connectivity with Traffic Control Room will be required for Monitoring and Manual Challan Generation, and its monitoring will be done at the City Operations Centre. Any additional CCTV data can be shared between City Operations Centre and the Traffic Control Room as per the need.

The IT connectivity across ABD and for the connectivity with the City Operations Centre shall be established through Internet Service Providers (ISPs) in a redundant model so as to avoid a single point of failure and to provide for high availability of the services. City Operations Centre shall be connected to the CCCC through KSWAN and it will not be in the scope of LSI. The solution will facilitate various departments which are working individually to get connected to a single smart solution; and many of departments who have their Apps and websites for citizens, where one can avail the services offered by the respective department, can be integrated under Mangaluru Smart City for improving the citizen' lifestyle. A single window of One Touch Mangaluru project including MCC Citizen Interface App shall facilitate citizen to have a single point of access to avail every government service. Public Mobility App to improve the travel experience so is a dedicated 24x7 help-desk at Integrated Command and Control Centre facilitating them in the usage of Smart City Components, and various services related to eGovernance, Safety Surveillance, Traffic Management etc. The IT connectivity shall be backbone for Smart City Solutions where the multiple sensors and end devices placed across the city shall collect information and will send it to the departments, City Operations Centre and the Integrated Command and Control Centre; where analysis shall be performed and the necessary action will be taken. The CCTV data shall be collected at the City Operations Centre and the other components such as Sensors, VMD, Vehicle Tracking, Smart Meters etc. shall be connected to the CCCC over GSM/GPRS.

Networking and cloud support shall cover the areas under PAN city for the common network connectivity with the various end entities such as Bus Shelters and Junction Boxes including the Switches with selected Wi-Fi Hotspots installed over buildings, hosted outside ABD area connected to the CCCC and the Internet shall be provided via separate broadband connections managed by the ISP for secure connectivity with provision the X.509 Certificates through AAA and Wireless controller.

6.1. Project Vision / Goals / Objectives

- To achieve the IT up-gradation of existing services of government and to achieve the overall functioning, 100% IT connectivity with Networking and cloud support is very much required so that Wired and Wireless both types of connectivity could be provided to the stakeholders. Phase wise implementation is also required for the IT connectivity to ensure the availability of Network across identified sites with the compliance of related Security Standards.
- Citizens will thus benefit with enhanced service delivery, convenience, efficiency, affordability, security, privacy and time savings with the fast, easy, and always up and running IT connectivity across city.
- At present there are various departments working individually and many of them have their Apps and websites for citizen, where one can avail the service to certain level. The data of different formats and sizes shall be acquired from these departments at CCCC belonging to multiple systems deployed at distributed locations and will be processed accordingly as per the requirements. The data ranges to hundreds of Terabytes. Citizen will require assistance in context of all the connected smart city components, and various services related to eGovernance, Safety Surveillance, Traffic Management etc.; which shall to be developed as a part of overall solution that shall include up-gradation of existing services of various government departments and shall also include various new installations for newer solutions like Air Quality Monitoring, eToilets, GPS Tracking of Public Transport & SWM collection, Smart Street Lights, etc.
- An effective connectivity shall result in better usage of the system; and when it is fast, easy and always available so the system can be utilized for its fullest. To achieve it a Network backbone shall be established across the covered area under the project and also Wi-Fi shall be provided to the citizen with the necessary arrangements with the Telecom and Internet Service Providers, so that people can use the system to its maximum.
- The main objective of 100% IT connectivity is to lay the fibre network across ABD area (and extend it to the selected locations outside the ABD area such as CCTV cameras installations and optionally to the Bus Shelters, wherever possible) and providing connectivity to City Operations Centre. Wi-Fi services will provide fast internet connectivity on the go to citizen in the ABD area with the Networking and cloud support to lay the optical fibre network beyond ABD area at selected locations, to all smart elements across the PAN city including Environmental Sensors and Smart Bus Shelters etc. and to the departments wherever

required; CCTV cameras connectivity to the City Operations Centre for Monitoring and Manual Challan Generation. The selected LSI can use MPLS or any other network topology for deploying the smart elements; however City Operations Centre to CCC connectivity shall not be in the scope of LSI as it will be done by the MSI

- A Central Wi-Fi Management solution will be used for controlling the Wi-Fi Hotspots deployed across city through ISP; similarly security of the devices and of all communications will be taken care by the deployment of security devices ranging from DDoS Protection System, Firewalls, IDS/IPS, UTM, AAA Server etc. City Operations Centre to the physical Security of the end devices deployed within the city. Secure connectivity with provision the X.509 Certificates through AAA and Wireless controller is also required for securing the Wi-Fi connectivity for the Internet usage by the citizens. The security shall also be ensured by defining Standard Operating Procedures and ensuring the strict following of the same. The various logs shall also be regularly collected and examined and shall also be retained as per the defined standard procedures. In case of any major (cyber) attack over the IT infrastructure, the defined SOPs shall be followed and the incidents in any such case shall be reported to the appropriate government agencies such as CERT India.
- The goals of the 100% IT Connectivity & Networking and cloud support are:
- Wired and/or wireless connectivity of various Departments to the City Operations Centre.
- Wired and/or wireless connectivity of various devices deployed by departments across city to the City Operations Centre wherever required.
- Wi-Fi Connectivity for citizen.
- Build Service Level Agreements (SLAs) Master Service Agreement (MSA) with necessary approvals from stakeholders.
- Build Standard Operating Procedures for how the System Integrator shall co-ordinate with ISP and get the complaint closed, including the producing documentary evidence regarding failure of bandwidth by ISP and not by Network equipment.
- Defining definite procedures for any payment deduction in case of lower performance & if the performance in respect of any parameter falls below the prescribed lower performance limit i.e. breach of SLA.
- Network redundancy, wherever applicable; there are options of taking redundant internet links from two ISPs. However redundancy shall result in major expansion of budget.
- Defining Backup procedure.
- Defining the scope for future extensibility and adaptability toward the growing needs.

6.2. Project Coverage

Mangaluru City 100% IT Connectivity in the areas within jurisdiction for following nodes, in consultation with the Mangaluru City Corporation, been identified as an ABD project where the 1628 acres of area shall be covered:

- Central Business District around Hampankatta
- Bunder
- Car Street

Networking and cloud support in SCP recognizes connectivity requirements to address Pan City deployments of following smart city components:

- CCTV deployment at select locations based on KUIDFC guidelines for Traffic and Law & Order purposes
- Waste management through Smart Bins and Mechanized Vehicles for SWM collections
- Limited Wi-Fi provisioning at selected locations.

6.3. Project Implementation Model and Timelines

Design & Development Phase

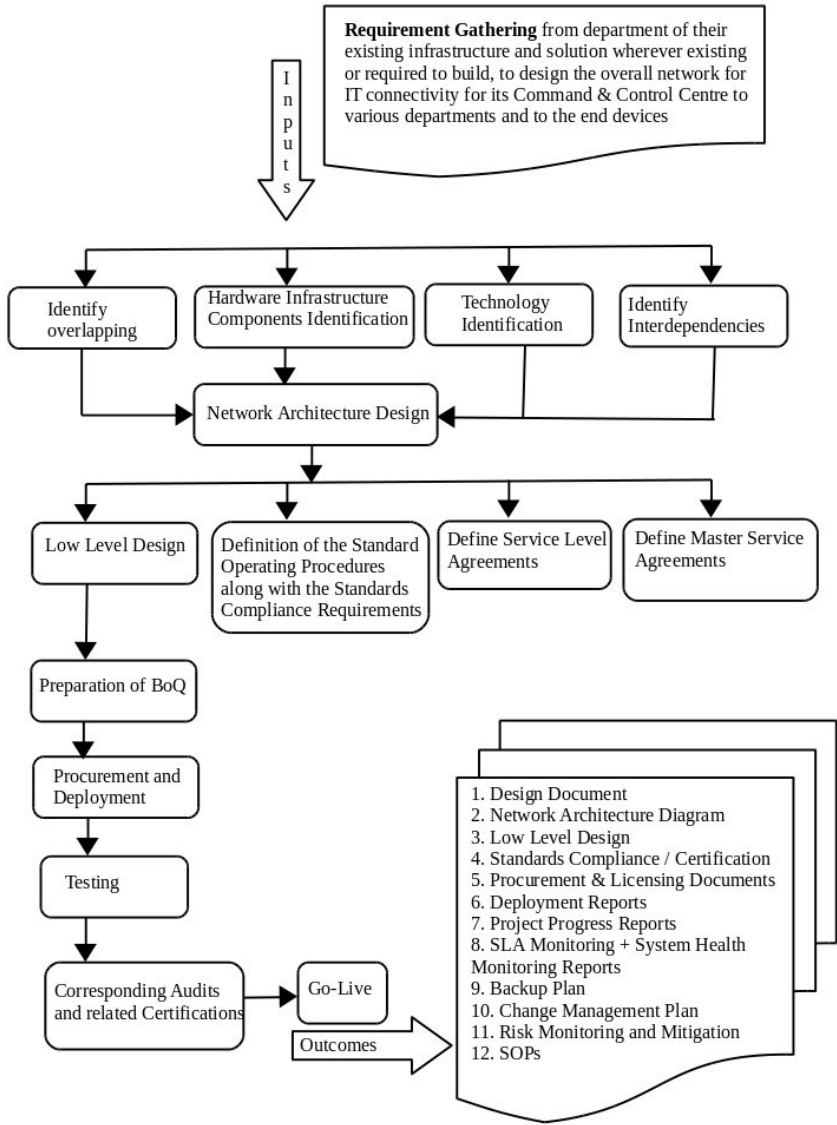


Figure 31. IT Connectivity Design Phase Workflow

Table 18. Timelines for IT Connectivity Projects

Timelines						
Task no.	Task	Predecessor	From Time	Duration	Deliverable	Responsible
	Design & Development Phase					
1.	Requirements Phase					
1.1	Requirements Gathering	-	T ₀	4 Weeks	Requirements Specifications	SI
1.2	Requirements Analysis	1.1	T ₀	6 Weeks		
1.3	Requirements Specification	1.2	T ₀	7 Weeks		
1.4	SRS Approval	1.3	T ₀ + 7 Weeks	1 Week	Approved SRS	SPV + PMC
2.	Design Phase					
2.1	Network Architecture Design	1.4	T ₀ + 8 Weeks	2 week	Network Diagram	SI
2.2.1	Low Level Design	2.1	T ₀ + 10 Weeks	3 week	Low Level Design + Standard Operating Procedure (SOP)	
2.2.2	Defining Standard Operating Procedures	1.4	T ₀ + 8 Weeks	5 week		
2.3.1	Low Level Design Approval	1.4, 2.2.1	T ₀ + 13 Weeks	1 week		
2.3.2	SOP Approval	1.4, 2.2.2	T ₀ + 13 Weeks	1 weeks		SPV + PMC
3.	Implementation Phase					
3.1	Hardware & Software Procurement	2.3.1	T ₀ + 14 Weeks	8 weeks	Purchase Orders	SI + SPV + PMC
3.2	Hosting Facility Readiness at DC, DR, and at relevant departments	2.3.1	T ₀ + 14 Weeks	8 weeks	Tripartite Agreement with the Hosting Facility	SI + SPV + State Data Centre Facility Providers
3.3	Hardware & Software Deployment	2.3.1, 3.1, 3.2	T ₀ + 22 Weeks	2 weeks	Deployment Reports	SI + Hosting Agencies
3.4	Interconnections and Integration	2.3.1, 3.1, 3.2, 3.3	T ₀ + 22 Weeks	2 weeks	Integration + Testing Reports	SI + In-Line Departments + MRC + CeG + NIC + MCC
4.	Testing & Certification Phase					
4.1	System Testing + Compliance Certification	3.3, 3.4	T ₀ + 24 Weeks	2 weeks		SI
5.	Operations and Maintenance Phase	4	T ₀ + 26 Weeks	47 months	O & M Reports + Audit Reports + (Re)Certifications	SI + SPV
6.	Project Monitoring and Management Activities	4	T ₀ + 26 Weeks	47 months	O & M	PMC + SPV

6.4. Expected Outcomes

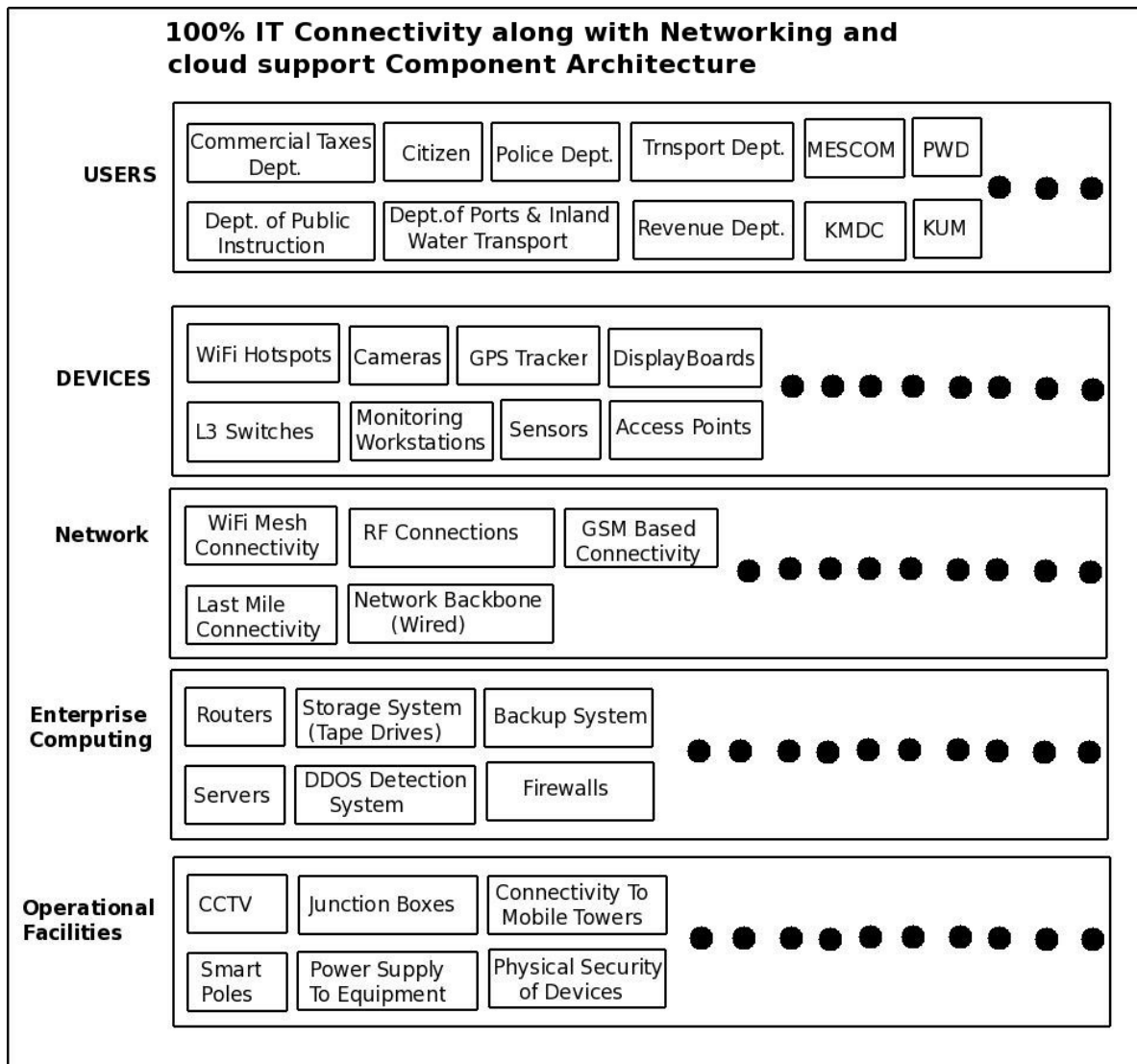


Figure 32. IT Connectivity: Component Architecture

IT Connectivity & Networking and cloud support is a basic IT infrastructure requirement for any and every smart solution that is to be implemented in a smart city. There are two major outcomes of the project as:

- Availability of the internet facility for the citizens through Wi-Fi at selected locations.
- Connectivity for the communication channels of the Smart Solutions with the City Operations Centre.

All the governing, and civic bodies of the Mangaluru city shall be connected to the City Operations Centre. The various public services and facilities shall be provided through these smart solutions and their control will be operated through CCCC, however the CCTV related activities shall be managed at City Operations Centre.

The IT connectivity along with Networking and cloud support across and beyond ABD shall be established through Internet Service Providers (ISPs) in a redundant model so as to avoid a single point of failure and to provide for high availability of the services.

To monitor proper functioning of a smart city an integrated platform shall be operative linking various public services and monitoring the systems' health at multiple levels ensuring the continuity and consistency in the service provision.

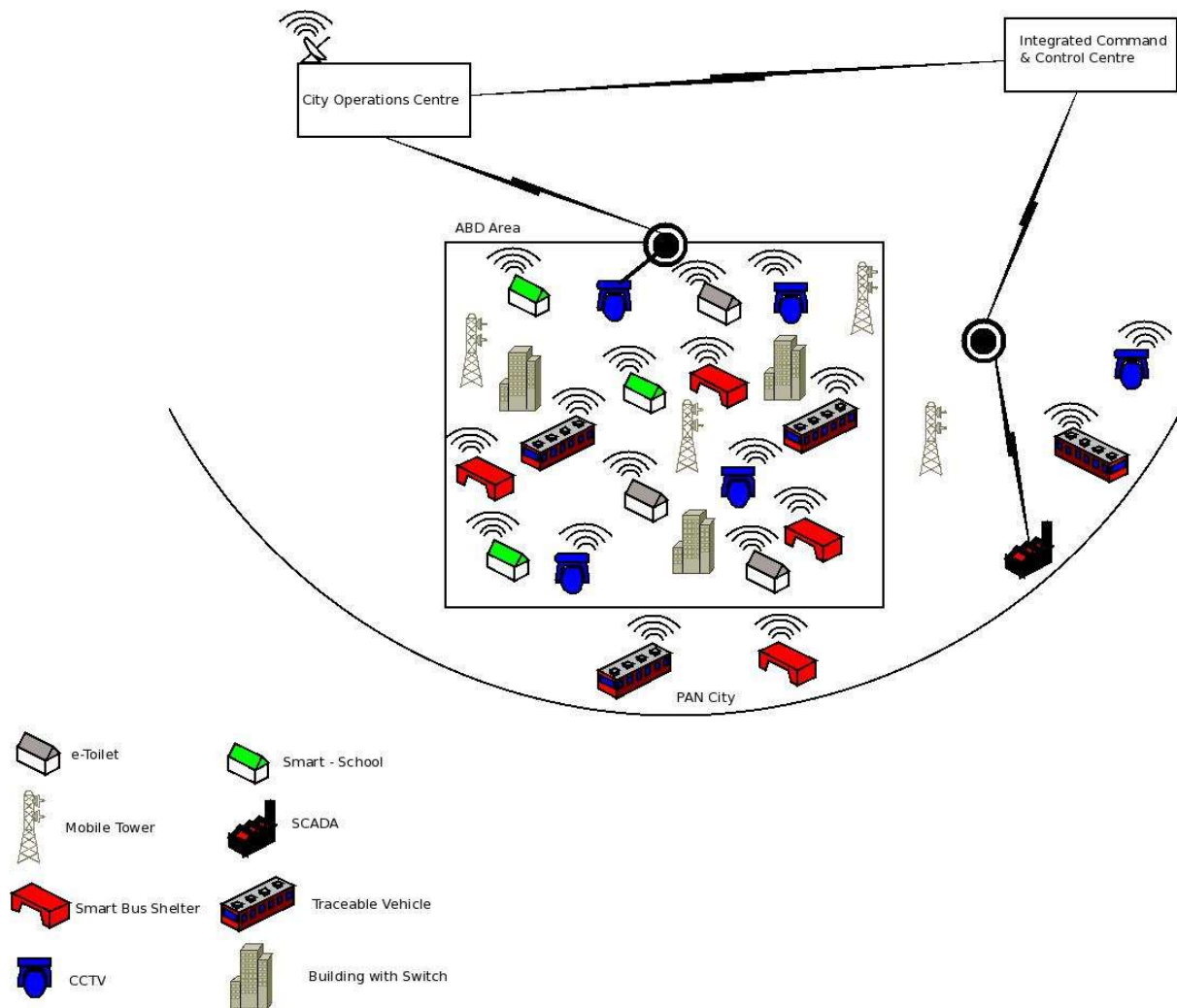


Figure 33. Network Connectivity for Federated Approach

6.5. Proposed Interventions

A smart city is a place where traditional networks and services are made more flexible, efficient, and sustainable with the use of information, digital, and telecommunication technologies to improve the city's operations for the benefit of citizens. A smart city needs to be instrumented, interconnected, and intelligent. All the governing, and civic bodies running the city need to be connected to Centralized Command and Control Centre (CCCC). Regular monitoring of its robust physical infrastructure its connectivity till departments and up till the end devices is essential for the smooth functioning of the system and for a greener, safer, faster, and friendlier environment.

6.5.1. Processes

The ICT infrastructure includes communication infrastructure, such as fibre optics, Wi-Fi networks, and wireless hotspots as well as service-oriented information systems. Smart infrastructure is more efficient, safe, secure, and fault tolerant as compared to a traditional infrastructure. IT connectivity and Networking and cloud support for the better utilization of the existing infrastructure and for establishing the interconnectivity among Departments, City Operations Centre, and the end devices located within and beyond ABD area at selected locations.

The supporting processes that are to be designed and executed with establishment of 100% IT Connectivity along with Networking and cloud support and ensuring its proper functioning are as follows:

- Definition of Technological Needs as per the Departments' existing status with respect to the desired solution.
- Identification of Technologies
- Defining Network Architecture and Low Level Designing
- Definition of Role Based Access Mechanism
- Definition, Logging and Periodic Review of Standard Operating Procedures.
- Network Devices Management
- Network Connectivity Management
- Wireless Access Management
- 24x7x365 Monitoring
- Real Time Fault Detection, Resolution and Notification
- Software Maintenance Updates & Upgrades and Patch Management
- Backup Management
- Network Optimization
- Change Management
- Performance & Utilization Reports Generation
- Performance Tuning
- Quality of Service assurance
- Development of NOC Knowledge Base
- Service Desk support
- Defining Escalation Process

6.5.2. People

The seamless working of IT infrastructure connectivity requires Role based Framework defined along with the Responsibilities associated with each of the Roles. The NOC team is required in Centralized Command and Control Centre (CCCC) + City Operations Centre for giving support for the Networking and cloud support along with IT connectivity establishment and maintenance:

Table 19. NoC Resource Team

Human Resource no.	NOC Resource Role	NOC Resource Responsibility
H.R. 1	Head of Data Centre Operations	Overall In-Charge for the Data Centre Operations
H.R. 2	Infrastructure & Applications Team Lead	Would provide expert guidance to the team
H.R. 3	Server & Storage Management Lead	Would be responsible for managing & operating server & storage
H.R. 4	Database Management Team Lead	Responsible for overall database management
H.R. 5	Infrastructure Team Members	Would be responsible for configuring and operations
H.R. 6	Server Team Members	Would be responsible for configuring and operations
H.R. 7	Database Team Members	Would be responsible for configuring and operations

6.5.3. Matrix for Service Response and Service Definition

There shall be a predefined matrix for service response and service definition to set the goals for quick problem resolution, as the service response time and recovery time directly impact network availability.

Table 20. Service Response Matrix

Problem Severity Level	Team Members	Team Lead	Head of Data Centre Operations	Problem Resolution
P.S.L. 1	Immediate	5 minutes	2 hours	4 hours
P.S.L. 2	Immediate	15 minutes	4 hours	8 hours
P.S.L. 3	Immediate	2 hours	24 hours	36 hours
P.S.L. 4	Immediate	4 hours	72 hours	144 Hours

6.5.4. Operations & Maintenance Escalation Process

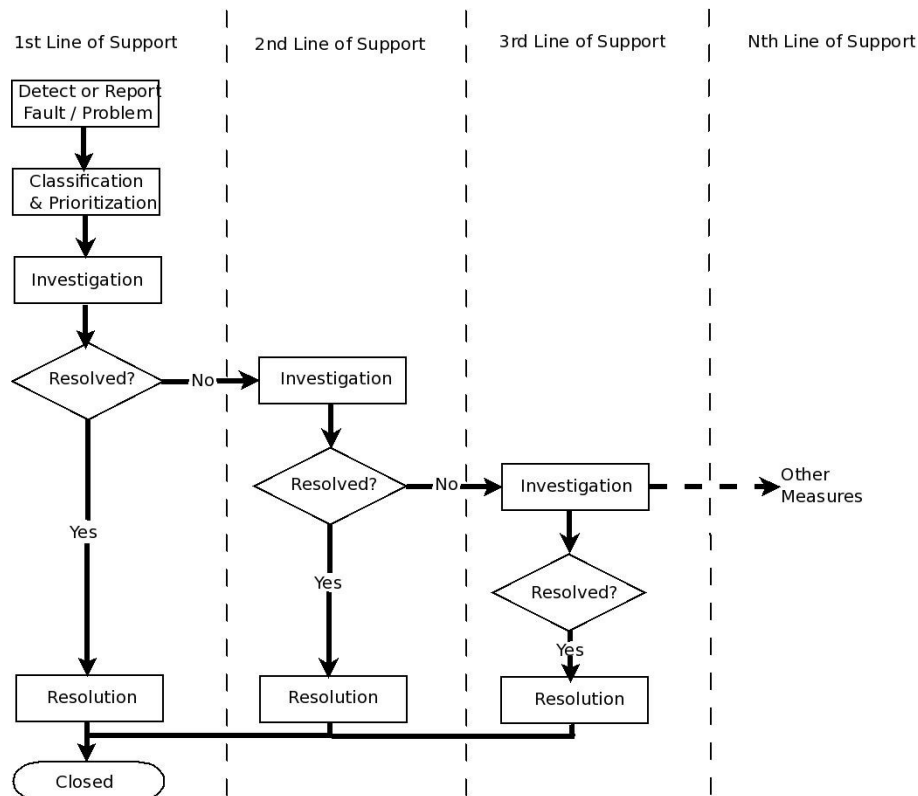


Figure 34. O & M Escalation Matrix

6.5.5. Technology

The role of technology providers is very crucial for establishment of 100% IT connectivity across ABD area along with Networking and cloud support that covers the areas beyond ABD area as defined in the scope of the project. The selected technology needs to be in tune with the smart city requirements and also align with the departments' existing set-up and operations. For proper functioning of a smart city and facilitating the seamless connectivity of departments and the related end devices deployed across city to Centralized Command and Control Centre (CCCC) & City Operations Centre, the identification and selection of right technology is essential so as to enable the system to deliver smart access to public services to citizens.

IT Infrastructure	
IT1.	Fibre optic connectivity among departments, City Operations Centre, City Operations Centre to CCCC; along with a Fibre Optic backbone connecting various Smart Poles and CCTV Junctions.
IT2.	Wi-Fi connectivity through Wi-Fi Hotspots installed at Smart Poles, Bus Shelters and other public buildings
IT3.	GSM Connectivity for devices installed like Smart Meters, Auto-mobiles etc.
IT4.	RF Connections wherever required by the departments
IT5.	Storage and Backup Systems

6.5.6. Infrastructure (non-IT)

Civil and Electrical Infrastructure along with the safety infrastructure makes the basic prerequisites of the CCCC, City Operations Centre, DR set-ups, and for placement of end devices across city; their interconnectivity also requires placement of network cables etc. with the permissions of local government bodies.

DC and DR will be the collocation facility with the state data centre. Site engineers at the NOC will be required to ensure the business continuity.



Figure 35. Implementation Strategy for Project IT Connectivity

Costs, schedule performance and quality assurance of each component will be baseline in a management control system to ensure adequate visibility for actual progress, accurate tracking of project costs against target dates and costs, and implementation of high quality systems; and a robust technology infrastructure will be implemented. A secure network backbone shall be implemented to interconnect City Operations Centre, various departments, and their field devices;

also Wi-Fi shall be made available for the citizens (with the through the Broadband connections and managed by the ISP) and through the deployment of Wi-Fi Hotspots across ABD area and in the PAN city at selected locations.

Appropriate guidelines and policies will be enforced to enable secure maintenance and exchange of information. Security policy will address in particular the issues relating to access, authenticity, and confidentiality, integrity, control, reliability and disaster recovery requirements so that advantages of initiatives become available to all citizens.

6.5.7. Capacity Building & Training Plan

Table 21. Capacity Building and Training Plan

Sr. No.	Training	Team to be Trained	Duration	Subject / Area
1.	Technology Training	Infrastructure Team Members	Two (02) Weeks	Hardware and Infrastructure Related
		Server Team Members		Hardware and Infrastructure Related
		Database Team Members		Hardware Infrastructure and Database Related
2.	Operations	All Staff Members	Two (02) Weeks	Hardware and Software related Standard Operating Procedures
3.	Operations & Maintenance	Infrastructure Team Members	Two (02) Weeks	Hardware and Software Handling Standard Operating Procedures including Backup & Recovery Procedures Change Management
		Server Team Members		Hardware and Software Handling Standard Operating Procedures including Backup & Recovery Procedures Change Management
		Database Team Members		Hardware and Software Handling Standard Operating Procedures including Backup & Recovery Procedures Change Management

6.5.8.2. Network Architecture

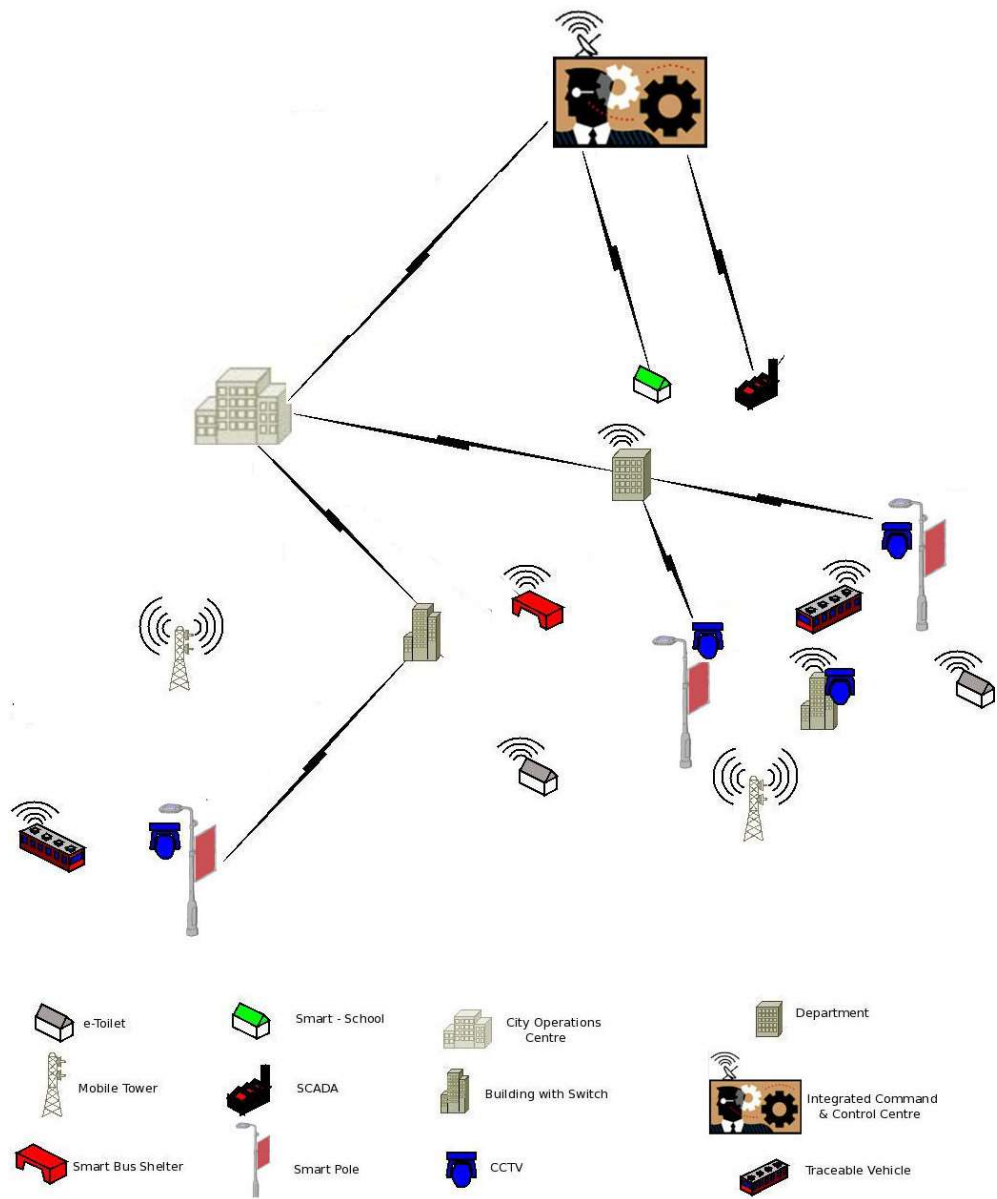


Figure 37. Network Architecture

6.5.8.3. Network Flow Diagrams

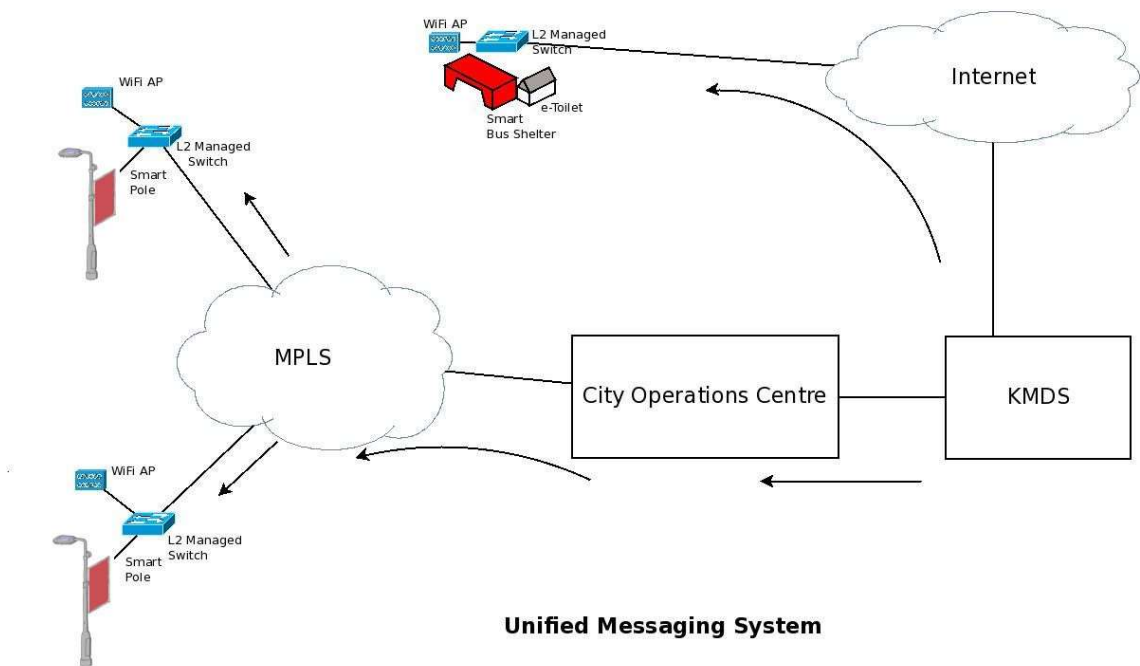


Figure 38. Network Flow Diagram: Unified Messaging System

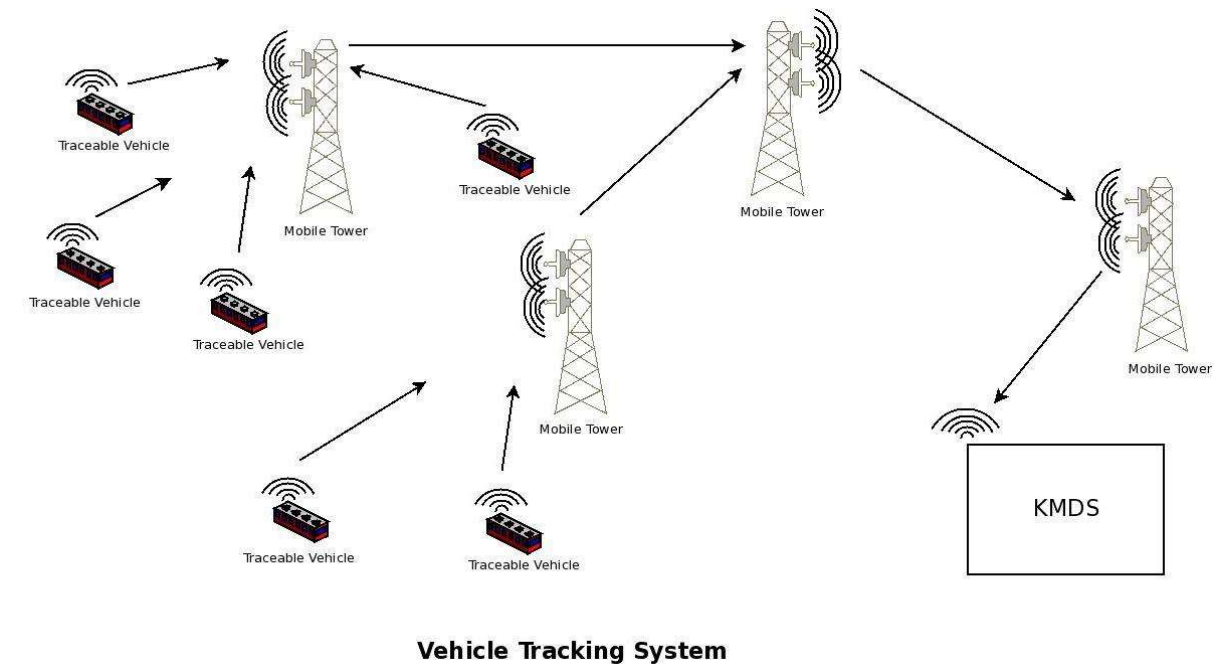


Figure 39. Network Flow Diagram: Vehicle Tracking System

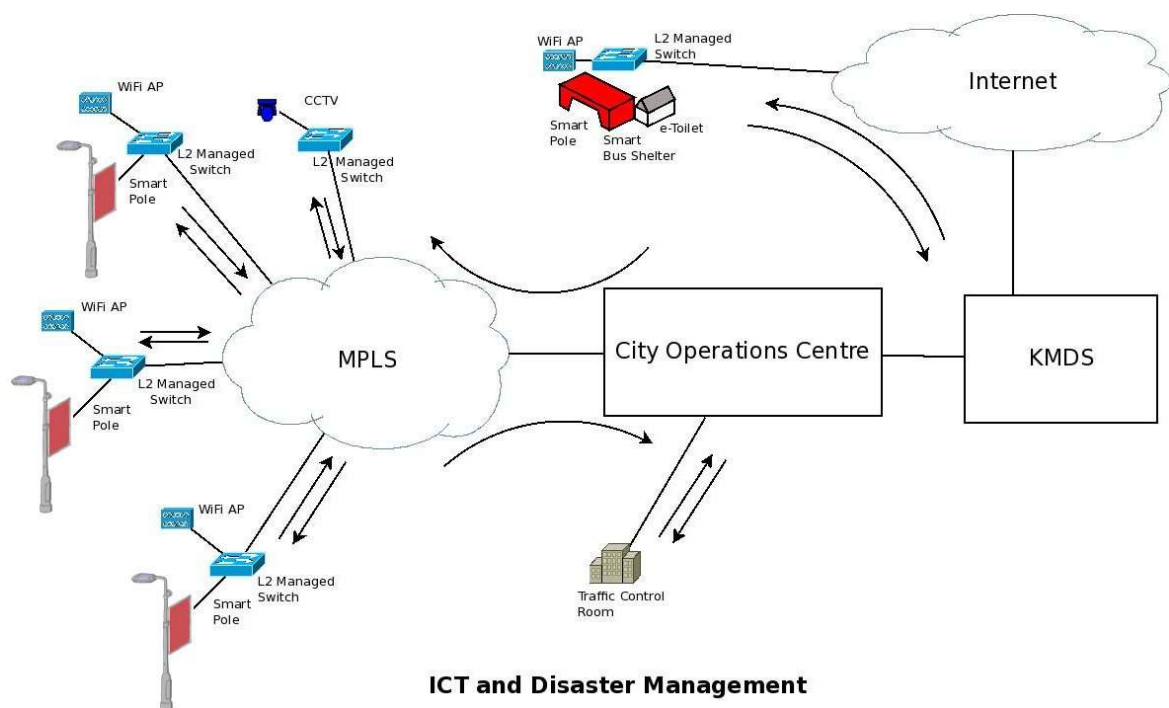
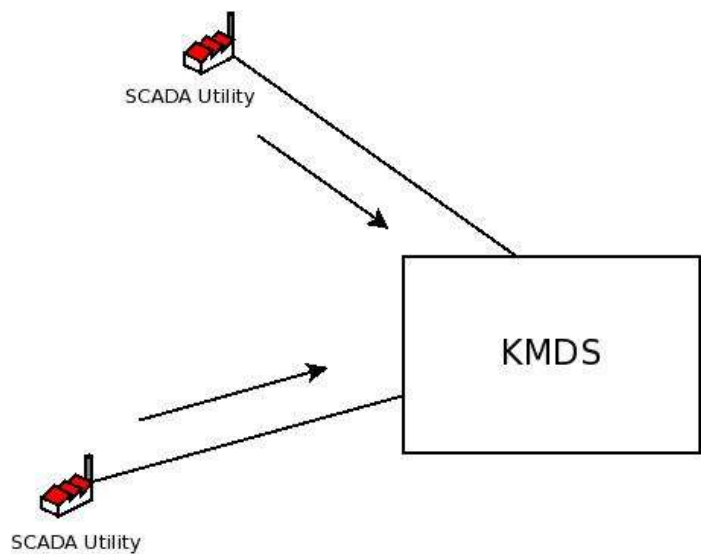


Figure 40. Network Flow Diagram: ICT and Disaster Management



Water, Waste & Energy SCADA

Figure 41. Network Flow Diagram: SCADA (Water, Waste Water, Energy) Systems

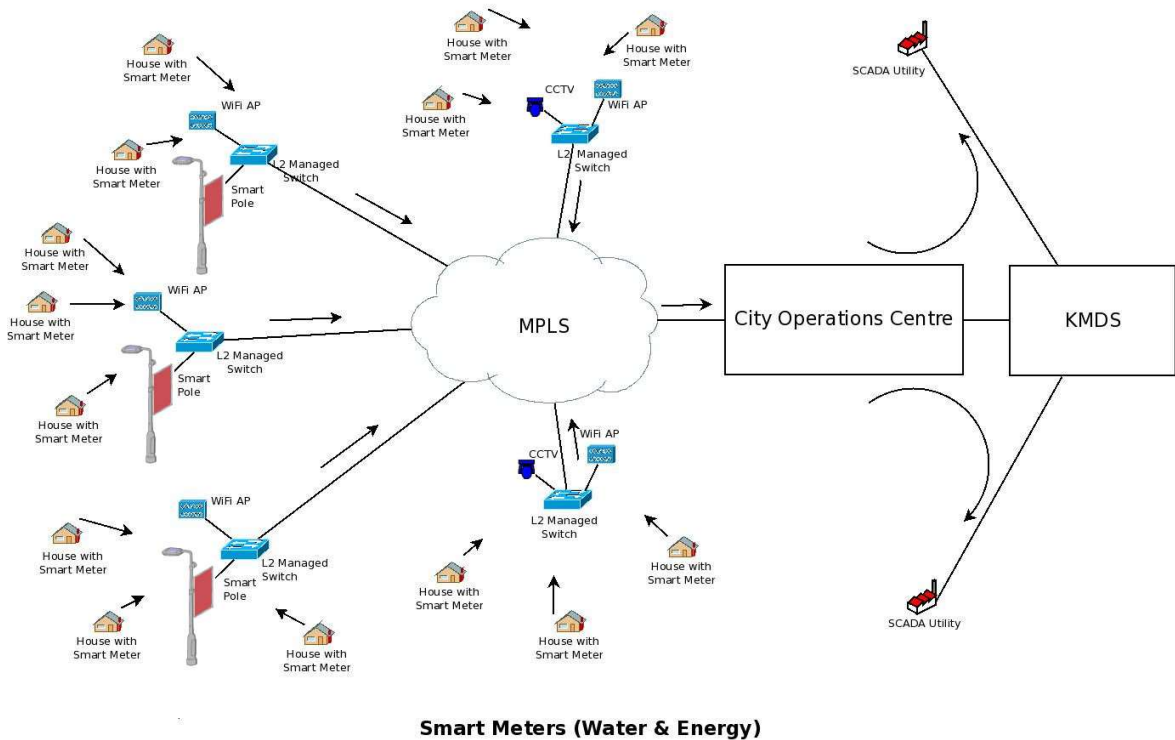


Figure 42. Network Flow Diagram: Smart Meters

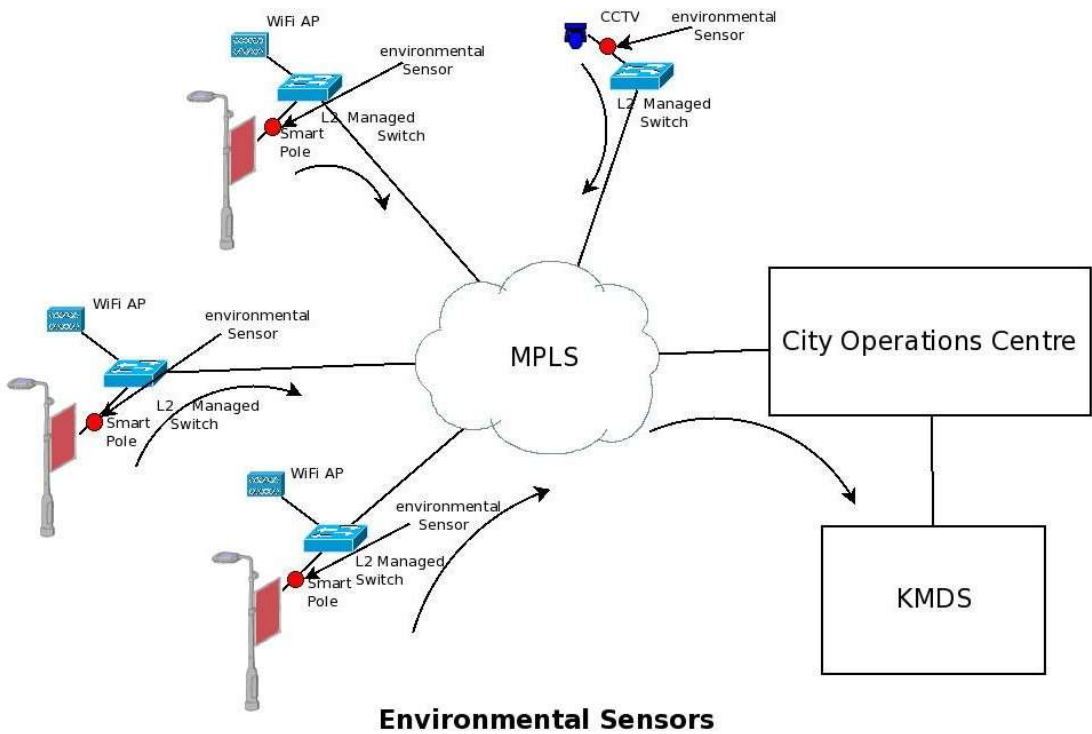
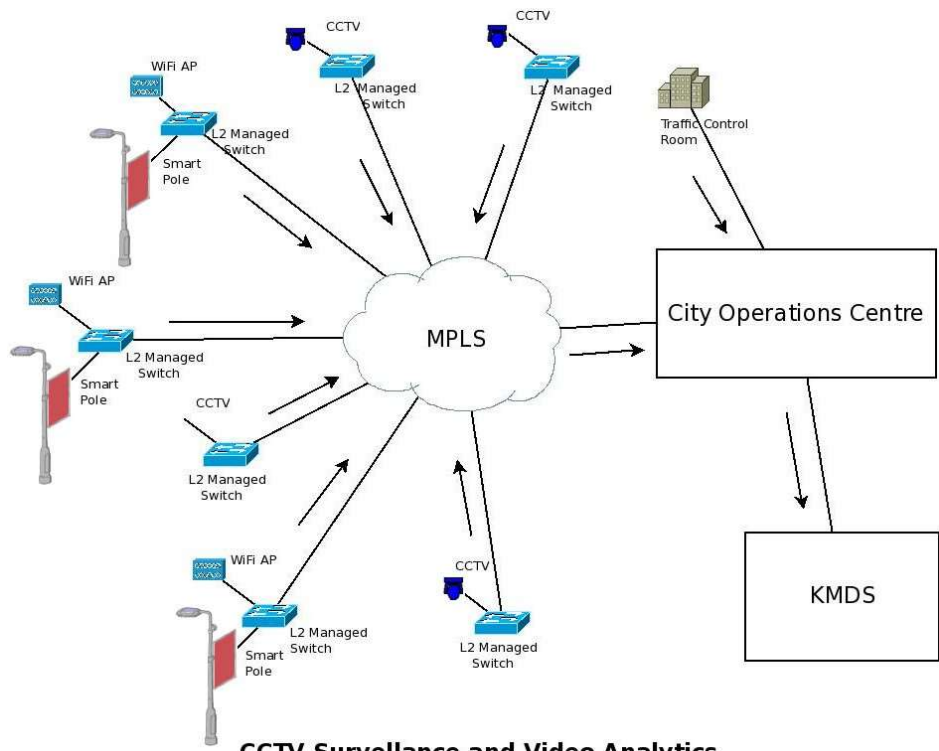
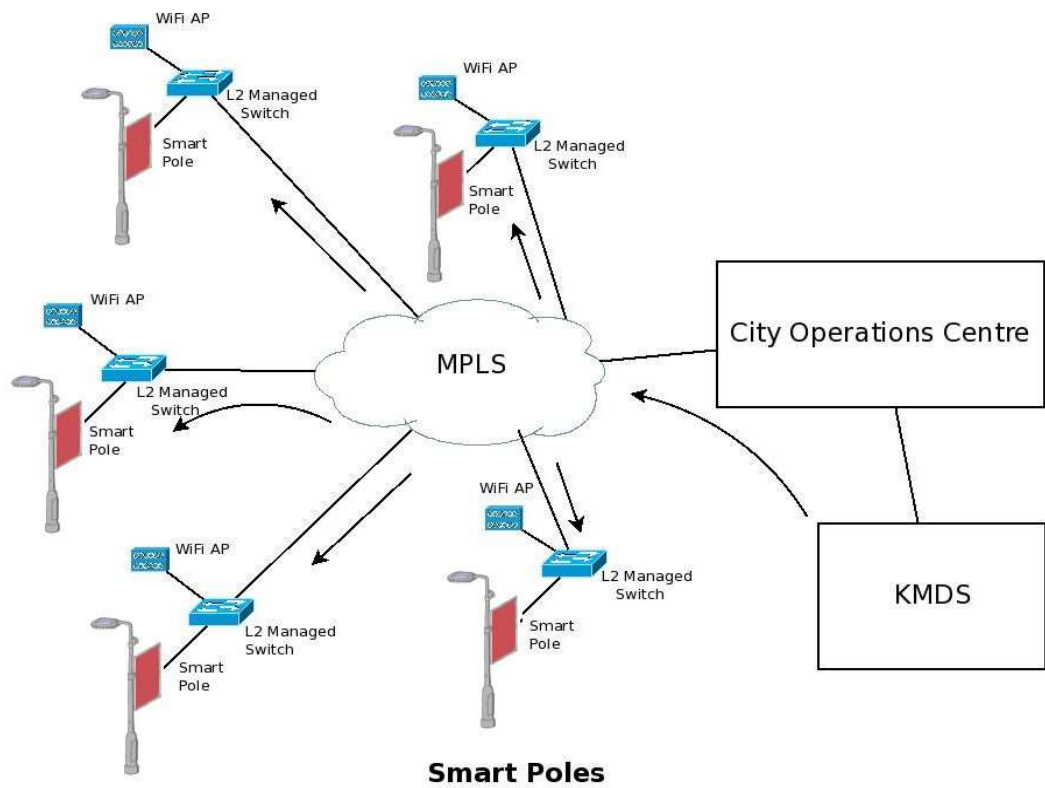


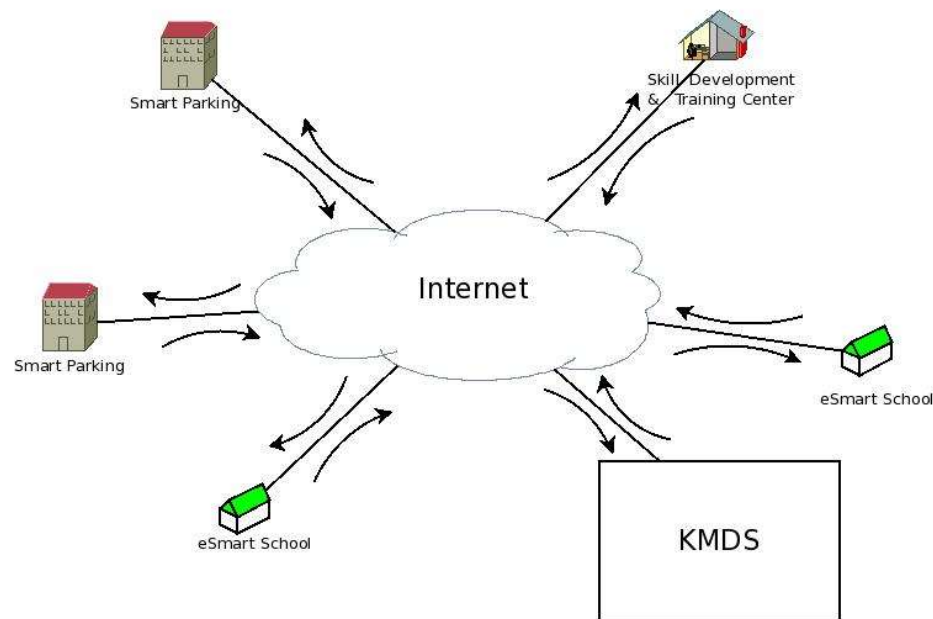
Figure 43. Network Flow Diagram: Environmental Sensors



CCTV Surveillance and Video Analytics
Figure 44. Network Flow Diagram: City Surveillance

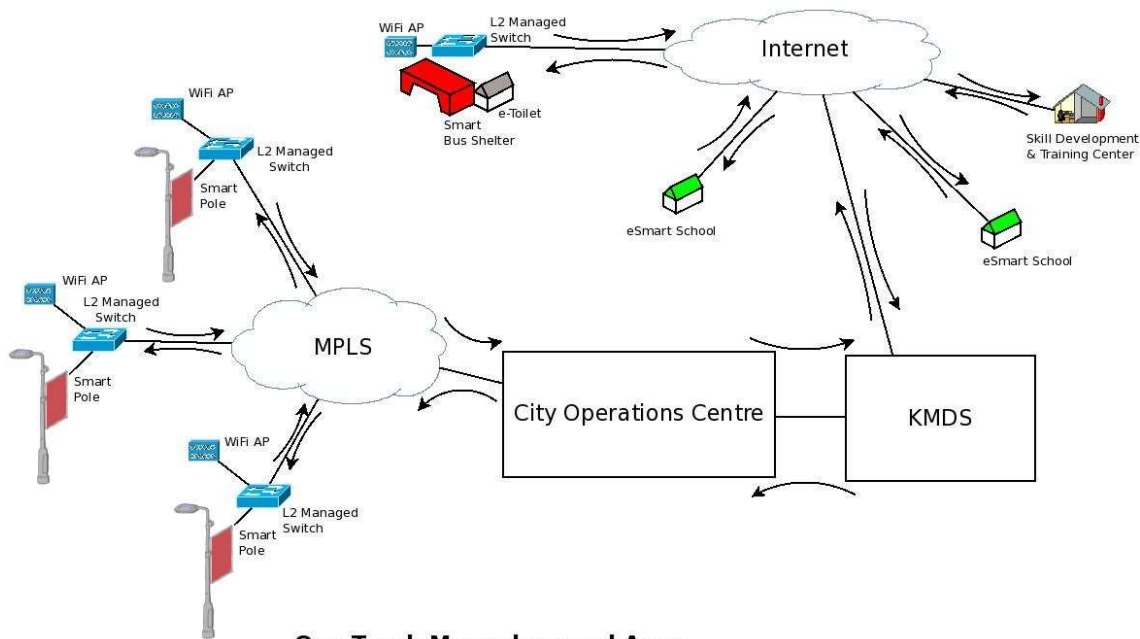


Smart Poles
Figure 45. Network Flow Diagram: Smart Poles



**Smart Parking, e-Smart Schools,
Skill Development & Training Centres**

Figure 46. Network Flow Diagram: Smart Parking, eSmart Schools, Skill Development and Safety Training Centre



**One Touch Mangaluru and Apps,
eGovernance Application Interface**

Figure 47. Network Flow Diagram: One Touch Mangaluru Portal

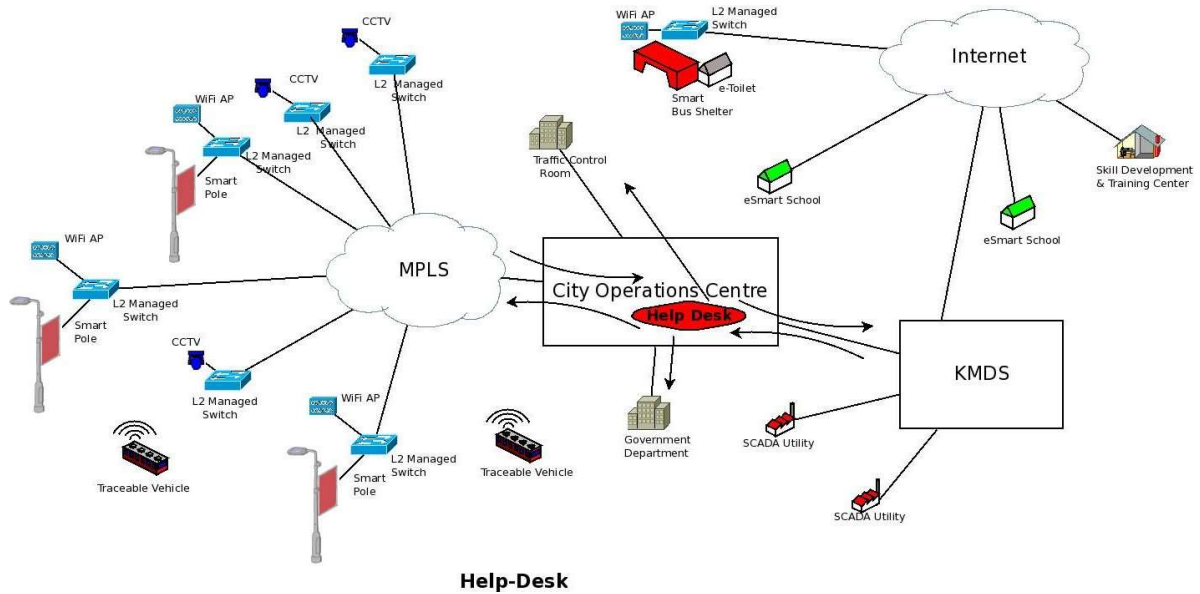


Figure 48. Network Flow Diagram: Help-Desk Set-up

6.6. Bandwidth Requirement

Application / Service	Bandwidth	Internet Link at KMDS
ICT and Disaster Management	N/A	YES (4 Mbps)
Unified Messaging System (VMD + Public Announcement Systems)	N/A	YES (4 Mbps)
One Touch Mangaluru	N/A	YES (6 Mbps)
SCADA Utility – Only Summary Data and major event based data to be shared to the ICC	N/A	YES (2 Mbps)
Water Meters (LoRa etc.) – No data to be sent	N/A	N/A
Skill Development & Safety Training - No connectivity required at City Operations Centre / ICC	N/A	N/A
Smart Parking	N/A	YES (2 Mbps)
e-Smart School	N/A	YES (2 Mbps)
City Operations Centre internet link	2 Mbps Internet Link	N/A
Total Bandwidth		20 Mbps
Intelligent Transport Management System	GSM/GPRS data to reach ICC	
Environmental Sensors	GSM/GPRS data to reach ICC	
Smart Energy Meters	GSM/GPRS data to reach ICC	

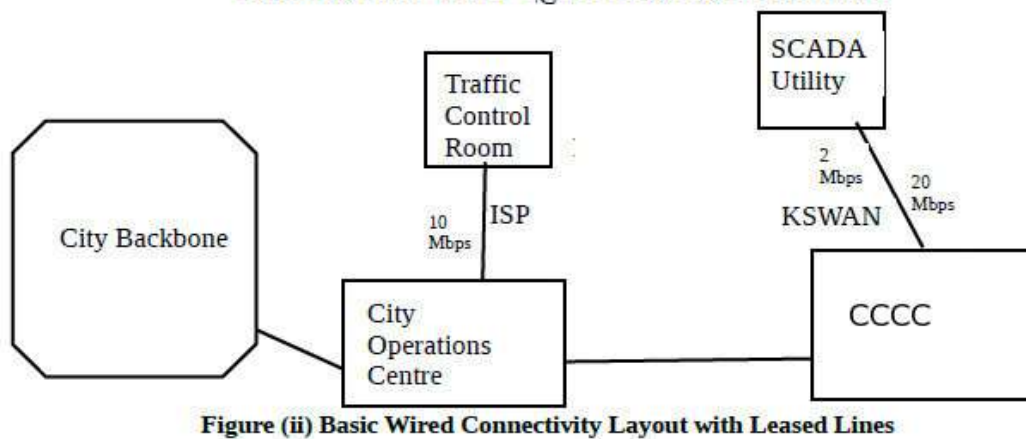
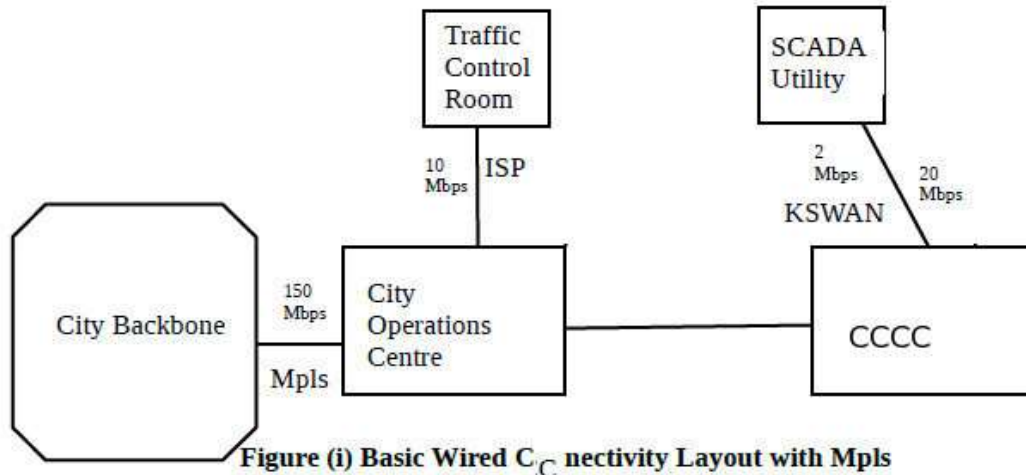


Figure 49. Basic Wired Connectivity Layout with MPLS and Leased Lines

Bandwidth Details

1. Junction Point / Smart Pole: 10 Mbps Connectivity to City Operations Centre

- 60 CCTV to be connected through 15 Junction Points / Smart Poles in Total. 2.5 Mbps each CCTV bandwidth required.
- Up to 4 CCTVs can be connected at a particular Junction Point / Smart Pole makes the bandwidth requirement of 10 Mbps per Junction Point / Smart Pole for CCTV only.

2. Backbone Connectivity

2.a. MPLS

Junction Point / Smart Pole Connectivity MPLS Links (15 in Total): 10 Mbps per Link

City Operations Centre Aggregator Link (MPLS): 150 Mbps

2.5x60 = 150 Mbps for Continuous CCTV Feeds

2.b. Leased Lines

Junction Point / Smart Pole Connectivity of Leased Lines (15 in Total) to City Operations Centre: 10 Mbps per Link.

3. City Operations Centre to Traffic Control Room: 10 Mbps

- Feed Sharing on demand Only
- Simultaneous feeds will not be taken for more than two cameras at a time.

4. ICC Internet Link: 20 Mbps.

KSWAN Presence at Mangaluru City

1. KSWAN has Presence in Mangaluru City in District Collector Office.
2. KSWAN can provide links within Mangaluru City and at KMDS after proper process and approval from their CEO.

6.7. Cost Estimates

There are a couple of options for laying out the IT connectivity and Networking and Cloud Support that can serve the purpose of the project, and each option has its own costing. The two options 1 and 2 depends whether City level connectivity till the City Operations Centre is established through Leased Lines or through MPLS links.

The costs are calculated in terms of establishing a 10 Mbps Backbone for connecting the Smart Poles, CCTVs installed at various Circles and Junctions at selected locations; along with additional Broadband Connections for the Wi-Fi Hotspots deployed at Smart Poles, Junctions, Bus Shelters, and at selected buildings across city at the selected locations. Here a single 20 Mbps Internet Link is used at CCCC.

Table 22. Budget Estimate for IT Connectivity + Networking & Cloud Support

Costs (in Rs. Lakhs)		Year 1	Year 2	Year 3	Year 4	Year 5	Total
100 % IT Connectivity + Network & Cloud Support							
IT Infrastructure	Option 1	90.00	84.31	84.31	84.31	84.31	427.24
	Option 2	153.97	148.28	148.28	148.28	148.28	747.09
Civil + Electrical + Supporting Infrastructure		15	—	—	—	—	15
Manpower¹							NILL
Operations & Maintenance		2	3	5	5	10	25
Capex, Opex, and AMC		Included in 'IT Infrastructure' and 'Operations & Maintenance'					NILL
Total		Option 1 (Leased Line)					467.24
		Option 2 (MPLS)					787.09

¹ Manpower for IT Connectivity is the ICC's & City Operations Centre's NOC team whose budget included in 'Project No. 60 Networking & Cloud Supporting'

* Costing has been estimated as per technologies outlined within the earlier scope of DPR and as per the incorporation new connectivity requirements

* Project costing has been estimated based on market values on date (29 December 2017)

6.8. Bandwidth

Component		Brief Description	Bandwidth	Numbers	Cost (In Lakhs)
Wi-Fi Hotspots		To be placed with Smart Poles in ABD Area; also distributed across PAN City through Bus Shelters, and CCTV Junction Points	Up to 40 Mbps Till 150 GB, 2 Mbps Beyond	10	0.22x10 = 2.20
External Connectivity		City Operations Centre to Traffic Control Room Connectivity (Leased Line)	10 Mbps	1 Unit	3.30x1= 3.30
Backbone ²	Option 1 (Leased Lines)	From Stand-alone Smart Poles & CCTV Junction Points to City Operations Centre	10 Mbps	15 Units	3.30x10 = 33.00
	Option 2 (MPLS Links)	Stand-alone Smart Poles & CCTV Junction Points	10 Mbps	15 Units	5.63x10 = 56.30
		City Operations Centre mpls link	150 Mbps	1 Unit	30.91x1 = 30.91
Internet Links		Skill Development & Safety Training	02 Mbps	10 Units	0.891x10 = 8.91
		Smart Parking	02 Mbps	10 Units	0.891x10 = 8.91
		e-Smart School	02 Mbps	10 Units	0.891x10 = 8.91
		ICCC	20 Mbps	1 Unit	6.22x1 = 6.22
Cost With Option 1					
Total		2.20+3.30+33.00+ 8.91*3 + 6.22			71.45
GST		18%			12.86
Grand Total					84.31
Cost With Option 2					
Total		2.20+3.30+56.30+30.91 + 8.91*3 + 6.22			125.66
GST		18%			22.62
Grand Total					148.28

¹ ICCC to City Operations Centre Connectivity will be through KSWAN

² Initially considered 60 CCTV cameras for first year; LL is preferable if there is not major increase otherwise MPLS is recommended for gradual increase with coming years

6.9. Hardware & Related Software

Component	Budget from	Numbers	Cost (In Lakhs)
Wi-Fi Access Points (With External Antennas)	Project 27 100% IT connectivity & Project 60 Networking and Cloud Support	10	0.0575x10 = 0.5750
Layer 2 Switch with 24 GE Ports	Project 27 100% IT connectivity & Project 60 Networking and Cloud Support	20	0.13x20 = 2.60
Junction Box	Project 27 100% IT connectivity & Project 60 Networking and Cloud Support	20	0.052x20 = 1.04
UPS	Project 27 100% IT connectivity & Project 60 Networking and Cloud Support	20	0.03x20 = 0.60
Total			4.82
GST	18%		0.87
Grand Total			5.69

7. Summary

7.1. Storage and Compute Requirements

For high availability

- Cluster of at least 2 nodes is desirable.
- However, in event of unavailability of clustering,
 - 2 or more nodes with compute core count equally divided between them may be used subject to SMP capabilities of the COP and/or ESB layers.)
 - 2 or more nodes with RAM requirement count equally divided between them may be used subject to upper limit on heap/memory requirements of the COP and/or ESB layers.)

Sr. No	Description	Numbers	Remarks
1	Cores	104 cores	Breakup shared. $(60 \times 1.2) + 32 = 104$ cores considering requirements of high availability and prevention of single point of failure at node level which should suffice for first 2 years. Final phase estimation is with an estimated projection for 5 years duration wherein demand may increase to $(114 \times 1.2) + 48$ cores = 185 cores.
2	RAM	1TB	Estimated 624 ~1090 GB but was agreed in meeting to finalize on 1TB per city.
3	Storage	7TB	First phase estimation taken into consideration. For final phase estimation, demand may increase to 7 TB gradually across 5 years.
4	Applications		GSM/ Lora/ Any other technology to be specified application-wise

- Clock cycle is uniformly considered to be minimum 2 GHz.
- The Backup and retention policy is to be provided for all use cases.

One Touch Mangaluru – Backup and retention for a period of 1 Year as directed by KUIDFC

Sr. no.	Centralized CCC	Integration points (No. of Integrations)		Compute Requirements in Cores		RAM requirements (in GB)		VM Storage (OS, Apps etc) in GB	Centralized Storage Requirements (Usable space from SAN in TB)		KSWAN / Internet Bandwidth (in Mbps)	Load Balancing	Connectivity	Basis
		First phase	Final phase	First Phase	Final phase	First phase	Final phase		First phase	Final Phase				
1	Smart City ICT Components			60	94	320	616		1.6	3.35	20 Mbps	1000 Concurrent connections on tcp / https / http		Ref: Belagavi RFP, Volume II.
1.1	Intelligent Transport Management System (including Vehicle Tracking System)	500		4	8	32	64	160 GB	GPS coordinates data, IoT health monitoring data 300 GB	500 GB			GSM, GPRS	Emergency Vehicles including Ambulances: 30+ Private Buses: 350+ Solid Waste Management Vehicles + Police Patrolling Vehicles
1.2	Unified Messaging System (VMD + PA + Environmental Sensor + Alert Generation to Concerned / Identified Responsib	15 Locations		4	8	32	64	160 GB	Incident, Disaster Mgmt, Environmental sensor 100 GB	150 GB			City OFC	VMD + PA = 15 Locations Environment Sensors = 5

Sr. no.	Centralized CCC	Integration points (No. of Integrations)		Compute Requirements in Cores		RAM requirements (in GB)		VM Storage (OS, Apps etc) in GB	Centralized Storage Requirements (Usable space from SAN in TB)		KSWAN / Internet Bandwidth (in Mbps)	Load Balancing	Connectivity	Basis
		First phase	Final phase	First Phase	Final phase	First phase	Final phase		First phase	Final Phase				
	le Authorities)													
1.3	Smart Meters with AMR (Water, Energy)	64 ~ 100 LoRa Gateways/Routers		4	8	16	32	160	Smart Meters Sensor Data 500 GB	1500 GB			LoRa	Aggregating Meter data at KMDS for CCC as well as One Touch Mangaluru
1.4	Disaster Management (Emergency Response) System	Automated dispatch integration Integration with 100, 108 etc		8	12	64	96	160	100 GB	150 GB			City OFC	Integrating Police, Fire and Emergency Services Departments with Disaster Management Cell of DC Office.
1.5	Smart Parking System	800 (MLCP)	1600 (including pumpwell etc)	4	8	16	32	120	100 GB	200 GB			Internet cloud	BoQ Received from Solution Providers.
1.6	IoT Health Monitoring	1000	3000	4	8	16	32	160	200 GB	500 GB			City OFC	BoQ Received from Solution Providers + Previous Project Experience

Sr. no.	Centralized CCC	Integration points (No. of Integrations)		Compute Requirements in Cores		RAM requirements (in GB)		VM Storage (OS, Apps etc) in GB	Centralized Storage Requirements (Usable space from SAN in TB)		KSWAN / Internet Bandwidth (in Mbps)	Load Balancing	Connectivity	Basis
		First phase	Final phase	First Phase	Final phase	First phase	Final phase		First phase	Final Phase				
														e
1.7	Wifi Management / Billing	10	20	4	10	16	40	120	100 GB	150 GB			City OFC, and Internet Cloud	BoQ Received from Solution Providers
1.8	Dashboard and Analytics			16	32	128	256	500	Important reports preserved which were utilized for policy making 200 GB	400 GB			City OFC	BoQ Received from Solution Providers + Previous Project Experience
2	One Touch Mangaluru Web Portal	500 Concurrent access on Mobile App 100 concurrent access on Portal Total citizens ~ 500000+ eGov services ~ 97 New services because of Smart ICT ~ 35+		12	20	48	80	2X500	1.5 TB	3 TB	4 Mbps	1000 https connections with SSL offloading per second	City OFC, and Internet Cloud	Previous Project Experience

Sr. no.	Centralized CCC	Integration points (No. of Integrations)		Compute Requirements in Cores		RAM requirements (in GB)		VM Storage (OS, Apps etc) in GB	Centralized Storage Requirements (Usable space from SAN in TB)		KSWAN / Internet Bandwidth (in Mbps)	Load Balancing	Connectivity	Basis
		First phase	Final phase	First Phase	Final phase	First phase	Final phase		First phase	Final Phase				
2.1	One Touch Mangaluru Mobile-based Portal	PIS, Parking Information, Utility, Complaints/Grievances	Emergency response, integration with existing eGov services of KMDS, CeG, PLO etc	8	12	32	48	300	1 TB	2			City OFC, and Internet Cloud	Previous Project Experience Will run over Application Server
2.2	MIS Reporting	MIS reports pertaining to PIS, Parking Information, Utility, Complaints/Grievances	MIS Reports for all Subsystems as well as Business Intelligence Reports for Sr Officials	4	8	16	32	300	Important Reports preserved 500 GB	1 TB				Previous Project Experience
3	Software Stack			32	48	256	394	1000	Round to 3	Round to 7				
3.1	Database Server	Common database across application		16+16	24+24	256	394	2X500	3.1	7				
3.x	Shared	Firewall		Not accounted for as it will be MSI responsibility to configure as per policies enforced by										

Sr. no.	Centralized CCC	Integration points (No. of Integrations)		Compute Requirements in Cores		RAM requirements (in GB)		VM Storage (OS, Apps etc) in GB	Centralized Storage Requirements (Usable space from SAN in TB)		KSWAN / Internet Bandwidth (in Mbps)	Load Balancing	Connectivity	Basis
		First phase	Final phase	First Phase	Final phase	First phase	Final phase		First phase	Final Phase				
	infrastructure	l, IDS, IPS, Load balancer, SIEM etc		KMDS/STPI and requirements put up by LSI										

3 Load Balancing

10000 connections per second scalable to 100000 connections per second during peak hours. LB to provide with SSL offloading, client certificate validation, round robin vs sticky session support etc. Logs to be shared on daily basis.

4 Security (UTM, DMZ, Firewall, etc.)

Shared security infrastructure with ability to define and configure multiple DMZ per city. Logs to be shared on daily basis. Support for forensic analysis and vulnerability assessments carried out by the DC team to be shared fortnightly.

5 Public IP

1 public IP per site (in case of DR, additional 1 public IPs will be required.)

6 DR services

DR site can be half capacity of DC site with active-passive setup to begin with. Asynchronous replication of configuration and data to be carried out with RPO, RTO as set by KUIDFC guidelines.

7.2. Summary of Estimate

Table 23. Summary Budget Estimate for Project Scope

Grand Summary		
Sr. No.	Description	Cost In INR LAKHS
1	CCC (CCCC + CoC)+ One Touch Mangaluru with O & M	3524.59
2	IT Connectivity + Networking & Cloud Support with O & M	467.24
3	City Wide CCTV Surveillance + O & M	632.38
4	Air Quality Monitoring Sensor	92.16
	Total	4716.37
	Contingency @ 5%	235.82
	Grand Total	4952.19

7.3. Comparing the Proposed Budget with Estimated Outlay

Project Code	Project Name	Budget Proposed in SCP (in INR Crores)	Budget Estimated in DPR (in INR Crores)
57	Command and Control Centre	60	27.51
	One Touch Mangaluru	38.08	7.73
39	ICT and Disaster Safety Components	15.58	
40	Public Mobility App	10	
41	Hardware & GPS Support	10	
42	MCC – Citizen Interface App	2.5	
	City Wide Surveillance	26	6.32
58	CCTV System Fixed Zoom Telescopic Camera	3	
61	CCTV for road surveillance (PTZ) with WP	12.5	
62	CCTV for road surveillance (fixed tele) with WP	4.5	
63	Control Room Hardware	3.5	
64	Cabling and Other Hardware	2.5	
	IT Connectivity	9.4	4.67
27	100% IT Connectivity	4.4	
60	Networking and Cloud Support	5	
34	Air Quality Monitoring Sensor	1	0.92
	Total Budget Estimate for CCC, One Touch Mangaluru, IT Connectivity and Networking & Cloud Support, City Wide CCTV Surveillance Projects (Without Contingency)	-	47.16
	With 5% Contingency	134.48	49.52

Annexure A: Detailed BOQ: Command and Control Centre

1. **Operator Console Table**
GeM List Price: INR 9001
https://gem.gov.in/cart/cart_global/describe_items/92306
Count: 8 (CoC: 8)

Sr. No.	Parameter	Minimum Specifications Required
1	Physical Structure	Ergonomically designed desk to ensure 24x7 desking solution with sufficient knee space (min 450mm) and foot space (min 600 mm).
2	Working Surface Material	The Console Top / working surface should be made of minimum 25 mm thick MDF with High Pressure Laminate finish. The laminate shall be fire retardant, Insulated, Water Proof, Scratch resistant and high hardness. The Table Top should be as able to mount three 27 Inches Display monitors for each work station
3	Console Design	Consoles must be of modular design, facilitating future equipment retrofits and full reconfigurations without requiring any major modification to the structure or exterior elements
4	Equipment Mounting	The workstations shall be able to house computer equipments, Ethernet points, Power Distribution Unit. The CPUs shall be mounted on slide out CPU Trays (mounted on Heavy Duty Slide) for ease in Maintenance.
5	Frame Material	Made of Heavy Duty Aluminum. The Extrusions shall be duly powder coated with 40+ micron over all surfaces.
6	Monitor Arms and Rear walls	<ul style="list-style-type: none"> Die cast mounted Aluminum arm; fixed firmly on MS Pole with powder coating mounted on its rear wall also made of aluminum. Monitor and functional holder shall guarantee optimum viewing distance. All ergonomic aspects shall be taken into account. It shall be capable of mounting all types of LCD/LEC display with Dimension between 17"to 27"using suitable brackets/additional base Plate. For configuration of working position, it shall allow the technical staff to rotate/tilt/raise the monitor as well as fix their adjustment in quick and easy manner.
7	Warranty / Guarantee	10 years with complete replacement in event of irreparable wear/tear/damage
8	Certification	ISO 11064 latest revision, BIFMA

2. **Chair**
GeM List Price: Rs 5250
https://gem.gov.in/cart/cart_global/describe_items/61486
Count: 18 (Help Desk: 5 + CoC: 8 + 5)

Sr. No.	Parameter	Minimum Specifications Required
1	General	Ergonomic Chair with Arm Rest and castor wheels designed for 24/7 usage.
2	Backrest Support	Tilt adjustable, polystyrene support frame with 100% polyester fibre.
3	Seat Support	Height adjustable Molded wood, 10 mm. thick with polyurethane foam, density minimum 70 kg/m3.
5	Seat Adjustment Mechanism	Self-adjustable synchronous mechanism with soft resort. Multi-locking with safe anti-return system.

Sr. No.	Parameter	Minimum Specifications Required
6	Armrests	Height adjustable via button, Front/back adjustable with PU pads (50 mm).
7	Column	Class 3 built-in cartridge cylinder steel tube.
8	Base	Swivel on castor with 5 polyamide double-wheel castors (made of polyamide and fiber glass).
9	Colour	Black
10	Warranty	Minimum 5 years with complete replacement in event of irreparable wear/tear/damage.

3. Office Cubicle / Cabin Tables

Price: Rs. 15000

Count: 5 (Help Desk: 5)

Sr. No.	Parameter	Minimum Specifications Required
1	Physical Structure	Workstation size of min. 18”(staff Cubicles) and 2” (for Cabin Table) 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 Long lasting polish.
2	Accessories	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.
3	Storage	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 Long lasting polish

4. Aluminum Office Partitions for CCC Helpdesk (24 x 7)

Price: INR 20,000

Count: 1

Sr. No.	Parameter	Minimum Specifications Required
1	Physical Structure	Aluminium Folding Partition to create a room for Help Desk team.
2	Accessories	Door
3	Room Created	12 feet x 12 feet

5. Online UPS for CCC

GeM list price: INR 13, 92,300

(https://gem.gov.in/cart/cart_global/describe_items/77579)

Count: 2

Sr. No.	Parameter	Minimum Specifications Required
1	Capacity	Adequate capacity to cover all IT components proposed by Bidder for Command and Control Centre
2	Technology	True On-line High-Frequency Design UPS with Double Conversion technology, 3 Phase Rectifier & Inverter both to be IGBT based PWM
3	Certification	ISO 9001:2000 and 14001 Certified OEM (certificate to be submitted) UPS should meet CE and ROHS standards (Compliance to be submitted)
4	Input Voltage	160-280 VAC @ 100% load, Single Phase

Sr. No.	Parameter	Minimum Specifications Required
	Range	
5	Input Frequency Range	50Hz +/- 3 (auto sensing)
6	Input Power Factor	0.99 (100% Load)
7	Input Protection	Thermal Circuit Breaker
8	Output Voltage	220/230/240 VAC +/- 1%
9	Output Frequency	50Hz ± 0.5Hz
10	Output Waveform	Pure Sinewave
11	O/P Voltage Distortion	<3% for Linear, <6% for Non-Linear Load
12	Output Connections	Output Connections: (1) Hard Wire 3-wire (H N + G), (2) IEC 320 C13
13	Efficiency (Overall)	Greater than 85%
14	Efficiency (Inverter)	Greater than 90%
15	Battery Type	SMF-VRLA (Sealed maintenance free valve regulated lead acid)
16	Battery Make	Exide, Quanta, Panasonic, CSB, Yuasa, Relicell or equivalent
17	Battery Backup	120 minutes backup on Full Load
18	Communication	Full-Functional SNMP Card should be present; RS 232 & USB port with software for UPS status monitoring
19	Protection	Inherent protection should be provided for Output Short-circuit and Overload, Input Fault, Cold Start, Low battery, Battery Over and Under charge, Battery Disconnect, Battery self-test feature, Over Temperature, OVCD, External Transient Voltage Surge Suppressor, etc.
20	LCD Display	Input Voltage, Input Frequency, Output voltage, Output Current, Output Frequency, Battery Voltage, UPS Status, Load Level, Battery Level, Discharge Timer, Battery Disconnect and Fault Conditions
21	By Pass	Manual and Automatic (Built-in) Bypass switch should be provided
22	Environment	Noise Level – less than 60 dB at a distance of 1 meter
23	Programmable outlets	UPS should have programmable outlets for control of load segment
24	Operating Temperature	0 – 45° C
25	Relative Humidity	20-90%RH @0-400 C (Non-condensing)
26	Miscellaneous	ECO Mode Operation with Enable/Disable function Cooling: Forces Air Cooling Emergency Power Off (EPO) BYPASS Mode Operation with Enable/Disable function Cables: With all necessary cables and plug and Battery Links Rack: Suitable Metallic Rack for housing of SMF Batteries to be provided
27	Battery Replacement	The successful bidder has to replace the UPS battery every 2 years for uninterrupted and smooth operations. OEM should confirm battery replacement in UPS at the end of 2nd year and 4th year respectively.

Sr. No.	Parameter	Minimum Specifications Required
28	Warranty/Guarantee	Rates to be all inclusive for 5 years warranty+ AMC support (If warranty is 3 years, AMC to be taken as 2 years all inclusive; if warranty is 1 year, AMC to be taken as 4 years all inclusive)

6. Building Management System

Price: INR 4, 80,000

Count: 1

6.1 Infrastructure Management System

Sr. No.	Minimum Specifications Required
1	This should be single Unified system capable of providing with a pre-integrated, centralized and consolidated platform for an end to end management of the infrastructure, which includes essential components like, UPS, Air-conditioning units, DG, CCTV, PDU, Electrical panel, Fire alarm system, Access control system, (WLD) Water leakage detection system, etc. irrespective of (Make / Model). The Proposed system should be highly fault tolerant to ensure high uptimes It could either be software based or appliance based solution.
2	Solution should provide a pre-integrated, centralized and consolidated platform for end to end management of the building, which would include: Air-conditioning units, D.G. sets, HT Panel, LT panel, UPS Systems, Fire Alarm system, Surveillance System, Access Control, Water leakage detection, Rodent repellent, Temperature and Humidity, Fire, etc.
3	The solution should be open to integrations with present and future disparate systems with minimal change in the existing system setup.
4	The IMS supplier will have the entire responsibility of the hardware, operating system and the applications for the system supplied by them for this solution.
5	The IMS system should be capable of enabling Notifications through Web Portal, SMS and email.
6	The IMS solution must be highly secure and must support HTTPS, SSH protocols with SHA 512 encryption level
7	Future Ready for Integration with IP / SNMP based systems at the remote infrastructure end.
8	IMS should provide with following functionalities <ul style="list-style-type: none"> ➤ The Monitoring and Management of Energy parameters at different levels of the remote location. ➤ The Monitoring and Management of DG set and Fuel tank for Diesel Supply. ➤ Monitoring and Management of Surveillance and Access control system ➤ Monitoring and Management of Fire Alarm System ➤ Monitoring and Management of Environmental Cooling system and Environmental Monitoring ➤ Customized Fault, Performance and availability reporting Mechanism. ➤ Integration with ITIL based Helpdesk tools for SLA and Vendor Management

6.2. Energy Supply and Distribution Monitoring and Fault Management

Sr. No.	Minimum Specifications Required
1	The IMS system should be capable of integrating energy monitoring from the HT/LT section of the input supply to the data communication infrastructure.
2	The IMS system should be able to do continuous monitoring of the quality of power supplied by the Electricity board and by the Generators.
3	The IMS system should be capable to monitor the UPS.

Sr. No.	Minimum Specifications Required
4	The IMS tool should have the feature to setup thresholds on each of the monitored energy parameter.
5	The Polling interval of each and every monitored parameter should be configurable.
6	The IMS tool should have the capacity to store monitored performance data of each and every parameter up to 1 year.
7	The IMS tool should have the inbuilt feature to enable data backup of the performance data at customer definable time intervals.
8	The IMS tool should be able to integrate with a Dashboard and Reporting tool to enable generation of different kinds of standard and customized reports.
9	The IMS tool should be able to get alarm information of electrical systems and should be able to generate SMS to the designated team and also trigger generation of trouble tickets with defined SLAs.

6.3. Fire Alarm System Monitoring and Management

Sr. No.	Minimum Specifications Required
1	The IMS tool should have the capability to integrate with the fire alarm system of the building and provide the alarms generated by the system on the centralized Dashboard of the Fire Alarm System.
2	The IMS tool should have the capability to be configured to setup control mechanism for the buildings in case of fire alarm is detected. Some of the actions which might have to be enabled by the IMS tool are referred below: a. Co-relation with the nearest camera to enable validation of the fire alarm. b. Activation of audio alarm at the centralized command centre. c. SMS notification to the concerned teams
3	Any other actions like the shutdown of the main supply should also be possible through the system if required to be configured in future.

6.4. Reporting Mechanism

Sr No	Minimum Specifications Required
1	The IMS tool should have availability and performance reporting mechanism built-in for fault and trend analysis.
2	The IMS tool should have its own Business Intelligence tool to help enable the customer get predefined business reports and should also be customizable for specific reports on request.
3	Monthly device availability report for all sub-systems.
4	Monthly SLA report for the sub-systems
5	Weekly report of CPH 'consumption per hour' of the Gensets in use.
6	Weekly report on the CPU 'cost per unit' of electricity generated by the Gensets.
7	Weekly and Monthly temperature and Humidity trend of the building.

6.5. Integrated Helpdesk System for SLA and Vendor Management

Sr. No.	Minimum Specifications Required
1	The IMS tool should be fully integratable with ITIL compliant Helpdesk tool.
2	Some of the alarms generated from the different systems in the IMS tool should generate trouble tickets and address it to the relevant teams with pre-defined SLAs.
3	The integrated Helpdesk tool of the IMS should be able to handle change requests as per the workflow defined by the customer.

Sr. No.	Minimum Specifications Required
4	The Helpdesk tool should be able to generate of different types of SLA reports to help the customer understand specific issues or calls handled by independent vendors and level of SLA adherence by the vendors etc.

6.6. Desirable Features for IMS

Sr. No.	Desirable Features
1	The centralized dashboard of the IMS tool should provide a monitoring and management window using the actual views of the data communication infrastructure where the different devices of IMS tool are placed. This will help immensely in the visual monitoring of the infrastructure health and quick identification of the fault area in case of alarm generation.
2	The IMS tool should have the capability to integrate systems with following interfaces,
3	NO/NC contacts
4	Analog signals - 0-20 mA, 0-5 V DC, 0-10 V DC.
5	Digital Outputs - Ref voltage 12 V DC
6	Modbus RTU
7	Modbus TCP
8	IP SNMP V1/v2/v3 support

7. Fire Alarm System Price: INR 3000 Count: 4

Sr. No.	Minimum Specifications Required
1	Shall be a microprocessor based single loop addressable fire detection and alarm system.
2	Must be implemented as per NFPA 72 guidelines.
3	Shall activate the system by automatic Heat and smoke detectors.
4	Shall have break glass units.
5	Shall be UL/EN54 Part 2 and UL/EN54 Part 4 compliant.
6	The system status shall be made available via panel mounted LEDs and a backlit 8 line x 40-character alphanumeric liquid crystal display.
7	All system controls and programming will be accessed via an alphanumeric keypad. The control panel will incorporate form fill menu driven fields for data entry and retrieval.
8	The system should have an option of manual over ride of the call, if required, after verification. Manual control should consist of: <ul style="list-style-type: none"> Start sounders Silence sounders Reset system Cancel fault buzzer Display test Delay sounder operation Verify fire condition Disable loop
9	Smoke detector should be UL/EN54 part 7 compliant
10	Heat detector should be UL/EN54 part 5 compliant
11	Heat detector shall be of the fixed temperature (58° C) or rate of temperature rise type with a fixed temperature operating point.
12	Control & Monitor module must be provided for integration with 3rd party systems.
13	Alarms:

Sr. No.	Minimum Specifications Required
	<ul style="list-style-type: none"> The sounders should be suitable for operation with a 24V DC supply Shall be providing a sound output of at least 100dBA at 1 meter and 75 dBA min, for a bed head or sounder base type device. The sounder frequency shall be in the range of 500Hz to 1000Hz.

8. **Junction Box with Adjustable Mounting Frames**
GeM Price: INR 5200
https://gem.gov.in/cart/cart_global/describe_items/104139
Count: 2

Sr. No.	Parameter	Minimum Specifications Required
1	Built	The Outdoor Utility Cabinet will be constructed with a front sheet steel door with 3 point Locking system to ensure the security of the cabinet. Side and Wall Panels shall be double wall constructed, with fixing bolts internal to the cabinet. The Cabinet should have the required frames to mount the required components like, network device, power, UPS, LPU, battery, etc.
2	Utility and IP Sharing	Should be Made for 24/7/365 Outdoor Applications; The Utility Cabinet shall be IP 55 rated (Regulatory Standard Compliance) for ingress protection.
3	Size	The cabinet has to be provided of size suitable for the mounting of the associated network devices, power, UPS, LPU / mini-server and Battery components securely and safely within the cabinet.
4	Power slot	3 x 5 way/15 Amp PDU's has to be provided to support the site equipment. PDU type should be as per actual requirement.
5	Installation	Each Cabinet will be mounted on a raised height Plinth, 600 - 1000 mm high, as per site requirements. Cooling unit shall be inherent in the design.
6	Cable Management	Proper Cable management should be provided Cable Routing: Power connection cable shall be provided from the nearest access point provided by Power utility company to the Outdoor Utility Cabinet through Power meter enclosure.

- 9 **Video Wall Solution – 55" LED in 3X3 Arrangement**
Gem Price: INR 30, 06,000 (https://gem.gov.in/cart/cart_global/describe_items/384912)
Count: 1

Sr. No.	Parameter	Minimum Specifications Required
1	Configuration	Full HD IPS LED Display, Direct LED Backlight, Display suitable for use in video wall with bezel to bezel distance not less than 4 mm
2	Resolution	Full High definition (1920 X 1080) 16:9 Widescreen
3	Contrast Ratio	5000:1
4	Brightness	1000 S
5	Refresh rate	> 800 Hz
6	Response time	At most 8 milliseconds
7	Viewing angle	H : 178°, V : 178°
8	Standard Input	1x Digital DVI-I ; 1x Digital DVI-D, or Higher
9	Standard output	1x Digital DVI-D ; 1x CVBS BNC, 2 X HDMI
10	Control	RS-232/RS-422/IR
11	Consumption	Not more than 5000 Watt
12	Power Supply	AC 100 -240 V~ (+/-10 %), 50/60 Hz
13	Operating Temperature	0°C - 40°C

Sr. No.	Parameter	Minimum Specifications Required
14	Humidity	10% - 90%, non-condensing
15	Connectors	Dual Link DVI-D cable, Power cable for daisy chain, AC cable, Remote Controller
16	Display Controllers	Video Distributor, Display controller to control Video wall in a matrix as per requirement with necessary software: Processor specs: Quad core 64-bit, 3.4 GHz CPU or latest RAM: 8 GB DDR3 minimum HDD: Min 500 GB Hard Disk (Hard disk Capacity should be upgradable) Network support: Gigabit Ethernet Controller inbuilt, Support for Add on Network adapters. Video wall Display: Display multiple source windows in any size, anywhere on the wall Accessories: DVD-R,DVD+RW,, Keyboard, mouse OS Support: 64-bit Operating Systems Windows / Linux or equivalent industry Standard

**10. Video Wall Management Software: Price: INR: 30,53,905 (Hardware + Software)
Count: 1
Price by Bosch.**

Sr. No.	Parameter	Minimum Specifications Required
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, browser, Desktop and Remote Desktop application
5	Multi-view option	Multiple view of portions or regions of Desktop, Multiple Applications can view from single desktop
6	Other Features	<ul style="list-style-type: none"> • SMTP support • Remote control over LAN • Alarm management • Remote Management • Multiple concurrent clients • KVM support
7	Cube Management	<ul style="list-style-type: none"> • Cube health monitoring • Pop up alert services • Graphical user interface

**11. Workstations
Price: INR 1, 15,000
Count: 15**

Sr. No.	Parameter	Minimum Specifications Required
1	Processor	Latest Quad Core i7 or AMD processors with 3 GHz or higher
2	Motherboard chipset	OEM Motherboard & compatible 64 bit chipset
3	Video/Graphic	Graphic Controller with dedicated 2 GB video memory

Sr. No.	Parameter	Minimum Specifications Required
	s	
4	System memory	Minimum 8 GB DDR3 expandable up to 64 GB or more
5	Ports	USB port, HDMI, Display, VGA etc. (data copy protection mechanism on USB ports)
6	Storage	2 TB SATA III HDD,
7	Monitor	2 X 27 inches or higher Wide LED Touch Screen,
8	Accessories	Mechanical Keyboard, optical mouse
9	Warranty	5 years onsite comprehensive
10	Protection	Locking mechanism, RFID tagging on all machines and their accessories
11	GeM Indicative Reference Link	https://gem.gov.in/cart/cart_global/describe_items/40981
12	GeM Reference Price	66000 for 3 years warranty and single display of 18.5” Extrapolating price to 115000 for 2 LED Monitors 27.5” for 20000 each (https://gem.gov.in/cart/cart_global/describe_items/70280) and 5 years comprehensive onsite warranty.

- 12. Multifunction Printer**
GeM Price: INR 20,000
(https://gem.gov.in/cart/cart_global/describe_items/13625)
Count: 2

Sr. No.	Parameter	Minimum Specifications Required
1	Function	Printer, Scanner, Copier
2	Printing speed	30 PPM or higher
3	Print Technology	Laser
4	Colour	Colour, Monochrome
5	Print Quality	1200 X 1200 dpi
6	Duty Cycle	Minimum 50000 pages per month
7	Duplex	Yes
8	Network	RJ45, WLAN
9	OS compatibility	Windows, Linux, Apple, Android (Cloud printing)
10	Memory	256 MB minimum
11	Cartridge yield	10000 per cartridge
12	Security	Access Control for print, pin/password for scanner and copier
13	Remote Management	Support remote management and accounting over http to monitor prints, scan and copying carried out
14	Input Trays	Minimum 2 (1 automatic, 1 manual feed)
15	Input/output paper volume handling	150 sheets standard
16	Media size	A4, A5, Letter, Legal.
17	Scanner type	Flat Bed with ADF for Auto Duplex scanning
18	Scan File format	JPEG, PDF, PNG,
19	Scan output	USB (Access password protected), Network File Server
20	Resolution	1200 X 1200 DPI

Sr. No.	Parameter	Minimum Specifications Required
21	Scan Speed	Minimum 20 PPM
22	Copy Speed	Minimum 20 PPM
23	Copy output	Monochrome enforced through Access Control. For colour copy, watermark of colour copy should be embossed.
24	Warranty	5 years comprehensive onsite
25	GeM Indicative Reference Link	https://gem.gov.in/cart/cart_global/describe_items/13625
26	GeM Reference Price	14799 with 1 year warranty Extrapolating price to 20000 with 5 years comprehensive warranty

13. Indoor Fixed Dome Cameras with PoE
Price: INR 55000
Count: 0

Sr. No.	Specification
1	Image sensor : 1/2.7" Progressive Scan CMOS
2	Lens : 3 to 9 mm or better, DC-iris, motorized
3	Field of View : 37.5°~103.7°(horizontal), 21.6° ~ 71.2° (vertical), 42.6°~111.21° (diagonal)
4	Day and Night : Automatic/manual/scheduled
5	Min. Illumination / Light Sensitivity : Color mode: F1.2 @ 0.5 lux Black and white mode: F1.2@ 0.05 lux
6	Light sensor: Senses the level of ambient light to determine when to switch day/night mode.
7	Video Compression : H.264 and Motion JPEG
8	Audio Compression : G.711 A-Law, G.711 U-Law, G.726
9	Resolutions and frame rates : 30 fps at 1920x1080 (1080p)
10	Protocol Support : IPv4, IPv6, TCP/IP, HTTP, DHCP, UDP, DNS, SMTP, RTP, RTSP, SNMP protocols/Should meet all functional requirement of the project
11	PoE : 802.3af compliant
12	Environmental Certification and Housing : IP66 and IK10 rated
13	Camera Should remote Zoom and Auto focus
14	Camera should support Micro SD/SDHC (up to 32GB) and other preceding standard SD cards
15	Should be ONVIF compliant
16	The camera should be automatically discovered and configured when connected to VMS or Network Switch, to set the right network parameters for the video stream on the network
17	5 years comprehensive warranty with repair/replacement
18	GeM Indicative Reference Link: https://gem.gov.in/cart/cart_global/describe_items/76695
19	GeM Indicative Price: Rs 36531 with 1 year warranty. Extrapolating to 55000 with 5 years warranty

14. 48 Port L2 Switch
Price: INR 40000
Quantity: 2 (CCC)

Sr No	Minimum Specifications Required
1	Layer 2 Switch with minimum 48 No's of 10/100/1000 Base-TX ports (Duplex: Full, Half)
2	Should have minimum switching capacity of 32 Gbps. All ports on the switch should work on line rate.
3	Should be IPv4 and IPv6 ready from day one
4	Should support minimum 4000 MAC address entries

5	Should support protocols like MSTP, STP, RSTP, dot1q VLAN-tagging, LACP, NTP
6	Should have features like port-security, auto-negotiate, flow control, MAC filtering
7	Should have a dedicated OOB Management port using CLI(SSH), WebUI(SSL), SNMP (V1, V2, V3), TFTP, etc.
8	Switch should support AAA features using TACACS+, Radius, LDAP, etc.
9	Should be NDPP or EAL3 certified at the time of Bidding
10	All necessary SFP's, interfaces, connectors, patch cords (if any) & licenses must be delivered along with the switch from day one.
11	The Switch should be Rack mountable & the switch should be supplied with Indian standard AC (15Amp) power cord.
12	5 Years comprehensive onsite warranty
13	GeM Indicative Reference link - https://gem.gov.in/cart/cart_global/describe_items/27943
14	GeM Reference price: 34300 for 3 years. Extrapolating to 40000 for 5 years comprehensive warranty

15. **24 Port L2 Switch**
Price: INR 29700
Quantity: 2 (CCC)

Sr No	Minimum Specifications Required
1	Minimum 24 No's of 10/100/1000 Base-Tx PoE+ ports (Duplex, Full, Half) and 2 x 1GE Uplink port.
2	All ports should have features of auto- negotiate, flow control (802.3x), port based network access control (802.1x), port security, MAC filtering etc.
3	Minimum Switching capacity of 32 Gbps or more
4	Should be IPv4 and IPv6 ready from day one
5	Should have IGMP snooping v1,2 & 3 supporting 1K multicast groups
6	Features of DHCP (including option 82), DHCP Relay NTP or equivalent, SNMPv1, v2 & v3, TELNET/SSH
7	Should have console port for administration & management, CLI and web based GUI for easy management
8	Support for IEEE 802.3ad Link Aggregation Control Protocol (LACP)
9	Port Security to secure the access to a port based on the MAC address of a user's device. The aging feature to remove the MAC address from the switch after a specific time to allow another device to connect to the same port.
10	Multilevel security on console access to prevent unauthorized users from altering the switch configuration.
11	Port-based and 802.1Q tag-based VLANs, MAC-based VLAN, Guest VLAN, Private VLAN, also known as protected ports, with multiple uplinks
12	Web/SSL, Telnet server/SSH, ping, traceroute, Simple Network Time Protocol (SNTP), Trivial File Transfer Protocol (TFTP), SNMP, RADIUS, syslog, DNS client, protocol-based VLANs
13	Duplicate address detection (DAD)
14	Should be Surge Protection certified S/N Specification
15	Operating temperature 0 to 60 °C
16	GeM Indicative Reference link - https://gem.gov.in/cart/cart_global/describe_items/35476
17	GeM Reference price: 29700 with lifetime warranty.

16. **Access Control System**
Price: INR 145750
Quantity: 1

Sr. No.	Minimum Specifications Required
---------	---------------------------------

Sr. No.	Minimum Specifications Required	
1	Transmission Frequency : 13.56 MHz	
2	iClass Technology. Should be compliance with iClass 15693 & 14443B	
3	The data flow between card & Reader should be encrypted using 64 bit authentication keys.	
4	Should be configured as a Reader – Enroller, Enroller Only & Reader Only (All three are mandatory)	
5	Optical Finger print sensor	
6	Sensor resolution should be of at least 500dpi	
7	Finger print should be captured in less than 2 seconds and verified in less than 5 seconds.	
8	Should have fingerprint enrolment software	
9	Operating temperature : 0° to 50°C	
10	Operating humidity : 10% to 90% relative humidity (Non-Condensing)	
11	Smart Card Reader Transmission Frequency 13.56 MHz	
Controller		
12	Reader Inputs	Two
13	Universal Inputs	Two
14	Tamper Input	One
15	Digital Lock Inputs	Two
16	Processor	50 MHz with 32 MB RAM
17	Processor for Reader Inputs	Yes (Dedicated Processor for each Reader)
18	Communication	10/100 Ethernet port
19	Memory	Minimum 500 personnel records
20	Area lockdown support	Yes
21	Real time clock	Yes
22	Encryption	Minimum 64 bit
23	Visual Indicator	Yes
24	Mounting	Wall/Ceiling
25	Battery Backup	5 hrs or more
26	Technology Compatibility	Wiegand
27	Card Reader power	5V DC
28	Wiring Distance	150 meters (Wiegand)
29	Indicator LED	Yes
30	Push Button Switches	For clearing memory; Configuring IP address
31	Enclosure	Yes
32	Certification	CE approved, UIDAI compliance
33	Operating Temperature	0° to 50°C
34	Operating Humidity	10% to 80% relative humidity (Non-Condensing)
Access Control Software		
35	Compatibility with any Windows Operating System	
36	Compatibility with MYSQL / PostgreSQL/ SQL / ORACLE	
37	Support for TCP/IP Communication	
38	Provision for Alarm Monitoring for Battery, Mains Supply, Door Opened too Long, Door Forced Opened, Unauthorized Swipe & Controller Tampering	
39	39. Support for unlimited number of Card Database & Transactions	
40	Specify Card Activation & Expiry Date	
41	Support for Biometric, Pin & Smart Card Applications	
42	Management of Dual Access Levels to a single Card	
43	Remote Locking & Unlocking of Doors	
44	Remote management of Controllers	

Sr. No.	Minimum Specifications Required
45	Customization of Door User time for every card Holder
46	Features: <ul style="list-style-type: none"> Two Stages of Alarm Management (Acknowledgement on Receipt & Closure on Investigation) Access Privileges on the basis of Time & Date Creation of holiday schedules to cover maintenance & Vacations / Holidays Permission to activate any control output for a specific event such as alarm Programmable Shunt time to control the door opening time Area Control by using Hard Anti Pass back, Soft Anti Pass back, Timed Anti Pass back, Occupancy Limit, Multi man principle, Area Lock down, Threat level conditioning. Alarm Management Automatic User Log off Cardholder Management & Enrollment Creation & Maintenance of User Database Assignment of Access Privileges
47	5 years comprehensive onsite warranty
48	GeM Indicative Reference Link - https://gem.gov.in/cart/cart_global/describe_items/90186 (For Aadhaar enabled attendance)
49	https://gem.gov.in/cart/cart_global/describe_items/60510 (With control kit)
49	GeM Reference price: 9600 for Aadhaar enabled attendance 145750 with Control kit

17. **Firewall**
Price: INR 108000
Quantity: 1

Sr. No.	Specifications
1	It must allow administrators to create Firewall/IPS policy by application, active directory users/groups and content.
2	It must support a minimum bandwidth of 10 Gbps (per interface) with no latency or performance impact with all protection capabilities enabled.
3	Should support atleast 30,00,000 concurrent sessions
4	Should Support atleast 100,000 new connections per second
5	Should provide throughput of 100Gbps or more
6	It must support multiple logical firewalls on the same hardware platform
7	It must support site to site VPN using IPSEC, GRE, remote access VPN
8	It must support client based VPN using SSL/TLS for remote users.
9	It must support the authentication of users via Radius, TACACS+, etc.
10	It must be capable of identifying and controlling both UDP and TCP based traffic
11	It must provide a configuration audit capability.
12	The supplier must provide 7x24x365 technical support.
13	It should perform all of the scanning and identification processes in a single pass
14	The licensing model should be appliance based
15	It should contain role/discretionary based administration function to provide for separation of duties for administrative access and control
16	It should provide vertical and horizontal delegation of access control of virtual firewalls/systems and policies
17	It should provide compliance reporting as per industry standards like ISO27001:2013, PCI,

Sr. No.	Specifications
	FIPPA, etc.
18	It should provide IPv4, IPv6 support.
19	It should support static and dynamic routing protocol, NAT, PAT, multicast support
20	It should have redundant power supply, Fan
21	It should have at least 4x10G port scalable to 8 and 2x40G port scalable to 4
22	It should have dedicated OOB Management port for managing the device using CLI(SSH), WebUI(SSL), SNMP, etc.
23	The device should be configurable in High Availability (Active-Active, Active-Passive mode)
24	5 years support
25	GeM Indicative Reference link - https://gem.gov.in/cart/cart_global/describe_items/94856
26	GeM Reference price – 108000

18. **Intrusion Prevention System**
Price: INR 300000
Quantity: 1

Sr. No.	Specifications
1	The device should be transparent to the network
2	The device should be configurable in High Availability mode (Active-Active, Active-Passive)
3	The device should have dual support
4	The device should provide throughput of 80Gbps
5	It must support a minimum bandwidth of 10 Gbps (per interface) with no latency or performance impact with all protection capabilities enabled.
6	Should Support at least 100,000 new connections per second and 30,00,000 concurrent connections
7	It should have dedicated OOB Management port for managing the device using CLI(SSH), WebUI(SSL), SNMP, etc.
8	Should be able to perform stateful inspection of traffic for: <ul style="list-style-type: none"> • TCP Reassembly • IP Defragmentation • Bi-directional Inspection • Forensic Data Collection • Access Lists
9	Should provide Real-time protection against: <ul style="list-style-type: none"> • Backdoor and Trojans • Brute Force Protection • SQL Injection • Worms and Viruses • Cross Site Scripting • SNMP Vulnerability • Web Protection • Mail Server Protection
10	Should have provision for Real Time Updates of Signatures, Should support Automatic signature synchronization from database server on web Device Should have capability to define User Defined Signatures
11	Proposed solution should have automatic bypass for IPS in case of performance suffer beyond defined administrative threshold or IPS function/engine fails
12	5 years comprehensive onsite warranty

Sr. No.	Specifications
13	GeM Indicative Reference link: https://gem.gov.in/cart/cart_global/describe_items/85297
14	GeM Reference Price: 207603 Extrapolating to 300000 for 5 years comprehensive onsite warranty

19. Enterprise Management System

Sr. No.	Minimum Specifications Required
1	<p>The System NMS/EMS system should deliver following functionalities:</p> <ul style="list-style-type: none"> • Network & Server Fault Monitoring & Performance for IP/SNMP enabled devices • like router, switches, CCTV devices, Sensors, PA System, Emergency Call Boxes, etc. • Application Performance Management • IT Helpdesk – ITIL v3 Aligned • Business Services Dashboard • Service Level Management • Capacity Management • IT Asset Inventory Management & License Management • Configuration Automation
2	The Centralized EMS solution needs to have a standalone system and has to be technology / vendor agnostic that shall enable to introduce any additional technology / vendor in the network. Such a network as and when introduced should seamlessly integrate with the solution proposed and continue to provide the services right since the day one of its introduction.
3	The EMS should also support single pane visibility across multiple areas of Monitoring
4	The system must allow for push or pull methods to send/collect or receive the information to and from various 3rd party systems/devices/servers.
5	The system should have the ability to provide performance/service data to external systems.
6	The system shall be able to interface with fault management system via standard protocol
7	The solution should be able to monitor the performance, availability, utilization, memory, etc of all the devices in the network.
8	It should have a WEB Based user Interface through which Administrator can access all administrative tasks and operational status monitoring for Network Devices, Servers, Sensors, etc.
9	It should produce a WEB based interface to the users also for accessing the SLA reports
10	Should be able integrate with Helpdesk System for automated incidents reporting with option for manual reporting followed by viewing, updating, tracking and closing.
11	The Enterprise Management tools must have Service Level Management function to allow building various service levels and track the performance of Infrastructure and operational service levels in real time.
12	The solution should have perpetual licenses to manage all the devices in the network and any other devices that may be added in future

20. Shared File System with Storage and LTO Tape Library
NICSI Price: 88,68,921 (Tape Library)
 (https://gem.gov.in/cart/cart_global/describe_items/115096)
Count 1 (CCC)

Sr. No.	Parameter	Specifications
1	Primary	<ul style="list-style-type: none"> • Solution should be IP Based/iSCSI/FC/NFS/CIFS • Retention period of 15days • 100% expandable • Storage Capacity should be as per Overall Solution Requirement (80% usable) • Disks should be preferably minimum of 3 TB capacity • To store all types of data (Data, Voice, Images, Video, etc) • Modular design to support controllers and disk drives expansion • Should be Rack Mountable • The controllers / Storage nodes should be upgradable seamlessly, without any disruptions / downtime to production workflow for performance, capacity enhancement and software / firmware upgrades. • Licenses for the storage management software should include disc capacity/count of the complete solution and any additional disks to be plugged in in the future, upto max capacity of the existing controller/units. • A single command console for entire storage system. • Should also include storage performance monitoring and management software • Should provide the functionality of proactive monitoring of Disk drive and Storage system for all possible disk failures • Should be able to take "snapshots" of the stored data to another logical drive for backup purposes • The storage array must have complete cache protection mechanism either by de-staging data to disk or providing complete cache data protection with battery backup for up to 4 hours
2	Secondary Storage	<ul style="list-style-type: none"> • Storage capacity of 500TB for Retention period of 30days • It should support LTO-7 drive type with Minimum 6 drives • It should support In-box capacity scaling of minimum 50 cartridge slots. • It should have capability for multi-unit scalability • It should drive interface support - 4 Gb Fibre Channel. • It should support tape based data encryption with the longest and most secure keys - 256 bits. • It should support web based remote manageability to allow monitoring and managing of the library • Web based interface should give - Status information, health, configuration and operations, reporting, error and status logs, Library and drive firmware upgrade capabilities, Diagnostic tests and information, Cartridge movement for maintenance and management purposes, Security and access control.

Sr. No.	Parameter	Specifications
		<ul style="list-style-type: none"> • It should support SNMP for device monitoring, HTTPS web console, IPv6. • Device should have link path failover features, power and cooling fans redundancy. • Should support industry leading backup software • Offered Secondary Storage solution with LTO Tape by the bidder shall be Certified by the Quoted VMS solution.
53	File Storage Management Software	<ul style="list-style-type: none"> • The Shared File System Software should support large file systems and in-Built data archiving to tape mechanism. • Upon the File System functionality for the Secondary Storage should not be only responsible to allocate move / Archive the data to tape but it shall be in Native Format between Primary & Secondary Storage automatically without using third party Backup and Archive Software. • Supported Inbuilt Archiving functionality shall also allow and confirm the Archived Data access & Retrieval Directly from VMS without using any third party Backup & Archive extensive system to retrieve the Data from Tape Library. • The Shared File System should provide low latency, high throughput concurrent data access to all the clients. • The Shared File System should support automatic placement & movement of the files created by the user / applications into appropriate multi-vendor & Compatible Primary storage arrays and then copying / moving the data to Tape pools, based on the defined affinity policies with the fixed duration for primary storage & secondary storage (Tape Library) using in-built Data Mover Mechanism. • The Shared File System should support heterogeneous clients on Network with shared data access for the same data set and same Data Storage. Heterogeneous clients support includes Microsoft Windows, Red Hat Enterprise Linux & SUSE Linux, MAC, AIX etc. • File system shall have the capability to allocate the Primary Storage space to recording server, monitors, analyst for read and write access accordingly. • The Shared File System shall permit consolidation of Storage with different capacities, performance capabilities and make and model into a common single and Global storage pool. • Addition, deletion or failure of any clients shall not have any effect on file system functionality. • It shall support to help in reducing the cost of Secondary Tape Storage in case of Increasing the Retention for the installed Camera Count as a future requirement just by adding the Media Cartridges. • The Shared file system should be open to support the different/ multiple make of Storage under the same existing Global name space view for all the users/ files in single file system view to the entire Heterogeneous client at the time of Storage Expansions and volume expansion with Capacity.

Sr. No.	Parameter	Specifications
		<ul style="list-style-type: none"> • The Shared File System should present the location of the file with the same file path and filename to all its clients. • The Shared File System should allow multiple clients to access the same file for concurrent read. • The Shared File System shall allow online expansion and retirement/removal of storage capacity without taking the file system off line. • Offered file system shall have the inbuilt Data Archiving functionality as a single software without using the LTFS mechanism, It shall be a single GUI to move the data from Primary Disk to Tape Library in the Native File Format and leave the Stubs on to Primary Storage. • Offered File System shall also have the in-built functionality of retrieving the data from Tape active slots in Native Format to Primary Storage through the VMS application as a normal Data access functionality from the VMS. Original Data can be accessed and read by the VMS application or User without using any data recovery console • Offered File System should have the provisioning of keeping a Duplicate / Second copy of the Primary storage's Online Video Data on Secondary Storage as well. Data Older than the Primary storage's retention will be kept only on Secondary LTO Tape Storage. • Shared File System should be capable of recovery in case of system crash or unplanned shutdown. • Offered Shared file system should be capable of recovering all the Backup & archived data in the Native Format from Tape without using the main server, in case of server is down or not in use. • In case of increasing the Retention, only LTO media cartridge to be added to retain the Data. No other licenses required to increase the Retention to control the Cost. • Secondary Storage should have the in-built Retrieval process, under which it shall restore the data directly on the Same Primary Storage location under the same path from where it was moved to Tape Storage. • Retrieving data from Secondary Storage shall be accessed directly by the VMS application to view/ Monitoring purpose as per the active Tape slot capacity sizing & planning. • Shared file system shall support to restore all the Data and Data link of the primary Storage content to the same or higher capacity Storage provided, in case of Primary Storage is completely down and not accessible. • It shall have the functionality to 'vault' the media and provide a means of notifying the operator to retrieve a 'vaulted' media when an 'oldest' file is requested, when the capacity is increased by increasing the Retention. • Shall have administration capabilities through GUI and CLI

Sr. No.	Parameter	Specifications
		<ul style="list-style-type: none"> Shall provide capabilities for user administration Bidder has to estimate licensing requirement for server, workstations for Connected Clients and storage equipment's. It is the bidder responsibility to make the solution operational as per RFP requirement.

21. **Antivirus Software:**
Price: INR 2619 (per server per year)
https://gem.gov.in/cart/cart_global/describe_items/71356
Count: 8 (CCC)

Price: INR 2600 (per pc for 3 years)
https://gem.gov.in/cart/cart_global/describe_items/77542
Count: 13 (CCC)

Sr. no.	Minimum Specifications Required
1.	Shall be able to scan through several types of compression formats.
2.	Must update itself over internet for virus definitions, program updates etc. (periodically as well as in push-updates in case of outbreaks)
3.	Able to perform different scan Actions based on the virus type (Trojan/ Worm, Joke, Hoax, Virus, other)
4.	Shall be able to scan only those file types which are potential virus carriers (based on true file type)
5.	Shall be able to scan for HTML, VBScript Viruses, malicious applets and ActiveX controls
6.	Shall provide Real-time product Performance Monitor and Built-in Debug and Diagnostic tools, and context- sensitive help.
7.	The solution must support multiple remote installations
8.	Shall provide for virus notification options for Virus Outbreak Alert and other configurable Conditional Notification.
9.	Should be capable of providing multiple layers of defense
10.	Shall have facility to clean, delete and quarantine the virus affected files.
11.	Should support in-memory scanning so as to minimize Disk IO.
12.	Should support heuristic scanning to allow rule-based detection of unknown viruses
13.	Updates to the scan engines should be automated and should not require manual intervention
14.	All binaries from the vendor that are downloaded and distributed must be signed and the signature verified during runtime for enhanced security
15.	Updates should be capable of being rolled back in case required
16.	Should support various types of reporting formats such as CSV, HTML and text files
17.	Shall be able to automatically push any updates, patches, fixes to all client machines to ensure up-to-date antivirus protection for all IT devices and systems.

23. **Back-up Software**
Price: INR 92820
Count 1 (CCC)
http://www.nicsi.com/frontendoffering/clients_new/eEY3bUNLRUZ2Y0ZObmxxYWFMS0pFZz09

Sr. no.	Minimum Specifications Required
1.	The software shall be able to back up the necessary and relevant video feeds from storage, various databases, etc.
2.	Should support file level backup/recovery
3.	Should perform Scheduled unattended backup using policy-based management for all Server

Sr. no.	Minimum Specifications Required
	and OS platforms
4.	The software should support on-line backup and restore of various applications and Databases.
5.	Should support database platforms like Microsoft Exchange Server, Oracle, Microsoft SQL Server, Microsoft SharePoint, Sybase, MySQL, Informix, IBM Domino (Lotus), SAP, IBM DB2, etc.
6.	Should support backup hardware like tape, virtual tape, optical, disk, interface hardware, etc.
7.	The backup software should be capable of having multiple back-up sessions simultaneously
8.	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
9.	. The backup software should support different types of user interface such as GUI, Web based interface
10.	Should have logging and reporting features

24. Server

Price: INR 569,999

https://gem.gov.in/cart/cart_global/describe_items/15149

Count: 8 (CCC)

Parameter	Minimum Specifications Required
Processor	Latest series/ generation of 64 bit x86 processors E5- 2640V4 -with Ten or higher Cores. Processor speed should be minimum 2.4 GHz. 2 processors per each physical server.
RAM	Minimum 128 GB Memory per physical server
Internal Storage	2x1.2TB 12G SAS (10k rpm) hot swap disks
Network interface	Server should be configured with dual converged adaptor ports supporting Ethernet and FC. Minimum of 2 PCI expansions/Mezzanine expansions
RAID support	Integrated Hardware Raid Controller to supports Hardware Raid RAID 0, 1
Operating System	As per requirement/solution licensed version of 64-bit latest version of Linux/Microsoft Windows based Operating system)
Form Factor	Blade Server or Rack Server
Virtualization	Shall support Industry standard virtualization hypervisor like Hyper-V, VMWARE.

24.1. Server Rack Specifications

Price: INR 45800

https://gem.gov.in/cart/cart_global/describe_items/99273

Count: 2 (CCC)

Parameter	Minimum Specifications Required
Type	<ul style="list-style-type: none"> 19" 42U racks mounted on the floor Floor Standing Server Rack - 42U with Heavy Duty Extruded Aluminum Frame for rigidity. Top cover with FHU provision. Top & Bottom cover with cable entry gland plates. Heavy Duty Top and Bottom frame of MS. Two pairs of 19" mounting angles with 'U' marking. Depth support channels - 3 pairs with an overall weight carrying Capacity of 500Kgs. All racks should have mounting hardware 2 Packs, Blanking Panel. Stationery Shelf (2 sets per Rack) All racks must be lockable on all sides with unique key for each rack Racks should have Rear Cable Management channels, Roof and base cable access
Wire managers	Two vertical and four horizontal
Power Distribution Units	<ul style="list-style-type: none"> 2 per rack Power Distribution Unit - Vertically Mounted, 32AMPs with 25 Power Outputs. (20 Power outs of IEC 320 C13 Sockets & 5 Power outs of 5/15 Amp Sockets), Electronically controlled circuits for Surge & Spike protection, LED readout for the total current being drawn from the channel, 32AMPS MCB, 5 KV AC isolated input to Ground & Output to Ground
Doors	<ul style="list-style-type: none"> The racks must have steel (solid / grill / mesh) front / rear doors and side panels. Racks should NOT have glass doors / panels. Front and Back doors should be perforated with at least 63% or higher perforations. Both the front and rear doors should be designed with quick release hinges allowing for quick and easy detachment without the use of tools.
Fans and Fan Tray	<ul style="list-style-type: none"> Fan 90CFM 230V AC, 4" dia (4 Nos. per Rack) Fan Housing Unit 4 Fan Position (Top Mounted) (1 no. per Rack) - Monitored - Thermostat based - The Fans should switch on based on the Temperature within the rack. The temperature setting should be factory settable. This unit should also include - humidity & temperature sensor
Metal	Aluminum extruded profile
Side Panel	Detachable side panels (set of 2 per Rack)

OR

A.24.2 Blade Servers + Chassis

Price: INR 3,99,98,179 (https://gem.gov.in/cart/cart_global/describe_items/23122)

Count: 1 (8 Blades Included) (CCC)

Blade Chassis Specifications

The blade chassis shall have the following minimum technical specifications:

- 1) Min 6U Rack mounted Chassis to house at least 8 no.s of 2 Socket Servers
- 2) Min 4 No. of interconnect bays or higher, capable of supporting Ethernet, FC or 2 Nos of Interconnect Bays / converged FCOE modules in case bidder is providing FCOE based converged solution.

- 3) Chassis should have a highly reliable mid plane for providing connectivity of the shared resources to the compute nodes in a highly reliable manner.
- 4) Have the capability for installing industry standard flavors of Microsoft Windows, and Enterprise Red Hat Linux Oss as well as virtualization solution such as VMware
- 5) 2 x Network switches with minimum 10 number of 10Gbps uplink ports per switch, up-linkable to the datacenter core switch.
- 6) 2 x FC switch with 8GbpsFC connectivity SFP should be supplied along with the switches.
- 7) If the Bidder is quoting converged solution then instead of separate 2 x Network switches and 2 x FC switches can quote for 2 x Nos of Converged FCOE Modules providing aggregated converged bandwidth for FC & Ethernet Traffic.
- 8) Hot plug/hot-swap redundant power supplies to be provided, along with power cables
- 9) Power supplies shall have N+N. All power supplies modules shall be populated in the chassis.
- 10) Required number of PDUs and power cables, to connect all blades, Chassis to Data Center power outlet
- 11) Integrated Dual redundant chassis Management Module / chassis providing virtual KVM feature. The management solution should be providing a centralized dashboard single pane of glass view of all the chassis and servers. Management software have to be from the OEM itself.
- 12) The Chassis should have LED panel / LED Indicators at every blade server for quick problem determination

25. Storage

Price: INR 89,00,000 (BOSCH) / INR 1,45,00,000 (GeM)

Count: 1 (CCC) (140 TB)

Parameter	Minimum Specifications Required
Solution / Type	<ul style="list-style-type: none"> IP Based/iSCSI/FC/NFS/CIFS
Storage	<ul style="list-style-type: none"> Storage Capacity should be minimum 140 TB (usable, after configuring in offered RAID configuration) RAID solution offered must protect against double disc failure. Disks should be preferably minimum of 3 TB capacity To store all types of data (Data, Voice, Images, Video, etc.) Storage system capable of scaling vertically and horizontally
Hardware Platform	<ul style="list-style-type: none"> Rack mounted form-factor Modular design to support controllers and disk drives expansion
Controllers	<ul style="list-style-type: none"> At least 2 Controllers in active/active mode The controllers / Storage nodes should be upgradable seamlessly, without any disruptions / downtime to production workflow for performance, capacity enhancement and software / firmware upgrades.
RAID support	<ul style="list-style-type: none"> RAID 0, 1, 1+0, 5+0 and 6
Cache	<ul style="list-style-type: none"> Minimum 128 GB of useable cache across all controllers. If cache is provided in additional hardware for unified storage solution, then cache must be over and above 128 GB
Redundancy and High Availability	<ul style="list-style-type: none"> The Storage System should be able to protect the data against single point of failure with respect to hard disks, connectivity interfaces, fans and power supplies
Management software	<ul style="list-style-type: none"> All the necessary software (GUI Based) to configure and manage the storage space, RAID configuration, logical drives allocation, snapshots etc. are to be provided for the entire system proposed. Licenses for the storage management software should include disc capacity/count of the complete solution and any additional disks to be plugged in in the future, up to max capacity of the existing controller/units.

Parameter	Minimum Specifications Required
	<ul style="list-style-type: none"> • A single command console for entire storage system. • Should also include storage performance monitoring and management software • Should provide the functionality of proactive monitoring of Disk drive and Storage system for all possible disk failures • Should be able to take "snapshots" of the stored data to another logical drive for backup purposes

26. **CCC Platform**
(Features to be supplied by KUIDFC, KMDS)
Price: INR 10,00,00,000
Count: 1 (CCC)

Sr. no.	Parameter	Minimum Specifications Required
1.	Solution & Platform	Must have built-in fault tolerance, load balancing and high availability & must be certified by the OEM.
2.		Software (Application, Database and any other) must not be restricted by the license terms of the OEM from scaling out on unlimited number of cores and servers during future expansion.
3.		System must provide a comprehensive API (Application Program Interface) or SDK (Software Development's Kit) to allow interfacing and integration with existing systems, and future application and sensors which will be deployed on the field.
4.		The solution should be network and protocol agnostic and provide option to connect legacy system through API's with either read, write or both options. It should connect diverse on premise and/or cloud platform's and makes it easy to exchange data and services between them.
5.		The system shall allow seamless integration with all of the department's existing and future initiatives (e.g. open source intelligence, situation management war room, etc.)
6.		The platform should be able to integrate with any type of sensor platform being used for the urban services irrespective of the technology used.
7.		The platform should be able to normalize 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
8.	Convergence of Multiple Feeds / Services	System need to have provision that integrates various services and be able to monitor them and operate them. The solution should provide option to integrate existing deployed solution by City and also need to provide scalability option to implement new use cases. System should have capability to source data from various systems implemented in Mangalore City to create actionable intelligence
9.	Industry Standards for the Command & Control Centre	The solution should adhere to the Industry standards for interoperability, data representation & exchange, aggregation, virtualization and flexibility
10.		IT Infrastructure Library (ITIL) standards for Standard Operations Plan & Resource Management
11.		Geo Spatial Standards like GML & KML etc.
12.		Business Process Model and Notation (BPMN) or equivalent for KPI Monitoring.
13.	Command & Control Centre Components	Web server to manage client requests. Client should provide web-based, one stop portals to event information, overall status, and details. The user interface (UI) to present customized information in various preconfigured

Sr. no.	Parameter	Minimum Specifications Required
		views in common formats. All information to be displayed through easy-to-use dashboards.
14.		Application server to provide a set of services for accessing and visualizing data. Should be able to import data from disparate external sources, such as databases and files. It should provide the contacts and instant messaging service to enable effective, real-time communication. It should provide business monitoring service to monitor incoming data records to generate key performance indicators. It should also provide the users to view key performance indicators, standard operating procedures, notifications, and reports, spatial-temporal data on a geospatial map, or view specific details that represent a city road, building or an area either on a location map, or in a list view. The application server should provide security services that ensure only authorized users and groups can access data. Analytics functionality can be part of application server or separate server.
15.	Incident Management Requirements	The system must provide Incident Management Services to facilitate the management of response and recovery operations:
16.		Should support comprehensive reporting on event status in real time manually or automatically by a sensor/CCTV video feeds.
17.		Should support for sudden critical events and linkage to standard operating procedures automatically without human intervention.
18.		Should support for multiple incidents with both segregated and/or overlapping management and response teams.
19.		Should support Geospatial rendering of event and incident information.
20.		Should support plotting of area of impact using polynomial lines to divide the area into multiple zones on the GIS maps.
21.		Should support incorporation of resource database for mobilizing the resources for response.
22.		Should provide facility to capture critical information such as location, name, status, time of the incident and be modifiable in real time by multiple authors with role associated permissions (read, write). Incidents should be captured in standard formats to facilitate incident correlation and reporting.
23.		The system must identify and track status of critical infrastructure / resources and provide a status overview of facilities and systems
24.		Should provide detailed reports and summary views to multiple users based on their roles.
25.		A Reference Section in the tool must be provided for posting, updating and disseminating plans, procedures, checklists and other related information.
26.		Provide User-defined forms as well as Standard Incident Command Forms for incident management
27.	Integrated User Specific & Customizable Dashboard	Should provide integrated dashboard with an easy to navigate user interface for managing profiles
28.		<ul style="list-style-type: none"> Collects major information from other integrated City sensors/platforms. Should allow different inputs beyond cameras Should allow different inputs beyond cameras, such as, PC screen, web page, and other external devices for rich screen layout & Multi-displays configurations Use of, GIS tool which allows easy map editing for wide area monitoring (Google map, Bing map, ESRI Arc GIS map, etc.).

Sr. no.	Parameter	Minimum Specifications Required
29.		Should provide tools to assemble personalized dashboard views of information pertinent to incidents
30.		Should provide historical reports
31.		Should provide dashboard filtering capabilities that enable end-users to dynamically filter the data in their dashboard based upon criteria
32.	Integration with Social Media & Open Source Intelligence	Should provide integration of the Incident Management application with the social media. Should Provide analytics based on the social media feed, other big data sources as identified by AMC/SCADL and collected from the open source intelligence and collate with the surveillance inputs to alert the responders for immediate action on the ground.
33.		Should extract messages and display it in an operational dashboard.
34.		Should be able to correlate the extracted message from the social media with existing other events and then should be able to initiate an SOP.
35.		Should be able to identify the critical information and should be able to link it to an existing SOP or a new SOP should be started.
36.		Should provide notifications to multiple agencies and departments (on mobile) that a new intelligence has been gathered through open source/social media.
37.	Device Status, Obstruction Detection and Availability Notification	Should provide icon based user interface on the GIS map to report nonfunctional device.
38.		Should also provide a single tabular view to list all devices along with their availability status in real time.
39.		Should provide User Interface to publish messages to multiple devices at the same time.
40.	Event Correlation	Command & Control Center should be able to correlate two or more events coming from different subsystems (incoming sensors) based on time, place, custom attribute and provide correlation notifications to the operators based on predefined business and operational rules in the configurable and customizable rule engine.
41.	Standard Operations Procedures (SOP)	Command & Control Center should provide for authoring and invoking unlimited number of configurable and customizable standard operating procedures through graphical, easy to use tooling interface.
42.		Standard Operating Procedures should be established, approved sets of actions considered to be the best practices for responding to a situation or carrying out an operation.
43.		The users should be able to edit the SOP, including adding, editing, or deleting the activities.
44.		The users should be able to also add comments to or stop the SOP (prior to completion).
45.		There should be provision for automatically logging the actions, changes, and commentary for the SOP and its activities, so that an electronic record is available for after-action review.
46.		The SOP Tool should have capability to define the following activity types:
47.		Manual Activity - An activity that is done manually by the owner and provides details in the description field.
48.		Automation Activity - An activity that initiates and tracks a particular work order and selects a predefined work order from the list.
49.		If-Then-Else Activity - A conditional activity that allows branching based on specific criteria. Either enter or select values for Then and Else.

Sr. no.	Parameter	Minimum Specifications Required
50.		Notification Activity - An activity that displays a notification window that contains an email template for the activity owner to complete, and then sends an email notification.
51		SOP Activity - An activity that launches another standard operating procedure.
52.	Key Performance Indicator	Command & Control Center should be able to facilitate measurement or criteria to assay the condition or performance of departmental processes & policies.
53.		Green indicates that the status is acceptable, based on the parameters for that KPI, no action is required.
54.		Yellow indicates that caution or monitoring is required, action may be required.
55.		Red indicates that the status is critical and action is recommended.
56.	Reporting Mechanism	Command & Control Center should provide easy to use user interfaces for operators such as Click to Action
57.		The solution should generate Customized reports based on the area
58.	Collaboration Tools	Should provide tools for users to collaborate & communicate in real-time using instant messaging features.
59.	Communication Requirements	The solution should adhere to the below mentioned communication requirements.
60		Provide the ability to search/locate resources based on name, department, role, geography, skill etc. for rapidly assembling a team, across department, divisions and agency boundaries, during emergency
61.		Provide the capability to Invite - Using information provided during the location of those individuals or roles
62.		Provide a single web based dashboard to send notifications to target audiences using multiple communication methods including voice-based notification on PSTN/Cellular
63.		The solution should provide Dispatch Console integrates with various communication channels. It should provide rich media support for incidents, giving dispatchers the power to consolidate information relating to an incident and instantly share that information among responder teams. It should assess the common operating picture, identify & dispatch mobile resources available nearby the incident location. Augment resources from multiple agencies for coordinated response.
64.	Authentication	Use authentication information to authenticate individuals and/or assign roles.
65.	Instant Messaging	Provide ability to converse virtually through the exchange of text, audio, and/or video based information in real time with one or more individuals within the emergency management community.
66.	Events and Directives	Should provide the capability for the events that are produced from a subsystem and are forwarded to the Command & Control Center. Events could be a single system occurrence or complex events that are correlated from multiple systems. Events could be ad hoc, real-time, or predicted and could range in severity from informational to critical. At the Command & Control Center, the event should be displayed on an operations dashboard and analysed to determine a proper directive.
67.		67. Directives issued by the Command & Control Center should depend on the severity of the monitored event. Directives will be designed and modified based on standard operating procedures, as well as state

Sr. no.	Parameter	Minimum Specifications Required
		legislation. A directive could be issued automatically via rules, or it could be created by the operations team manually.
68.		The solution should provide the capability to manage the emergencies and in turn reducing risks
69.	What-if Analysis Tool	To take proactive decisions that help minimize risks and damages the solution should provide Analytical and Simulation systems as part of the Decision Support System. The solution should help simulate what if scenarios. It should help visualize assets/resources at risk due to the pending/ongoing incident, should render impacted region on a GIS/3D map. The solution should help to build the list of assets, their properties, location and their interdependence through an easy to use Graphical User Interface. When in What if Analysis mode the solution should highlight not only the primary asset impacted but also highlight the linked assets which will be impacted. The user should be able to run the What-if Analysis mode for multiple types of emergency events such as Bomb Blast, Weather events, Accidents etc.
70.		Should provide an optimization engine for solving problems expressed as mathematical programming models.
71.	Resource & Route Optimization	Should provide a software library of constraint programming tools supporting constraint propagation, domain reduction, and highly optimized solution search.
72.		The system should provide the software component for the message broadcast and notification solution that allows authorized personal and/or business processes to send large number of messages to target audience (select-call or global or activation of pre-programmed list) using multiple communication methods including SMS, Voice (PSTN/Cellular), Email and Social Media.
73.	Alert & Mass Notification Requirements	Provide a single web based dashboard to send notifications to target audiences using multiple communication methods including voice
74.		Provide function for creating the alert content and disseminating to end users. Provision of alerting external broadcasting organizations like Radio, TV, Cellular, etc., as web
75.		Provide Role based security model with Single
76	Security & Access Control	Provide comprehensive protection of web content and applications on backend application servers, by performing authentication, credential creation and authorization.
77.	Internet Security	Comprehensive policy-based security administration to provide all users specific access based on user's responsibilities. Maintenance of authorization policy in a central repository for administration purposes.
78.	Authorization	Should support to enable assignment of permissions to groups, and administration of access control across multiple applications and resources. Secure, web-based administration tools to manage users, groups, permissions and policies remotely
79.	User Group	User group Provide policies using separate dimensions of authorization criteria like Traditional static Access Control Lists that describe the principals (users and groups) access to resource and the permissions each of these principals possess.
80.	Provide Multidimensional Access Control	Provide multidimensional access control SSO to Web-based applications that can span multiple sites or domains with a range of SSO options.

Sr. no.	Parameter	Minimum Specifications Required
81.	Flexible Single Sign-On (SSO)	Support LDAP authentication mechanism
82.	Authentication	Should have ability to respond to real-time data with intelligent & automated decisions
83.	Rule Engine & Optimization	Should provide an environment for designing, developing, and deploying business rule applications and event applications.
84.		The ability to deal with change in operational systems is directly related to the decisions that operators are able to make
85.		Should have at-least two complementary decision management strategies: business rules and event rules.
86.		Should provide an Integrated development environment to develop the Object Model (OM) which defines the elements and relationships
87.		Should support to enable assignment of permissions to groups, and administration of access control across multiple applications and resources. Secure, web-based administration tools to manage users, groups, permissions and policies remotely
88.	Situational Awareness COP (Common Operational Picture)	<p>The CCA should be able to combine data from various sources and present it as different views tailored to different operator's needs.</p> <ul style="list-style-type: none"> The CCA should automatically update the information based on alarms and incidents that are presented to it via the business rules engine. The polling and CCA database refresh cycle shall be configurable to match the status of the situation (whether there is an emergency or crisis or just monitoring only). Common Operational Picture should comprise of a comprehensive view of the incident or a group of related incidents as on a specific date and time which should include but not be limited to the following: <p>Tasks assignment and their status</p> <ul style="list-style-type: none"> Agencies involved Resources deployed Incident status across relevant parameters of the incident e.g. household affected by a transformer shut down Timeline view of the situation Suggested actions from the system with their status
89.	Task Assignment	<p>The system should be able to create, assign, track and report on the lifecycle of tasks during a particular incident.</p> <ul style="list-style-type: none"> The system should allow a particular task to be decomposed into subtasks. The system should provide an easy to interpret management dashboard view of the progress of all tasks during an incident. The system should be able to organise the visual representation of tasks into prioritized list, filtered list, as well as colour coded representation for ease of understanding. The system should be able to perform the following functions around task management: <ul style="list-style-type: none"> Create a task with unique ID. (Subtasks shall follow parent ID with second level numbering). Assign a target completion date and time for the task, either directly or as a time-span from the task's creation. Date and time stamp of the creation of the task. Log and track status of tasks. System should provide capability to

Sr. no.	Parameter	Minimum Specifications Required
		<p>define status of tasks during its lifecycle. These status definitions could be mapped to other task attributes such as the task type.</p> <ul style="list-style-type: none"> ○ Key-word search against task list. ○ The above attributes shall be colour coded. ○ The system shall allow the tasks to be filtered on the real-time dashboard by agency then by task status. This filtering should allow an operator to filter for all tasks of a particular state or a combination of state; and by the time remaining until (or time elapsed since) the target completion time. ● The system should allow multiple individual workstations to select specific agencies of interest on each workstation simultaneously. ● The system should allow the NRDA to display all agencies' tasks simultaneously as well. ● The tasks should be displayed on a real-time timeline. ● The criticality of tasks should be dynamically changed depending on the performance of the incident response.
90.	Timeline and Charting	<p>The system should provide a facility to see incidents and actions (tasks) added to the CCA in a tabular list form as well as GANTT chart format filtered by day, week, month, year or any specific date range.</p> <ul style="list-style-type: none"> ● The system should provide a facility to see incidents, actions and interdependencies between actions in a clear visual graphical manner. ● The system should be able to filter the information based on at least the following parameters: <ul style="list-style-type: none"> ○ Incident information ○ Resources information ○ Agency type ○ Tasks ○ Criticality or priority
91.	GIS Display	<p>Shall view the environment through geospatial or fixed composite computer-generated (JPEG, BMP, AutoCAD, etc.) map</p> <ul style="list-style-type: none"> ● Should allow user to view sensor and related name from the displayed map ● Should allow all resources, objects, sensors and elements on the map to be geo-referenced such that they have a real world coordinate. ● Should visually display a camera sensor with related camera orientation, camera range and camera field of view angle. ● Should visually display an alarming sensor on map ● Should visually differentiate sensor alarm severities on map through different color and icon identifiers ● Should immediately view alarm details (including description, video, etc.) and investigate the alarm from the map ● Should allow user to choose camera and other sensors from map to view live video and the data ● Should allow user to choose camera and take live video image snapshot and save to file from any camera ● Should allow user to choose camera from map to move PTZ cameras ● Should allow user to choose camera to play, pause, stop, fast-forward, rewind, and play recorded video from preset time ● Should allow user to choose camera and take recorded video image

Sr. no.	Parameter	Minimum Specifications Required
		<p>snapshot and save to file or print from any live or recorded video</p> <ul style="list-style-type: none"> Should allow user to jump from one map to the next with a single click of a mouse with map links Should allow map information “layers” to be displayed/hidden on items such as – <ul style="list-style-type: none"> Sensor names Sensors Sensor range (e.g. camera – orientation, range, field of view angle) Locations and zones Perimeter ranges Resource tracks Allow user to zoom in/out on different regions of map graphic.
92.	Video Display	<p>Shall view live or recorded video from resizable and movable windows</p> <ul style="list-style-type: none"> Should have an ability to perform video controls for video systems from workstation Shall play, fast-forward, rewind, pause, and specify time to play recorded video Shall take a video still image (snapshot) from live or recorded video Shall export video for user specified time and duration Shall have the capability to move PTZ cameras Shall view Video in Video Matrix Shall display in 1x1, 2x2, 3x3 and 4x4 window formats Shall enable operator to specify video windows to be displayed in matrix Shall enable matrix settings to be saved per user Shall view either live or recorded video can be displayed in the video matrix window. Shall enable video snapshot to be taken and saved from any window pane in the matrix view Shall rotate video in “virtual” video guard tour Shall rotate through multiple video views based on predefined video camera sequence and duration. Shall enable the user to pause the rotation of video and resume the video rotation again Shall enable times between new video to be adjusted Shall enable both live video and recorded video to be played through the video guard tour. Shall enable alarms to be generated from any video pane Shall enable user to only view and control video for which they have been assigned permissions by the administrator Shall manually create an alarm from the live or recorded video with specified severity and description
93.	Alarm Display	<ul style="list-style-type: none"> Should have an ability to display alarm condition through visual display and audible tone Should have an ability to simultaneously handle multiple alarms from multiple workstations Should have an ability to automatically prioritize and display multiple alarms and status conditions according to pre-defined parameters such

Sr. no.	Parameter	Minimum Specifications Required
		<p>as alarm type, location, sensor, severity, etc.</p> <ul style="list-style-type: none"> Should display the highest priority alarm and associated data / video in the queue as default, regardless of the arrival sequence
94.	Historical Alarm Handling	<ul style="list-style-type: none"> Should have an ability to view historical alarms details even after the alarm has been acknowledged or closed. Should have an ability to sort alarms according to date/time, severity, type, and sensor ID or location.
95.	Alarm Reporting	<ul style="list-style-type: none"> Should have an ability to generate a full incident report of the alarm being generated. Should have an ability to display report on monitor and print report Should have details of alarm including <ul style="list-style-type: none"> severity, time/date, description and location Captured video image snapshots Relevant sensor data such as SCADA sensors Response instructions Alarm activities (audit trail) Should have an ability to export alarm report in various formats including pdf, jpeg, html, txt, and mht formats Should have an ability to generate an alarm incident package including the full incident report and exported sensor data from the incident in a specific folder location.
96.	Alarm Policies and Business	The CCA solution should have the following ability to handle the workflow alarms through graphical user interface.
97.	Logic Administration	<ul style="list-style-type: none"> Should have an ability to match keywords or text from the alarming subsystem's incident description to raise an alarm using criteria including exact match, exact NOT match, contains match, wildcard match and regularly expression match (such as forced door alarm, denied access, door open too long, etc.) Should have an ability to optionally match alarming subsystem's incident status, incident severity, and sensor type Should have an ability to apply any alarm policy to one or more monitoring area(s) or zone(s) without having to reapplying the policy multiple times. Should have an ability to apply any alarm policy to one or more sensors without having to reapply the policy multiple times. Should have an ability to assign specific actions for each alarm Should have an ability to activate or deactivate alarms as required Should have an ability to create exceptions Should Create batch-wise rules and process them Should Check and rectify logical errors and contradictory rules Should have an ability to schedule execution of rules Should Suspend or Terminate the application of rule Should archive unused or deactivated rules
98.	CCC Contact Centre	<p>For up to 10 agents</p> <ol style="list-style-type: none"> Automatic call distribution, Automatic identification of incoming number based on landline and mobile number mapping Call recording mapped to incident tickets Customizable agent and supervisor desktop layout

Sr. no.	Parameter	Minimum Specifications Required
		6. Inbound and outbound capability 7. Call control 8. Multisession web chat 9. Email 10. Live data reporting gadgets 11. Phonebook 12. Multiline support 13. Speed dial in IP phones

27. GPS Devices
Price: INR 7500
Count: 100 (Pan City)
Total: 7,50,000

Sr. No.	Parameter	Minimum Specifications Required
1	General Requirements	<ul style="list-style-type: none"> • GPS (Location, speed, heading, timestamp, fuel monitoring,) data polling and sending frequency capability of less than or equal to 05 sec. • Location on demand on GPRS/SMS • Memory to store sufficient positional log. (Used when connectivity is not available. It will synchronize with server as soon as connectivity establishes) • Configurable Backup SMS facility in case of GPRS failure. • Remotely controlled (to change any configuration) • Device should have status LED's to indicate Power, GPS, and GPRS status. • GPS Device should be battery based and Battery Backup of device should be at least for 5 days. • Device must be sealed with security screws. • Parallel GPS Receiver : minimum 20-Channel or more • Acquisition sensitivity : better than (-)148dBm • Tracking Sensitivity better than (-)155dBm • Less than 5m Positional Accuracy,(2dRMS confidence level higher than 95%) or 3m CEP • Hot Start < 10s • Warm Start :< 40s • Cold Start <60s • Outputs as per NMEA 0183 • WGS-84 compliant • Internal memory backup up-to 10 days. • GPRS Communication • In- Built Triband GPRS module/Modem • Multi Slot GPRS • Class 10 GSM/GPRS module • Should support all – SMS, Voice, Data, GPRS, TCP/IP • Power Input voltage range 8-30 Volts • Active mode Peak < 1.0 A • Active mode Avg< 200mA

Sr. No.	Parameter	Minimum Specifications Required
		<ul style="list-style-type: none"> Sleep Mode < 25 mA
2	Operating Environment	Temperature range: 0° C to 90° C Humidity Level: 4% to 95% non-condensing Dust, temperature, airtight, vibration and Water Splash resistant IP 55 rated or better.
3	Antenna	All the antennas must be internal but should have provision for supporting external antenna
4	Ports	<ul style="list-style-type: none"> 8 or more digital Inputs 4 or more digital outputs (For Relays, sirens etc.) 1 or more analog inputs (For analog inputs like Fuel, temperature etc) Ignition sensing 2 no.s RS232 ports RS232 /GPS out for LED display board thru integrated controller, inside vehicle. (GPRMC string out in Degree, minutes format with 1/10,000 of minutes, ddmmyy format every 1 sec feed) (Optional).

28. **Vehicle Tracking System integrated with all GPS devices across Private Buses, Waste Vehicles, and Emergency Response Vehicles etc.**
Price: INR 1,00,00,000
Count: 1 (CCC)
Total: 1,00,00,000

Sr. No.	Parameter	Desirable Specifications
1	Dashboard	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. The Dashboard view should provide the following information: Zone name, Ward Name, Selected integrator 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. It should also give an indication regarding the running speed of the vehicle i.e. Normal speed, Alarming speed and above Alarming speed. There should be provision to see a particular vehicle on map.
2	Live Vehicle Tracking	This module should give all the information pertaining to a particular vehicle on selection of the various selection parameters i.e. Zone Name, Ward Name and Vehicle Number. Information like Zone Name, Ward Name, Vehicle Type, Contact Number, Current Speed, Maximum Speed, Average Speed, Trip Time, Idle Time, Distance Travelled & Last updated Date & Time should be displayed. The live vehicle view also should have facility for various alerts i.e. Ignition on / off, Speed status, Battery Removal Alert, No Communication from device. In live vehicle map view, real time location of vehicle and the path taken by the vehicle to reach its current location should be plotted. A very important feature of Live Vehicle view should be the user can create Landmark i.e. any important point or location name w.r.t. the application of vehicle.
3	Route display	Route replay feature is very important in knowing the vehicle movement in a specified period of time. Here the user should be able to select a

Sr. No.	Parameter	Desirable Specifications
		particular date and time and can see where exactly the vehicle moved in that specified period. There should be various selection parameters i.e. Zone Name, Ward Name, Vehicle Number, Date, Time and provision for viewing the over speed done and the stoppages (as per pre-defined time for each collection point) taken by the vehicle. User also should be able to view Route statistics like vehicle type, speed violations, total alerts, trip time, idle time, maximum speed, average speed and distance travelled by the vehicle for that specified period of time in map view.
4	Status Reporting	This feature should be useful to Executives / Officers. They can view the current status of the garbage collection in particular ward or zone. For this feature sufficient rights or authorization should be provided and User has to select the zone and / or ward name to get the latest update regarding the garbage collection status
5	MIS Reports & Business Intelligence	Several Customized MIS Reports should be available: Report on door to door collection as well as Bin management. In addition, following reports also should be available. Daily Kilometre, Distance Report, Event Report, Trip Report, Engine Utilization Report, Idle Report, Geo-fence Entry Exit Report, Collection Point Served / Un-served Report In addition, from time to time Business Intelligence reports using BA tools/algorithms needs to be prepared for Policy makers.
6	Role Based Access	For Administrator: Admin Module should have facility to add, edit and delete the user. The rights of information to be viewed by the user can also be controlled by the admin. The admin can assign vehicles to ward, zone and Selected integrator For Supervisors/Operations: This facility enables a concern supervisor to address citizen's complaint / query to know the last time when garbage from his particular society or location has been lifted. (Scheduled time and actual time)
7	Master Management	Following masters should be maintained in the system by this module. Vehicle, Route, POIs, Geo-points, Geo-fence, GPS device-Vehicle mapping, etc.)
8	Data Storage	Active storage for retaining 2 months data with tape archival for the period dictated by IT Act or Project Duration whichever is longer

**29. Authentication, Authorization and Accounting (AAA) Solution
(to be provided by KUIDFC, KMDS)**

Sr. no.	Desirable Specifications
1.	The Authentication, Authorization and Accounting (AAA) solution should be fully scalable and capable for future needs without any existing Hardware up-gradation or inserting a new device.
2.	The AAA should be capable of user customized branding of Splash Page, Logo, Background, domain, etc.
3.	The system should be capable of delivering Pre-authentication ads to Wi-Fi users from day one.
4.	The system should be capable of delivering Pre-authentication ads in form of Click to connect, Video push, Offers and Vouchers, App push and Social media, etc.
5.	The system should be capable of delivering In-session browser ads from day one.
6.	The system should be configurable to create different types of premium ad-free internet

Sr. no.	Desirable Specifications
	access plans based on duration, bandwidth, validity, quota and multi-device accessibility.
7.	The AAA should have an inbuilt mechanism to capture analytical data such as user Mobile number, MAC ID, IP address, Make and model of the device, OS, session time, etc. from day one.
8.	The system should be capable of delivering multiple ads based on location, specific duration, number of hits, etc.
9.	The system should have a complete monetization dashboard to configure and view ads, splash pages, user templates, pricing plans, etc.
10.	The system should have integrated SMS and payment gateway which should be customizable as per operational needs.
11.	The AAA should support all types of payment options for paid users including M-Wallets and Payment Banks.
12.	The AAA should support BYOD and adaptive captive portal and splash page from day one.
13.	The AAA should have user feedback functionality built-in from day one. E.g. It should be possible to survey users randomly or at specific times about the services or any other content.
14.	The AAA should support Social Media integration from day one.
15.	The system should support Walled Garden functionality from day one.
16.	The system should be able to generate analytical data based on user sessions, page hits, page & ad views, repeat/returning users, ad performance and hits, campaign management.
17.	The system should be capable of third party real-time API integration such as Google Maps, etc.

30. Public Address System

Parameter	Specification
PAS system	Should have the capability to control individual PAS i.e. to make an announcement at select location (1:1) and all locations (1: many) simultaneously. The PAS should also support both, Live and Recorded inputs
Speaker	Minimum 2 speakers, To be used for Public Address System
Connectivity	IP Based
Access Control	Access control mechanism would be also required to establish so that the usage is regulated.
Integration	With VMS and Command and Control Centre
Construction	Cast Iron Foundation and M.S. Pole, Sturdy Body for equipment
Battery	Internal Battery with different charging options (Solar/Mains)
Power	Automatic on/off operation
Casing	IP-55 rated for housing
Operating conditions	0° to 50°C

31. Emergency Call Box

Parameter	Specification
-----------	---------------

Construction	Cast Iron/Steel Foundation, Sturdy Body for equipment
Call Button	Watertight Push Button, Visual Feedback for button press
Speaker	To be used for Public Address System
Connectivity	GSM/PSTN/Ethernet as per solution offered
Sensors	For tempering/ vandalism
Battery	Internal Battery with different charging options (Solar/Mains)
Power	Automatic on/off operation
Casing	IP-55 rated for housing
Operating conditions	0° to 50°C

32. Variable Messaging Sign Boards

Parameter	Specification
Dimensions	Minimum 3.0m length X 1.5m height X 0.2m depth. (3000mm x 1500mm X 200mm approx.)
Color LED	Full Color, class designation C2 as per IRC/EN 12966 standard
Luminance Class/Ratio	L3 as per IRC/EN 12966 standards.
Luminance Control & auto Diming	Should be automatically providing different luminance levels but shall also be controllable from the traffic centre using software. Auto dimming capability to adjust to ambient light level (sensor based automatic control) Photoelectric sensor shall be positioned at the sign front and sign rear to measure ambient light. Capable of being continually exposed to direct sunlight without impairment of performance. Message shall be readable even in broad daylight without any shade & displayed image shall not appear to flicker to the normal human eye (>5500 cd/m2).
Contrast Ratio	R3 as per IRC/EN 12966 standard
Beam Width	B6+ as per IRC/EN12966 standards.
Pixel Pitch	12mm or better
Picture Display	At least 300mm as per IRC /EN 12966 standards Full Matrix: Number of lines & characters adjustable, active area: 2.88mX1.2m at-least Synchronized Dot to Dot display. Capable of displaying real time message generated by CCCC. Special frontal design to avoid reflection. Display shall be UV resistant
Viewing Angle	B6+ as per IRC/EN12966 standard- Viewing angle shall ensure message readability for motorists in all lanes of the approach road.
Viewing Distance	Suitable for readability from 150 Mtrs. or more at the character size of 240mm, from moving vehicles.
Self-Test	VMS shall have self-test diagnostic feature to test for correct operation. Display driver boards shall test the status of all display cells in the sign even when diodes are not illuminated. All periodic self-test results shall be relayed to the CCC in real time to update the status of the VMS

Alarms	Door Open sensor to Inform Control room during unauthorized access LED Pixel failure detection alarm
Flicker	Refresh Frequency should not be less 90 Hz. No visible flicker to naked eye.
Multiple Data Communication interface/Port	RJ45 Ethernet, RS232, RS 485, FC port and any other suitable
Communication (connectivity)	Wired & GPRS based wireless technology with 3G upgradable to 4G capability.
Ambient Operating Temperature	should be capable of working in ambient temperature range of 0oC to 55oC.
Humidity (RH)	Operating ambient humidity: 10% - 95% Rh or better.
Protection against Pollution/dust/water	Complete VMS should be of IP 65 protection level from front and IP54 from side and rear. As per EN60529 or equivalent Standard.
Power	170-250V AC (more than 90% power factor) or DC as per equipment requirement. The enclosure shall contain at least two 15 Amp VAC (industrial grade) outlet socket for maintenance purpose.
Power Back-up & its enclosure:	UPS for one hour power back-up with auto switching facility. The enclosure of UPS and battery should be pole mountable with IP 65 protected housing and lockable. Batteries with solar charging options can also be provided as back up
Material for VMS frame	at least 2mm aluminum or Non-corrosive, water resistant or better. Frame of the VMS should be black & Powder coated.
Mounting, Installation and finishes	Mounting structure shall use minimum 6Mtrs. High Cylindrical GI Pole (Class B) or suitable structure with 5.5 mtr. Minimum vertical clearance under the VMS sign from the Road surface. The mounting shall be capable of withstanding road side vibrations at site of installation. It shall be provided with suitable walkway for maintenance access. The side interior and rear of enclosures shall be provided in maintenance free natural aluminum finish. All enclosure shall be flat and wipe clean. Rugged locking mechanism should be provided for the onsite enclosures and cabinets. For Structural safety, the successful bidder has to provide structural safety certificate from qualified structural engineers approved/ certified by Govt. Agency. Wind Load: WL9 as per EN12966 to withstand high wind speeds and its own load.
Cabling, connections and Labeling	All cable conductors shall be of ISI marked for quality and safety. It shall be of copper insulated, securely fastened, grouped, wherever possible, using tie warps approximately every 10-20 Cms or cable trays. All connections shall be vibration-proof quick release connections except for power cables terminating in terminal blocks, which shall be screwed down. All terminal block shall be made from self- extinguishing materials. Terminations shall be logically grouped by function and terminals carrying power shall be segregated from control signal terminals. All cables shall be clearly labelled with indelible indication that can clearly be identified by maintenance personnel using “As built:

	drawings”. Lightening arrester shall be installed for safety on each VMS. The successful bidder has to provide safety certificate from qualified Electrical engineers approved/certified by Govt. Agency.
Local Storage in VMS	Embedded VMS controller should be capable to store at-least 100 messages and symbols/pictograms to allow display to run in isolated mode on predefined structures/timings, in case of connectivity failure. The MTBF of DDS shall not be less than 100,000 hours.

33. Smart Pole

Sr No	Broad Requirements
1	Smart pole should able to meet city aesthetic requirement and it should be visual appealing. It should easily blend into city light pole master plan. The general concept is to integrate telecom solution with street light poles in a Smart way. This solution should fully be encapsulated for outdoor site deployments. The Telecom units should be inside the Smart pole that is camouflaged while other equipment such as power, battery and cooling etc. are placed underground in an IP 67 cabinet. It shall be possible to uplift the entire underground Column above Ground level. Underground equipment box should be maintenance friendly; Provision of lifting of equipment from maintenance perspective is available. In order to have trouble free operation Lifting column is able to support 200Kg or more of equipment load.
2	Apart from the LED Lights and Telecom Equipment, the pole should have capabilities to accommodate Surveillance Camera, Environment Sensors and Wi-Fi. It should have the capability to incorporate backhaul for connectivity such as Optical Fiber Network and Microwave as per requirement. The signage may be fitted at an appropriate height measuring 4 feet by 3 feet. All the cablings are to be done inside the pole and the whole design should be aesthetic and attractive.
3	Specifications: <ol style="list-style-type: none"> 1. Getting ideal location for seamless mobile broadband coverage in dense urban areas for various technologies 2G/3G/4G &Wi-Fi. 2. Multi use of city infra – blends easily into city aesthetics without any visual pollution 3. The Smart Pole should withstand partial flooding on the ground level 4. Smart Street Solution should be designed to suit all climate zones 5. Lighting protection and grounding are to be included in the pole structure 6. DC Power Backup: It should be possible to house minimum 3-4 telecom technologies (GSM, WCDMA, LTE, Wi-Fi, BLE4.0 etc.) simultaneously with minimum 2-3 sectors. It should also be possible to support future technologies such as 5G. 7. It should be possible to support LED luminaries as per the primary requirement of the Light Pole 8. The height of the smart pole should be in line with the requirement of the street light varying from 9 to 15 meters depending on the type of the road and the lighting required. 9. It should be possible to support 1 light arm/2 light arm as per requirement. 10. Smart pole should be able to support other societal/smart city applications such as surveillance camera, weather monitoring, flood monitoring, bill board etc. 11. The camera should be integrated with the light arm and should have feature of night vision 12. It should provide passive infrastructure in suitable underground box for supporting space and power need for telecom / Wi-Fi equipment

	<ol style="list-style-type: none"> 13. It should be able to cater to the space, power and functionalities of environmental sensors, billboards and EV charging as and when required 14. There should be provision to have separate connection for light as well for telecom and other secondary equipment for maintenance purpose. 15. Hanging of telecom equipment boxes or ground based cabinets at bottom level (outside of structure or integrated with pole) is not permissible, approach needs to have integrated solution which blends into the city scape and would look like a light pole with mandatory underground box for telecom and other equipment 16. It is encouraged to utilize the space inside the top section and facilitate antenna sharing within the operators 17. There should be suitable mounting options for Radio /Antenna unit mounting 18. Pole hat mounting is allowed with suitable mounting option for GPS antenna, small MW antenna (up-to 30 cm dia). 19. It should be possible to house telecom equipment from all reputed OEMs. 20. All cabling, cooling/heating etc. should be via/inside the pole and it should not be visible from outside due to aesthetic and security reasons 21. It is mandatory to use underground space for telecom equipment with suitable telecom grade enclosure box with IP67 protection 22. Underground equipment box should be maintenance friendly; provision of lifting of equipment (at suitable working height) from maintenance perspective should be available as option up to equipment weight of 200 Kgs. The underground box needs to be available option however selection can be based on operator / city discretion. The lifting column should be self-powered and operable with the help of external remote / connected switch 23. Sections of the poles which are going to enclose equipment for telecom etc. needs to be provided with proper cooling arrangement to cater to heat dissipation from the radio equipment 24. The cooling/heating equipment to cool /heat telecom equipment should be integral part of smart pole. Efforts should be made to reduce the power consumption as much as possible. 25. The camouflaging material for covering the antenna /RF equipment should be hard material with a minimum life of 10 years. It should be possible to provide multiple color options as asked by municipality/user as per city light pole colors. The paint material (to cover the RF section) should be complied to RF /Telecom requirement should be possible to color the complete body (including RF equipment camouflaging) by any paint 26. The camouflaging material (to cover RF equipment) should have RF transparency with maximum 0.5db of attenuation covering all the radio frequency bands available in India 27. It should meet EMC requirement of telecom sites as per Indian regulations 28. The structure should be free from any passive intermodulation. Passive intermodulation (PIM) value should be < -150 dBc @ 2 x 43 dBm. 29. The smart pole should be preventive maintenance free for minimum 2 years. 30. The minimum life requirement of above smart pole structure is 15 years (metal parts) 31. The supplier should not use any banned /restricted material as per Indian regulations 32. Smart pole should comply with city as well telecom standards for India for various parameters defined for wind speed, climate, aesthetic etc. 33. For wind speed requirement IS codes for the applicable city needs to be
--	--

	<p>followed.</p> <p>34. Suppliers needs to provide IIT approval certificate for structural stability</p> <p>35. Ingress Protection standard for underground box should be IP 67 approved by any International Lab or Govt of India accredited labs.</p>
4	All necessary IPR and related patents should be submitted.

SAN Switch

Sr. No.	Parameter	Specifications
1	Architecture	<ul style="list-style-type: none"> Minimum Dual SAN switches shall be quoted by MSI where each SAN Switch shall be configured with minimum 48 FC Ports. Required scalability shall not be achieved by cascading the number of switches and shall be offered within the enclosure only. Should deliver line rate non-oversubscribed FC port speeds of 16 Gbps with backward compatibility of 8Gbps in non-blocking architecture in an energy efficient fashion. SFP Optics quantity of 48 numbers of 16Gig FC MM SFP should be supplied along with each switch. The switch shall support different port types such as F_port & E_Port. The switch should be rack mountable Proposed SAN switch (or through a solution) should support FC/SAN analytics including the ability to export the analytics data to third party monitoring software. All the license and/or appliance should be supplied with license from day-1 Switch shall have support for web-based management and should also support CLI The switch should have USB port for firmware download, support save, and configuration upload/download. Switch shall support POST and online/offline diagnostics, Fcping and Path info (FC Traceroute), port mirroring (SPAN Port), Internal loopbacks, Syslogs, FC debug, online system health Offered SAN Switch shall support services such as Quality of Service (QoS) to help optimize application performance in consolidated, virtual environments. It should be possible to define high, medium and low priority QoS Zones to expedite high-priority traffic. SAN switch shall support to restrict data flows from less critical hosts at preset bandwidths It should be possible to isolate the high bandwidth data flows traffic to specific ISLs by using simple zoning

Sr. No.	Parameter	Specifications
		<ul style="list-style-type: none"> Offered SAN Switch shall support to measure the top bandwidth-consuming traffic for a specified port or a fabric which should detail the physical or virtual device The Switch shall provide Redundant and hot swappable power supplies and should be platinum certified. All relevant licenses need to be included from day one All the cables, connectors, accessories required for the complete functioning of the equipment should be provided from the day one.

Sr. No.	Parameter	Specifications
1	Minimum Required Specification	<ul style="list-style-type: none"> Should have a dedicated data plane Processor, independent of the control plane Processor. The performance should be at least 50 Gps The router must have redundant power supply. Router must support AC Power supply. There should not be any impact on the router performance in case of one power supply fails.
2	Router Performance parameters	<ul style="list-style-type: none"> Router must have the capability of 500VRF and Up to 5,00,000 IPv4 / 5,00,000 IPv6 routes from day 1 and up gradable up to 1,000,000 IPv4 / 1,000,000 IPv6 routes. Should support at least 10000 multicast routes/destinations. The router should support uninterrupted forwarding operation for OSPF, IS-IS routing protocol to ensure high-availability during primary controller card failure. Must support for In-Service Software Upgrade (ISSU) support Router shall have built in power-on diagnostics system to detect hardware failures. Router shall have suitable Visual Indicators for

Sr. No.	Parameter	Specifications
		<p>diagnostics and healthy / unhealthy status of Ports & modules.</p> <ul style="list-style-type: none"> Core router must support MPLS Core router must support VXLAN/VPLS
3	Hardware	<ul style="list-style-type: none"> Router should have internal redundant hot swappable Power supply. Must have inbuilt Slots / module for minimum 8* 1G SFP port and loaded with 4 x 1G copper and 4x1G SM-SFP and 2 * 10G SM-SFP+ and 2* 10G MM-SFP+ from Day 1 Memory: MSI to ensure adequate RAM to meet the above mentioned performance requirements. Must support 2 / 1 USB ports with 1 No of System Management port Router shall support 19" rack mountings. Router shall support Upgrade of Software through Flash Memory / USB / Network. The router shall support Net Flow / S Flow / J flow Routers shall be capable of working with 110 – 240 Volts AC
4	Software	<p>The router shall support following protocols from day one:</p> <ul style="list-style-type: none"> TCP/IP with MTU of 1500 bytes or above on all interfaces. ARP, RARP, ICMPv4 and ICMPv6, DHCP, TFTP and DNS Network address translation (NAT) and Port Address Translation (PAT) supported on all interfaces. VRRP

Sr. No.	Parameter	Specifications
		<ul style="list-style-type: none"> • IPv4 & IPv6 Tunnelling on all interfaces. • The router must support AES and 3DES encryption standards
5	WAN Protocols	<p>The router shall support static as well as dynamic routing with support for following IP routing protocols:</p> <ul style="list-style-type: none"> • RIP Version 2 • RIPng • OSPF Version 2 & 3. • BGP Version 4. • Multi-Protocol BGP Version 4.
6	QoS	<ul style="list-style-type: none"> • Weighted Fair Queuing (WFQ) • IP Precedence i.e. Priority based on TOS field of IPv4 and IPv6. • Differentiated Services (Diff Serve) i.e. Priority based on DS Field of the IPv4 and IPv6. • The router must be able to implement hierarchical without any compromise in the performance.
7	Security	<ul style="list-style-type: none"> • Generic Routing Encapsulation. • Access lists based on Network Address, Mask, Protocol Type and Socket Type • Access list violation Logging & Accounting • MD5 Route Authentication. • Controlled SNMP Access through the use of SNMP with MD5 Authentication. • Multiple Privilege levels to provide different levels of access. <p>Application Visibility feature should be supported by the</p>

Sr. No.	Parameter	Specifications
		<p>Router Hardware.</p> <ul style="list-style-type: none"> • Remote Authentication Dial in User Service (RADIUS). • uRPF on all interfaces. • The Router shall support authentication, authorization and accounting through RADIUS / TACACS+.
8	Network Management	<ul style="list-style-type: none"> • SNMP V-1, V-2 & V-3 • RMON support • MIB I and MIB II • Router shall support all standard MIBs based on OSPF, BGP etc. • Software Upgrade through FTP or TFTP • TELNET Client and Server vii) SSH Version-2 • Router shall have Debugging features to display and analyze various types of packets. • The router shall support NetFlow / SFlow / JFlow in hardware. • Router shall support System & Event logging functions as well as forwarding of these logs onto a separate Server for log management.
9	Regulatory Compliance	<ul style="list-style-type: none"> • FCC 47 CFR Part 15 Class A • VCCI Class A • AS/NSZ Class A • ICES-003 Class A • EN55024/CISPR 22 Information Technology
10	Miscellaneous	<ul style="list-style-type: none"> • Equipment Router shall have: • UL60950-1

Sr. No.	Parameter	Specifications
		<ul style="list-style-type: none"> CSA C22.2 No. 60950-1-03 EN 60950-1 IEC 60950-1 AS/NZS 60950.1 <p>The Proposed router should be EAL/NDPP certified and IPv6 Phase 2 Ready certified. In case OEM does not have IPV6 phase 2 certification, they should produce a letter from Ipv6 ready forum / self-signed stating that they have applied / will apply for certification for the type of products and will produce the certificate within 12 months of deployment.</p> <ul style="list-style-type: none"> All the cables, connectors, accessories required for the complete functioning of the equipment should be provided from the day one.

IP Phones

Sr. No.	Parameter	Specifications
1	Display	<ul style="list-style-type: none"> 4.3" or bigger, 480 x 272-pixel color LED display with backlight, LED indication and status information. Dual color (red, Green)
2	Integral Switch	<ul style="list-style-type: none"> Dual-port Gigabit Ethernet , Power over Ethernet (IEEE 802.3af), class 3
3	Speaker phone	<ul style="list-style-type: none"> Full duplex speaker phone with echo cancellation Speaker on/off button, microphone mute
4	Headset	<ul style="list-style-type: none"> Wired, Cushion Padded Dual Ear-Speaker, Noise Cancelling headset with mouthpiece microphone, port compatibility with IP Phone
5	VoIP	<ul style="list-style-type: none"> SIP v1 (RFC2543), v2 (RFC3261)

Sr. No.	Parameter	Specifications
6	PoE	<ul style="list-style-type: none"> IEEE 802.3af or better and AC Power Adapter (Option)
7	Supported Protocol	<ul style="list-style-type: none"> DHCP, DNS, SNTP, SRTP
8	Codec	<ul style="list-style-type: none"> GSM_FR, G.723, G.729AB, G.726-32 iLBC, G.722, G.711(A/μ)
9	Volume control	<ul style="list-style-type: none"> Easy decibel level adjustment for speaker phone, handset and ringer
10	Address book	<ul style="list-style-type: none"> Upto 1000 entries
11	Call logs	<ul style="list-style-type: none"> Access to missed, received, and placed calls. (Minimum 20 overall)
12	Directory Access	<ul style="list-style-type: none"> XML/LDAP remote phonebook
13	QoS	<ul style="list-style-type: none"> 802.1p/Q tagging (VLAN), Layer 3 ToS DSCP
14	Security	<ul style="list-style-type: none"> AES encryption for configuration file

IPBX

Sr. No.	Parameter	Specifications
1	General	<ul style="list-style-type: none"> Extensions - unlimited support Number of Simultaneous Calls Supported - upto 1024 Call Logging Call Reporting Call Forward on Busy or No Answer Call Routing by DID Auto Attendant / Digital Receptionist Voicemail/ Music on Hold Central Phonebook Call by Name Call Parking / Pickup Call Transfer Call Queuing Call Recording MWI – Message Waiting Indicator Supports Popular SIP Phones Supports SIP Trunks / Gateways Intercom/ Paging

Sr. No.	Parameter	Specifications
		<ul style="list-style-type: none"> • Ring Extension & Mobile Simultaneously • Extensive Codec Support (G711, G722, GSM, Speex, ILBC, G729) • Automatic Pickup on Busy • Call Recordings Management
2	Management & Scalability	<ul style="list-style-type: none"> • Web-based Management Console • Automated Provisioning of Devices • Real Time Web-based System Status • Integrated Web Server • Easy Backup and Restore • SBC to Configure Remote Extensions • VMware / Hyper-V Compatibility • Scheduled Backup • Scheduled Restore • Inbuilt Fail Over Functionality
3	Communications	<ul style="list-style-type: none"> • Setting Up Conference Calls • See the Presence of Your Colleagues • Receive Voice Mail via Email • Receive Faxes via Email as PDF • Integrated Fax Server • Integrate Offices • Advanced Forwarding Rules
4	Mobility	<ul style="list-style-type: none"> • Android Client • iOS Client • Windows Phone Client • CTI Support • Seamlessly Create Conference Calls • Users can Configure their Own Extension • Provisioning by Email
5	IP Phone Management	<ul style="list-style-type: none"> • Automatic Plug & Play Phone Provisioning • Manage IP Phones Network Wide from Console • Restart Phones Remotely • Update & Manage Firmware Network Wide
6	Gateway – Key features	<ul style="list-style-type: none"> • Flexible SIP and Protocols configuration enable services providers and enterprises to seamlessly connect in hybrid networks • Routing Features: Call routing and translation (from PCM to IP or reversely) • Codec support: G.711A,G.711U, G.729 A/B,G723,G722, GSM, iLBC, RFC 2833,RF 3261,SIPINFO,INBOUND • IP protocols: TCP/UDP, HTTP, ARP/RARP, DNS, NTP,

Sr. No.	Parameter	Specifications
		<p>TFTP, TELNET, STUN and more IP protocols</p> <ul style="list-style-type: none"> • Interworking/Digit transmission: T.38 real-time fax, T.38 – G.711 interworking, Digit transmission via RFC 2833 (SIP) • Power Requirements/ Consumption: AC Power Supply Range 100 – 240 VAC, Consumption- 15W(Normal Conditions) • IP Interfaces: Dual redundant 2 *100 Base-T Ethernet for VoIP payload and signaling • Signaling Protocols: TDM Signaling Protocols, ISDN PRI, MF R2, SS7 ISUP, SS7 MTP1~3, SS7 SIGTRAN • QoS: Adaptive jitter buffer, Packet loss compensation, Configurable Type of Service (ToS) fields for packet prioritization and routing • Safety: Compliant with international standards • 30/60 simultaneous SIP sessions with multimedia transcoding and 30/60 channels of ISDN signaling • Integrated transcoding support for voice, tone and faxing

Table 24. CoC ICT Infrastructure

Sr. No.	Item	Per unit price (in Rs.)	Quantity	Aggregate Price (in Rs.)	In lakhs	Price Input from	Link
	ICT HW			125677965	1256.78		
1	Operator Console Table	9001	8	72008		GeM	https://gem.gov.in/cart/cart_global/describe_items/92306
2	Chair	5250	18	94500		GeM	https://gem.gov.in/cart/cart_global/describe_items/61486
3	Office Cubicle / Cabin Tables	15000	5	75000		Indiamart	
4	Aluminum Office Partitions for CCC Helpdesk (24 x 7)	20000	1	20000		Indiamart	
5	Online UPS for CCC	1392300	1	1392300		GeM	https://gem.gov.in/cart/cart_global/describe_items/77579
6	Building Management System	480000	1	480000		Belagavi	
7	Fire Alarm System	500000	2	1000000		Belagavi	
8	Junction Box with Adjustable mounting frames	5200	2	10400		GeM	https://gem.gov.in/cart/cart_global/describe_items/104139

9	Workstations	80000	8	640000		GeM	https://gem.gov.in/cart/cart_global/subscribe_items/70280
10	Thin client desktops	30000	5	150000		GeM	https://gem.gov.in/cart/cart_global/subscribe_items/78074
11	Multifunction Printer	85000	2	170000		GeM	https://gem.gov.in/cart/cart_global/subscribe_items/13625
12	Indoor fixed dome camera	55000	3	165000		GeM	https://gem.gov.in/cart/cart_global/subscribe_items/76695
13	Core Router	1900000	2	3800000		Belagavi	
14	48 Port L2 switch	261975	2	523950		GeM	https://gem.gov.in/cart/cart_global/subscribe_items/27943
15	Access Control System	145750	1	145750		GeM	https://gem.gov.in/cart/cart_global/subscribe_items/90186
16	Firewall/IPS/IDS	1250000	2	2500000		GeM	https://gem.gov.in/cart/cart_global/subscribe_items/94856
17	Enterprise Management System + Help Desk + Ticketing System(Open Source)	1000000	2	2000000		OpenSource	https://www.opennms.org/en/opennms/the-platform
18	Shared File System with Storage and Tape library	10918237	1	10918237		NICSI	http://www.nicsi.com/frontendoffering/clients_new/WTNtSDhSV3hiSHhSVp0MS9Bb0diZz09
19	Blade server chassis	2100000	1	2478000		HPE	
20	Blade Server	750000	8	6000000		Belagavi	
21	Backup Software	92820	1	92820		GeM	http://www.nicsi.com/frontendoffering/clients_new/eEY3bUNLRUZ2Y0ZObmxxYWFMSOpFZz09
22	SAN Storage (150 TB)	8900000	1	8900000		Bosch	https://gem.gov.in/cart/cart_global/subscribe_items/37285
23	GPS Devices	18000	300	5400000		Belagavi	
24	Authentication, Authorization and Accounting (AAA) Solution	8500000	1	10030000		HPE	
25	RFID Tagging	200	88000	17600000		Belagavi	
26	RFID Receiver	120000	100	12000000		Belagavi	
27	WLC	1000000	1	1000000		Belagavi	
28	Smart Pole (inclusive of display, Access Point, SoS button, LED Light, 1 PTZ camera)	2500000	15	37500000		Ericsson	
29	IP Phones	40000	13	520000		Belagavi	

DETAILED PROJECT REPORT – CITY LEVEL COMMAND & CONTROL CENTRE + CITY WIDE SURVEILLANCE + IT CONNECTIVITY

	ICT SW			23533800	235.34		
1	Antivirus Software for server	2000000	1	2000000		GeM	https://gem.gov.in/cart/cart_global/subscribe_items/71356
2	AV for desktop	2600	13	33800		GeM	https://gem.gov.in/cart/cart_global/subscribe_items/77542
3	OS + DB (Open Source)	300000	10	3000000		GeM	
4	Vehicle Tracking System integrated with all GPS devices across Private Buses, Waste Vehicles, Emergency Response Vehicles etc	10000000	1	10000000		Belagavi	
5	SWM	8500000	1	8500000		Belagavi	

Annexure B: Detailed BOQ: City-wide CCTV Surveillance

1.	Fixed Camera with Lens, IP66 housing and Accessories including IR Illuminator	No.s	49	6287	335503
Fixed Edge based FHD IP Box Camera Price: INR 6287 (Honeywell make, GeM Reference link: https://gem.gov.in/cart/cart_global/describe_items/218519) INR 75000 (CISCO supplied rate)					
Video Compression		H.264 or better			
Video Resolution		Full HD 1920 X 1080			
Frame Rate		Min. 25 fps			
Image Sensor		1/3" Progressive Scan CCD / CMOS			
Lens Type		Varifocal, C/CS Mount, IR Correction			
Lens		Auto IRIS 5 – 50 mm, F1.4			
Minimum Illumination Colour:		0.5 lux, B/W: 0.1 lux (at 30 IRE)			
IR Cut Filter		Automatically Removable IR-cut filter			
Day/Night Mode		Colour, Mono, Auto			
S/N Ratio		≥ 50 dB			
Auto adjustment + Remote Control of Image settings		Colour, brightness, sharpness, contrast, white balance, exposure control, backlight compensation, Gain Control			
Wide Dynamic Range		On/Off			
Audio:		Audio Capture Capability			
Local storage		Memory card slot availability			
Protocol		HTTP, HTTPS, FTP, RTSP, RTP, TCP, UDP, RTCP, DHCP			
Security		Password Protection, IP Address filtering, User Access Log, HTTPS encryption, X.509 compatible			
Operating conditions		0 to 50°C			
Casing		NEMA 4X / IP-66			
Certification		UL / CE / FCC / EN			
2.	PTZ Camera including mounting & accessories	Nos	11	149874	1648614
PTZ Camera Price: INR 149874 (BOSCH make, GeM Reference link: https://gem.gov.in/cart/cart_global/describe_items/280760) INR 250000 (CISCO supplied rate)					
Video Compression		H.264 or better			
Video Resolution		1920 X 1080			
Frame rate		Min. 25 fps			
Image Sensor		1/3" Progressive Scan CCD / CMOS			
Lens		Auto-focus, 4.3 –1296 mm (corresponding to 30x)			
Minimum Illumination		Colour: 0.5 lux, B/W: 0.1 lux (at 30 IRE)			
Day/Night Mode		Colour, Mono, Auto			
S/N Ratio		≥ 50dB			

PTZ		Pan: 360° endless/continuous, 0.2 to 300°/s (auto), 0.2 to 100°/s (Manual) Tilt: 90°, 0.2 to 100°/s (Auto), 0.2 to 40°/s (Manual) 30x optical zoom and 10x digital zoom 16 Preset Positions Auto-Tracking Pre-set tour			
Auto adjustment + Remote Control of Image settings		Colour, Brightness, Sharpness, Contrast, White Balance, Exposure Control, Backlight Compensation, Gain Control, Wide Dynamic Range			
Protocol		HTTP, HTTPS, FTP, RTSP, RTP, TCP, UDP, RTCP, DHCP			
Security		Password Protection, IP Address filtering, User Access Log, HTTPS encryption, X.509 compatible			
Operating Conditions		0 to 50°C			
Casing		NEMA 4X / IP-66 rated			
Certification		UL / CE / FCC / EN			
3.	Automatic Number Plate Recognition (ANPR) System with Camera & Accessories	Nos	0	48750	0
Price: INR 48750 (Tentronix make, GeM reference link - https://gem.gov.in/cart/cart_global/describe_items/204186)					
Parameter		Technical Specifications			
General		<ul style="list-style-type: none"> The system should be capable of generating a video & minimum 3 snapshot in any of the standard industry formats (MJPEG, JPG, avi, mp4, mov, etc.) with at least 10 frames per second. The video shall be from t-5 to t+5 sec of the violation and should also be recorded (being the instant at which the infraction occurred). The system should perform ANPR on all the vehicles passing the site and send alert to the command control and communication centre on detection of any Hot-listed. Vehicles (whose numbers have been marked as Stolen, Wanted, etc. at the Central server). With the detected number plate text, picture should also be sent of hot listed vehicle. It is highly likely to misread similar alphabets like 7/1/L or 8/B. The system should have ANPR/ OCR to address the Alpha numerical character of irregular font sizes. 			
Digital Network Camera		Video Compression	H.264		
		Video Resolution	1920 X 1080		
		Frame rate	Min. 30 fps		
		Image Sensor	1/3" Progressive Scan CCD / CMOS		
		Lens Type	Varifocal, C/CS Mount, IR Correction full HD lens		
		Lens#	Auto IRIS 5~50mm /8 – 40 mm, F1.4		
		Minimum Illumination	Colour: 0.5 lux, B/W: 0.1 lux (at 30 IRE)		
		IR Cut Filter	Automatically Removable IR-cut filter		
		Day/Night Mode	Colour, Mono, Auto		
		S/N Ratio	≥ 50 Db		
		Auto adjustment + Remote Control of Image settings	Colour, brightness, sharpness, contrast, white balance, exposure control, backlight compensation, Gain Control, True Wide Dynamic Range		

	Audio	Audio Capture Capability, G.711, G.726
	Local storage	Micro SDXC up to 64GB (Class 10) In the event of failure of connectivity to the central server the camera shall record video locally on the SD card automatically. After the connectivity is restored these recordings shall be automatically merged with the server recording such that no manual intervention is required to transfer the SD card based recordings to server.
	Protocol	IPV4, IPV6, HTTP, HTTPS, FTP/SMTP, RTSP, RTP, TCP, UDP, RTCP, DHCP, UPnP, NTP, QoS, ONVIF Profile S
	Security	Password Protection, IP Address filtering, User Access Log, HTTPS encryption
	Operating conditions	0 to 60°C (temperature), 50 to 90% (humidity)
	Casing	NEMA 4X / IP-66, IK10 Rated
	Intelligent Video	Motion Detection & Tampering alert
	Alarm I/O	Minimum 2 Input & 1 Output contact for 3rd part interface
	Certification	UL/EN, CE,FCC
On site-out station processing unit communication & Electrical Interface (Junction Box)	<ul style="list-style-type: none"> • Data Storage on site: The system should be equipped with appropriate storage capacity for 7 days 24X7 recording, with overwriting capability. The images should be stored in tamper proof format only. • Network Connectivity: Wired/GPRS based wireless technology with 3G upgradable to 4G capability. • Minimum 2(two) USB Port to support the latest external mass storage devices and Ethernet (10/100) Port for possible networking. However all logs of data transfer through the ports shall be maintained by the system. • System should be capable of working in ambient temperature range of 0oC to 60oC. • Lightning arrester shall be installed for safety of system (As per BIS standard IS 2309 of 1989). • The housing(s) should be capable of withstanding vandalism and harsh weather conditions and should meet IP66, IK10 standards (certified) 	
Violation Transmission and Security	<ul style="list-style-type: none"> • Encrypted data, images and video pertaining to Violations at the Onsite processing station should be transmitted to the CCC electronically through GPRS based wireless technology with 3G upgradable to 4G, or wired connectivity if available in Jpeg format • Advanced Encryption Standard (AES) shall be followed for data encryption on site and CCC, and its access will be protected by a password. • The vendor shall ensure that the data from the onsite processing unit shall be transferred to CCC within one day. 	
Video Recording	<ul style="list-style-type: none"> • The system should be capable of continuous video recording in base station for 30 days. The system shall automatically overwrite the data after 30 days. It should be noted that at any point of time the local storage at the base station should have the data of previous 30 days. • Direct extraction through any physical device like USB flash drive , Portable Hard 	

	<p>disk etc. shall be possible</p> <ul style="list-style-type: none"> The system should capture standard vehicle's number plates with an accuracy of at least 70% at day time and at least with an accuracy of 60% at night time. (On basis of number of vehicles) 				
4.	Red Light Violation Detection (RLVD) System with Camera & Accessories	Awaited	0	-	Awaited
Parameter		Technical Specifications			
General		The system should be capable of generating a video & minimum 3 snapshot in any of the standard industry formats (MJPEG, JPG, avi, mp4, mov, etc.) with at least 10 frames per second. The video shall be from t-5 to t+5 sec of the violation and should also be recorded (being the instant at which the infraction occurred).			
Digital Network Camera		Video Compression	H.264		
		Video Resolution	1920 X 1080		
		Frame rate	Min. 30 fps		
		Image Sensor	1/3" Progressive Scan CCD / CMOS		
		Lens Type	Varifocal, C/CS Mount, IR Correction full HD lens		
		Lens#	Auto IRIS 5~50mm /8 – 40 mm, F1.4		
		Minimum Illumination	Colour: 0.5 lux, B/W: 0.1 lux (at 30 IRE)		
		IR Cut Filter	Automatically Removable IR-cut filter		
		Day/Night Mode	Colour, Mono, Auto		
		S/N Ratio	≥ 50 Db		
		Auto adjustment + Remote Control of Image settings	Colour, brightness, sharpness, contrast, white balance, exposure control, backlight compensation, Gain Control, True Wide Dynamic Range		
		Audio	Audio Capture Capability, G.711, G.726		
		Local storage	Micro SDXC up to 64GB (Class 10) In the event of failure of connectivity to the central server the camera shall record video locally on the SD card automatically. After the connectivity is restored these recordings shall be automatically merged with the server recording such that no manual intervention is required to transfer the SD card based recordings to server.		
		Protocol	IPV4, IPV6, HTTP, HTTPS, FTP/SMTP, RTSP, RTP, TCP, UDP, RTCP, DHCP, UPnP, NTP, QoS, ONVIF Profile S		
		Security	Password Protection, IP Address filtering, User Access Log, HTTPS encryption		
		Operating conditions	0 to 60°C (temperature), 50 to 90% (humidity)		
		Casing	NEMA 4X / IP-66, IK10 Rated		
		Intelligent Video	Motion Detection & Tampering alert		

	Alarm I/O	Minimum 2 Input & 1 Output contact for 3rd part interface			
	Certification	UL/EN, CE,FCC			
On site-out station processing unit communication & Electrical Interface (Junction Box)	<ul style="list-style-type: none">• Data Storage on site: The system should be equipped with appropriate storage capacity for 7 days 24X7 recording, with overwriting capability. The images should be stored in tamper proof format only.• Network Connectivity: Wired/GPRS based wireless technology with 3G upgradable to 4G capability.• Minimum 2(two) USB Port to support the latest external mass storage devices and Ethernet (10/100) Port for possible networking. However all logs of data transfer through the ports shall be maintained by the system.• System should be capable of working in ambient temperature range of 0oC to 60oC.• Lightening arrester shall be installed for safety of system (As per BIS standard IS 2309 of 1989).• The housing(s) should be capable of withstanding vandalism and harsh weather conditions and should meet IP66, IK10 standards (certified)				
Violation Transmission and Security	<ul style="list-style-type: none">• Encrypted data, images and video pertaining to Violations at the Onsite processing station should be transmitted to the CCC electronically through GPRS based wireless technology with 3G upgradable to 4G, or wired connectivity if available in Jpeg format• Advanced Encryption Standard (AES) shall be followed for data encryption on site and CCC, and its access will protected by a password.• The vendor shall ensure that the data from the onsite processing unit shall be transferred to CCC within one day.				
Video Recording	<ul style="list-style-type: none">• The system should be capable of continuous video recording in base station for 30 days. The system shall automatically overwrite the data after 30 days. It should be noted that at any point of time the local storage at the base station should have the data of previous 30 days.• Direct extraction through any physical device like USB flash drive , Portable Hard disk etc. shall be possible				
5.	Facial Recognition System (FRS) with Hardware & accessories	No.s	0	-	-
Face Recognition System					
<p>Face Recognition System (FRS) shall be designed for identifying or verifying a person from various kinds of photo inputs from digital image file to video source. The system shall offer logical algorithms and user-friendly, simple graphical user interface making it easy to perform the facial matching.</p> <p>The system shall be able to broadly match a suspect/criminal photograph with database created using photograph images available with Passport, CCTNS, and Prisons, State or National Automated Fingerprint Identification System or any other image database available with police/other entity.</p> <p>The system shall be able to:</p> <ol style="list-style-type: none">Capture face images from CCTV feed and generate alerts if a blacklist match is found.Search photographs from the database matching suspect features.Match suspected criminal face from pre-recorded video feeds obtained from CCTVs deployed in various critical identified locations, or with the video feeds received from private or other public organization's video feeds.					

- iv. Add photographs obtained from newspapers, raids, sent by people, sketches etc. to the criminal's repository tagged for sex, age, scars, tattoos, etc. for future searches.
- v. Investigate to check the identity of individuals upon receiving such requests from Police Stations.
- vi. Enable Handheld mobile with app to capture a face on the field and get the matching result from the backend server.

The facial recognition system shall be enabled at cameras identified by the Authority. These cameras identified shall be installed at critical locations identified by the City Police.

The facial recognition system in offline mode shall be provided by the SI in line with the requirement specified in the RFP.

Parameter	Minimum Specifications Required
Configuration	Full HD IPS LED Display, Direct LED Backlight, Display suitable for use in video wall with bezel to bezel distance not less than 4 mm
Resolution	Full High definition (1920 X 1080) 16:9 Widescreen
Contrast Ratio	5000:1
Brightness	1000 S
Refresh rate	> 800 Hz
Response time	At most 8 milliseconds
Viewing angle	H : 178°, V : 178°
Standard Input	1x Digital DVI-I ; 1x Digital DVI-D, or Higher
Standard output	1x Digital DVI-D ; 1x CVBS BNC, 2 X HDMI
Control	RS-232/RS-422/IR
Consumption	Not more than 5000 Watt
Power Supply	AC 100 -240 V~ (+/-10 %), 50/60 Hz
Operating Temperature	0°C - 40°C
Humidity	10% - 90%, non-condensing
Connectors	Dual Link DVI-D cable, Power cable for daisy chain, AC cable, Remote Controller
Display Controllers	Video Distributor, Display controller to control Video wall in a matrix as per requirement with necessary software: Processor specs: Quad core 64-bit, 3.4 GHz CPU or latest RAM: 8 GB DDR3 minimum HDD: Min 500 GB Hard Disk (Hard disk Capacity should be upgradable) Network support: Gigabit Ethernet Controller inbuilt, Support for Add on Network adapters. Video wall Display: Display multiple source windows in any size, anywhere on the wall Accessories: DVD-R,DVD+RW,, Keyboard, mouse OS Support: 64-bit Operating Systems Windows / Linux or equivalent industry Standard

Infrared Illuminator

Parameters	Minimum Specifications or Better
Range	Min. 100 mtrs
Minimum Illumination	High sensitivity at Zero Lux

Power	Automatic on/off operation				
Casing	NEMA 4X / IP-66 rated				
Operating conditions	-5° to 50°C				
Certification	UL / CE / FCC / EN				
1.	Keyboard Joysticks to control PTZ cameras	Nos			
Supply, Installation, Testing and Commissioning of Software Solutions components with tentative minimum quantity for components are:					
1.	Server OS Licenses	No.s			
2.	Antivirus Licenses	Lot			
3.	Video Management Software (VMS) Camera Licenses including failover & Edge storage license	Lot			8,892,111
<p>Video Management System (VMS):</p> <p>BOSCH supplied Rate: INR 8,892,111</p> <p>Video Management System (VMS) shall bring together physical security infrastructure and operations and shall use the IP network as the platform for managing the entire surveillance system. End users shall have rapid access to relevant information for analysis.</p> <p>This shall allow operations managers and system integrator to build customized video surveillance networks that meet their exact requirements. Software suite shall be a scalable and flexible video management system that could be easily managed and monitored. Scalable system shall permit retrieval of live or recorded video anywhere, anytime on a variety of clients via a web browser interface.</p> <p>Video management server, on which the VMS is hosted upon, shall run seamlessly in the background to manage connections, access and storage. Video management server shall accept the feed from IP Camera installed at field locations. Server shall stream incoming video to a connected storage. VMS shall support video IP fixed colour / B&W cameras, PTZ / Dome cameras, infrared cameras, low light/IR cameras and any other camera that provides a composite PAL video signal.</p> <p>VMS shall facilitate situational awareness of the on-ground condition at Command Control Center or any other view center. This shall be achieved by transmission of real time imagery (alarm based or on-demand). This imagery can be viewed live by operators and/or recorded for retrieval and investigation at a later time. Major functionalities are described here:</p> <ul style="list-style-type: none"> • The VMS shall support a flexible rule-based system driven by schedules and events. • The VMS shall be supported for fully distributed solution for monitoring and control function, designed for limitless multi-site and multiple server installations requiring 24/7 surveillance with support for devices from different vendors. • The VMS shall support IP cameras of different makes. • All the offered VMS and cameras shall have ONVIF compliance. • The VMS shall be enabled for any standard storage technologies and video wall system integration. • The VMS shall be enabled for integration with any external Video Analytics Systems. • The VMS shall be capable of being deployed in a virtualized environment without loss of any functionality. • The VMS server shall be deployed in a clustered server environment for high availability and failover. • All CCTV cameras locations shall be overlaid in graphical map in the VMS Graphical User Interface (GUI). The cameras selection for viewing shall be possible via clicking in the camera location on the 					

graphical map. The graphical map shall be of high resolution enabling operator to zoom-in for specific location while selecting a camera for viewing.

- The VMS shall have an administrator interface to set system parameters, manage codecs, manage permissions and manage storage.
- The VMS day to day control of cameras and monitoring on client workstations shall be controlled through the administrator interface.
- Whilst live control and monitoring is the primary activity of the Operator workstations, video replay shall also be accommodated on the GUI for general review and also for pre and post alarm recording display.
- The solution design for the VMS shall provide flexible video signal compression, display, storage and retrieval.
- All CCTV camera video signal inputs to the system shall be provided to command control Center, and the transmission medium used shall best suit the relative camera deployments and access to the CCTV Network.
- The VMS shall be capable of transferring recorded images to recordable media (such as CD/DVD and/or DAT tapes) in tamper evident and auditable form. All standard formats shall be supported including, but not limited to:
 - a. AVI files
 - b. Motion- Joint Photographic Experts Group (M-JPEG)
 - c. Moving Picture Expert Group-4 (MPEG-4)
- All the streams shall be available in real-time (expecting the network latency) and at full resolution. Resolution and other related parameters shall be configurable by the administrator in order to provide for network constraints.
- The VMS shall support field sensor settings. Each channel configured in the VMS shall have an individual setup for the following minimum settings, the specific settings shall be determined according to the encoding device:
 - a. Brightness
 - b. Contrast
 - c. Color
 - d. Sharpness
 - e. Saturation
 - f. Hue
 - g. White balance
- The VMS shall support the following minimum operations:
 - a. Adding an IP device
 - b. Updating an IP device
 - c. Updating basic device parameters
 - d. Adding / Removing channels
 - e. Adding / Removing output signals
 - f. Updating an IP channel
 - g. Removing an IP device
 - h. Enabling / Disabling an IP channel

i. Refreshing an IP device (in case of firmware upgrade)

- The VMS shall support retrieving data from edge storage. Thus when a lost or broken connection is restored, it shall be possible to retrieve the video from SD card and store it on central storage.
- The VMS shall support bookmarking the videos. Thus, allowing the users to mark incidents on live and/or playback video streams.
- The VMS shall be capable of intrusion detection: Detection of moving objects in selected areas covered by the camera (those that are specified as restricted areas like those before some major events, etc.). Avoid false alarms due to wildlife or other moving objects (e.g., tree leaves).
- The VMS shall be capable of tracing of a specific person or object in multi-camera videos: Track a specific person or object across several surveillance (e.g., to trace and identify criminals and/or anti-social elements).
- The VMS shall be capable of counting of people and detection of abnormal crowd behaviour: Detection of people flow and counting of people in selected areas. To identify abnormal crowd behaviour and raise alarms to avoid untoward incidences in public places, and maintaining law & order.
- The VMS shall be capable of summarize videos and create a content summary of the captured video depicting relevant movements or objects of interest. This would on *off-line* as well as *online* videos captured by the camera. For example, an hour-long surveillance video could be shortened by considering only the frames that depict major movements in the video.
- The VMS shall allow the administrator to distribute camera load across multiple recorders and be able shift the cameras from one recorder to another by simple drag and drop facility.
- VMS shall support automatic failover for recording.
- VMS shall support manual failover for maintenance purpose.
- VMS shall support access and view of cameras and views on a smartphone or a tablet (a mobile device).
- VMS shall support integration with the ANPR application.
- VMS shall support integration with other online and offline video analytic applications.

VMS CORE COMPONENTS

1. CCTV Camera Management – Shall enable management of cameras associated with the VMS.
2. Video recording, retrieval and archiving – Shall manage live camera viewing, recording of live feeds for future review, search and retrieval of recorded feeds and archiving of recorded video feeds for optimum utilization of resources.
3. Video Analytics (VA) alert management – Shall enable defining of rules for handling of alerts using the VA handling of events as per the defined rules.
4. MIS and Reporting – Shall provide users with business analytics reporting and tools to organize evaluate and efficiently perform day to day operations.
5. Security and Roles – *Shall manage* role definitions for internal as well as external access.

VMS GENERAL

1. The VMS shall be Codec and IP camera agnostic such that it can support devices that are not supplied by the manufacturer/developer of the VMS software and Codec hardware.
2. Each camera shall be identified by giving it a minimum thirty-two (32) character long, alphanumeric

- unique id followed by text description field.
3. When viewed on the GIS map, the text description of each camera shall be capable of being positioned anywhere on the monitor screen, on a camera by camera basis, shall afford options for size variations, and display with a flexible solid, semi-transparent or transparent background.
 4. The VMS shall support tamper detection for all cameras to warn of accidental or deliberate acts that disable the surveillance capability.
 5. For alarm interfacing requirements, the VMS shall allow the selection of minimum five (5) cameras per single alarm source. The designated primary camera shall be automatically displayed as a full-screen image on the main GUI CCTV screen. The VMS shall also, on alarm, present associated pre/post event video allowing the Operator to assess the alarm cause. Other associated cameras, when called up, shall be displayed as split-screen images on the other monitor of the operator workstation.
 6. Playback of any alarm related video, (including pre and post alarm video) shall start at the beginning or indexed part alarm sequence.
 7. Video management software shall incorporate online video analytics on live video images. It shall include the following video analytics detection tools:
 - a. Presence detection for moving and stopped vehicles
 - b. Directional sensitive presence detection
 - c. Congestion Detection
 - d. Loitering detection
 - e. Improper Parking Camera Tampering
 - f. Abandoned objects detection
 - g. Gun-shot detection
 8. Off- Line Video Analytics should allow for quick retrieval of video footage to metadata stored with each image. System should provide results within few seconds, system should support for below listed the user's query.
 - a. System should allow to specify the following search criteria:
 - i. Motion in the zone, user-defined with any polyline
 - ii. Detection of crossing a virtual line in a user-defined direction
 - iii. Loitering of an object in an area
 - iv. Simultaneous presence of a few objects in an area
 - v. Motion from one area to another.
 - b. System should support to apply below listed filters to search results:
 - i. Object size
 - ii. Object color
 - iii. Direction of object motion
 - iv. Speed of the moving object
 - v. Defined area entry/appearance and zone exit/disappearance
 9. Video clips of specific events via the VA or by the operator action shall be capable of being separately stored and offloaded by operator with appropriate permissions on to recordable media such as CD or Write Once Read Many (WORM) together with any associated meta-data for subsequent independent playback.
 10. The system shall provide the capability to select duration and resolution of storage by camera, time

- and activity event and user request. Frequency/trigger of transfer shall be configurable by user.
11. The system shall provide the capability to digitally sign recorded video.
 12. Live video viewing: The system shall allow the viewing of live video from any camera on the system at the highest rate of resolution and frame rate that the camera shall support on any workstation on the network.
 13. Recorded video viewing: The system shall allow the viewing of recorded video from any camera on the system at whatever rate the camera was recorded.
 14. Storage of video: The system shall store online thirty (30) days of video for all cameras. Balance 60 days will be on low cost secondary storage /tape library.
 15. The system shall provide the capability to manage the video storage to allow selective deletions, backups, and auto aging.
 16. VMS shall have an extensive reporting capability with ability for administrator to define reports in a user friendly manner. The pre-existing reports shall include, but not limited to, the following:
 - a. Reports on alerts received by type, date and time, location
 - b. Reports on system errors and messages
 - c. Reports on master data setup including cameras, decoders, locations
 - d. Reports on cameras health check
 - e. Reports on audit trails such as user actions
 - f. Reports on system health including storage availability, server performance, recordings.

VMS GUI CAPABILITIES

1. The user interface shall be via a GUI providing multiple video streams simultaneously on multiple monitors.
2. The GUI shall have the minimum capability of naming locations, users, and cameras events be displayed correctly on users screen.
3. The system shall have the capability to store and record operator specific options, such as screen layout, video layout, action on alarm, and automatic video transmission settings on events.
4. The GUI shall conform to standard Windows conventions.
5. The system shall provide unified GUI camera control at an operator's workstation for all types of cameras installed whether existing or new or connected via another agency.
6. By means of this unified control the following functions shall be provided:
 - a. Selection
 - b. Display
 - c. PTZ
 - d. Setup and adjustment
 - e. Determination of pre-sets
 - f. Any other commissioning and camera setup activity
7. All user interfaces shall support English Language and shall conform to standard Windows protocols and practices and allow the control of all functions via a simple easy to use interface.

VMS MAP FUNCTIONALITY

1. The system shall support a mode of operation whereby a map of all or part of the map (at operator request) is displayed on a separate or same screen and that status information can be provided via an icon, and access to any cameras shall be accessible by means of an icon on that screen.

2. These Maps shall be defined so that an operator may make a selection from the same source of mapping that is available to the other systems within the command control center, displaying whichever Map or section the operator needs, and it shall be displayed within one (1) second.

VMS CONFIGURATION

1. The VMS shall include a configuration facility to provide system administrators with a single interface utility to configure all VMS operating parameters.
2. The configuration tool shall be capable of supporting multiple concurrent users of the system, providing the ability to automatically update. It shall also allow the codec and camera configurations to be imported and exported in excel format.
3. The import/export tool shall be as sophisticated as necessary to support the following:
 - a. Log every action so an audit or report can be completed
 - b. Only update and log configurations where there is a difference between the system configuration and the new configuration file to be loaded
 - c. The import configuration file can contain any amount of data
 - d. Ability to run an update on the fly - i.e. no or minimal downtime to the system
 - e. Not require a reset or restart after any upgrades
 - f. Definable update times
4. The VMS configuration tool shall define:
 - a. Cameras (whether via codec units or directly connected IP cameras) and text based names
 - b. Camera Groups
 - c. User Groups
 - d. Monitors
 - e. Codec parameters
 - f. Alarms
 - g. Workstations
 - h. storage
5. The configuration utility shall allow the system administrator to:
 - a. Install new devices
 - b. Configure all aspects of existing devices
 - c. Configure and set up users/user groups and their rights/permissions/priorities
 - d. To define multiple camera groups
 - e. Each group to be defined for combinations of viewing and control rights
 - f. Individual Operators to be assigned multiple groups
 - g. Each group to be allocated to multiple Operators
 - h. Each camera may be in multiple groups
 - i. To program macros for individual and group camera characteristics
 - j. Program camera/monitor selection and configuration of the video wall(s) in response to an incoming alarm
 - k. Designate workstation destination for picture presentation in response to alarm initiation
6. User permissions/privileges, to be allocated, shall extend from full administrator rights down to

basic operation of the system, and shall include the ability to designate workstations to an operator, and to designate one or more camera groups to an operator for viewing and/or control.

7. The configuration utility shall store all changes to the system, including but not limited to:
 - a. User log-ins
 - b. User log-offs
 - c. Human interface device inputs (key strokes)
 - d. External alarm commands
 - e. Error messages
8. A copy of the system configuration shall be stored external to the system to allow system restoration in case of hardware failure. External would mean another site, to be agreed with (City) during detail design.

VMS USER HIERARCHY

1. The System Integrator shall request a detailed User Prioritization List (UPL) from the Authority during the project.
2. The UPL shall enable the programming of the CCTV management system with the agreed user prioritization.
3. Over and above user priority, users shall be enabled for the following in varying combinations:
 - a. Image viewing
 - b. Image recording
 - c. PTZ control
4. In addition, the control location shall be prioritized as such that the City Operation Centre has full control of all functions and priority one (1) override over all other locations.
5. Within the hierarchy, each user's log-on password shall not only allow access to varying levels of system functionality, but shall also provide for a relative priority between users of equal access rights. In this manner, operators in the above groups shall be individually allocated a priority level that allows or denies access to the functions when in conflict with another operator of lower or higher priority level.
6. These priority levels and the features they contain shall be discussed and defined with the system administrator. The SI shall allow time to carry out this exercise together with the relevant configuration of groups, sub-groups, permissions and priorities.

VMS RECORDING REQUIREMENTS

1. All images shall be recorded centrally as a background process at configurable parameters.
2. It shall not be possible to interrupt, stop, delay or interfere with the recording streams in any way, without the appropriate user rights.
3. The CCTV recording system shall enable pre and post event (PPE) recording, presentation and storage, initiated automatically in response to system alarm sources received by the VMS.
4. The PPE recording clips shall be provided by the VMS and retrieved from the central video archive on the buffer storage system. This PPE stream shall be totally independent of the background recording stream provided to the central video archive such that central video archive recording, as programmed, continues under all circumstances.
5. The information stored shall be full real-time and full resolution from each incoming camera channel. In the absence of a trigger from a manual input or from a programmed alarm source, the

- PPE video recording shall be written to buffer storage on a FIFO basis.
6. PPE periods initiated by a single alarm occurrence shall be configurable via the VMS as follows:
 - a. Pre – 0 to 30 seconds
 - b. Post – 30 to 300 seconds
 - c. Shall be variable for each camera according to each individual alarm and the alarm type
 7. In the event of a trigger, the VMS shall ensure that the programmed sections of pre and post event video are immediately presented to the Operator to complement the alarm display and simultaneously saved as an identified indexed video clip, complete with time/date stamp, in a reserved and protected area of the storage system. Such PPE recording shall then be capable of later retrieval via search criteria.
 8. Once tagged and saved, the PPE video clip shall NOT be overwritten except by an operator with the required permissions i.e. it is excluded from the normal FIFO regime of the bulk storage system. Recording shall also be initiated on-demand by manual triggers from system operators e.g. keyboard key-stroke.
 9. The VMS shall support the following recording modes:
 - a. Total recording – the VMS shall constantly record the video input. The VMS shall allow for continuous recording of all video inputs
 - b. Event based recording – the VMS shall record the video input only in case an event has occurred
 10. VMS shall support the following triggers to initiate a recording
 - a. Scheduler – the recorder will record the video inputs based on a specified schedule.
 - i. The VMS shall allow recording based on a time schedule for all or some of the video channels
 - ii. The VMS shall allow for multiple recording periods per day, per channel
 - iii. The VMS shall have the option to set any available trigger in the system (VMD, TTL and/or API) to trigger the channel
 - iv. The VMS shall have the option for individual channel setup of pre/post-alarm recording for defined interval (e.g. up to 10 minutes pre-alarm and 30 min post-alarm recording)
 - v. The VMS shall have the ability to enable/disable triggers through a daily time schedule
 - b. Manual – the user shall be able to initiate a manual recording upon request.
 - i. The VMS shall work in conjunction to the any previous alarm operations
 - c. The VMS shall allow API Triggers
 - d. All trigger information shall be stored with the video information in the VMS data set and shall be made available for video search

MANUAL OR ON DEMAND RECORDING

1. Recording shall also be initiated on-demand by manual triggers from system operators e.g. keyboard key-stroke (subject to user rights).
2. The system shall allow for an operator to initiate recording on any live stream being viewed.

VMS REVIEW SYSTEM

1. The VMS recording and replay management systems shall support the following features and

operations:

- a. Play back shall not interfere with recording in any way
- b. Support either analogue cameras connected via Codecs or IP-cameras directly connected to the network
- c. Stream live images through the network using IP Multi-cast techniques
- d. Stream images from the Codec to the attached storage system
- e. Store the recording stream from all cameras simultaneously with no degradation to any individual camera recorded image stream unless the system is configured by administrator to allow for change in quality
- f. Deliver live video to VMS workstation within a period of one second from manual call up
- g. Deliver live video to VMS workstation within a period of three seconds from automatic alarm receipt on alarm interface
- h. Storage of each camera's images at a rate and resolution as defined in the Codec or IP camera configuration. The system VMS programming shall automatically vary these rates in response to time profiles, alarm inputs
- i. Support multiple, configurable recording time schedules per camera. Each schedule shall support different recording parameters and automatically implement against the configured time schedule e.g. operational and non-operational hours shall be scheduled with different recording parameters on designated cameras
- j. Support streaming of recorded files using IP Unicast directly to hardware decoders for display on analogue monitors or software decoder when/if required
- k. Playback multiple, synchronized recorded streams at differing speeds and frame rates
- l. Record and playback a video stream simultaneously at differing speeds and frame rates
- m. Time stamping of every recorded video field based upon Network Time Protocol (NTP) time
- n. Selectable on-screen-display of time and camera title during playback
- o. Security file lock to prevent specific recorded files from being overwritten regardless of their date and time, in addition to those records stored as PPE clips. The duration and policy for retention of such videos would be same as that of the PPE clips
- p. Configurable granularity of video files
- q. Generate alarm when storage medium has fallen below a user selectable threshold
- r. Stored video files can be "down-loaded" to directly CD ROM and/or DVD or WORM for replay using the VMS video replay application, and shall incorporate proof of authenticity
- s. Download video records in common (e.g. AVI) file format for remote, cursory review and assessment prior to generating tamper-evident auditable copies.

VMS ALARM HANDLING

1. The video alarm handling shall provide the following facilities for the handling and management of video images generated by alarms associated with other systems integrated with the VMS.
2. Whilst the pre and post alarm requirement has been included (up to thirty (30) seconds pre alarm, three hundred (300) seconds post alarm per camera at fifteen (15) FPS) the VMS shall display and manage the pre and post alarm information as follows for a maximum of two hundred (200) alarms per day:

- a. The pre and post alarm video clip shall be displayed full screen, in real-time and shall continuously play the 'loop' until the operator accepts the initial alarm activation or clears down the event
 - b. The pre and post alarm shall be displayed on a dedicated monitor
 - c. Each monitoring station shall be able to display simultaneous alarms
 - d. The 'video clip' associated with the alarm shall be tagged with date and time etc. and stored in a dedicated location for retrieval at a later date
 - e. Alarm archived video shall be readily available for one month but accessible for six months
 - f. The VMS shall accommodate at least 100 simultaneously alarm activating CCTV cameras
 - g. All alarm based images shall be displayed
3. The VMS shall have the capability to automatically display a primary camera, plus minimum of four additional cameras associated with each alarm based on either camera locations with respect to the alarm, or a programmed set of parameters defining the associated cameras.
4. The VMS shall also accommodate operator-initiated recording of a given camera. The operator-initiated recording shall:
 - a. Accommodate up to a total of at least 50 cameras simultaneously (all operators)
 - b. Record the selected camera/s for an administrator configured number of hours or until stopped, whichever is the sooner

VMS INTEGRATION REQUIREMENTS

1. VMS shall be integrated within a consolidated GUI that would include other command control Center systems as well. All events, activations and alarms that occur with the VMS and its sub systems will interact seamlessly between the command and control center sub systems as required.
2. Either the OPC or the SDK shall manage the interface between the VMS, GUI and the other City Management systems as required.
3. The OPC or SDK shall allow the operator workstations to control the VMS irrespective of the vender chosen by duplicating all control functionality of the VMS used for normal day-to-day activities.
4. Alarm linking between VMS sub-systems shall be done at VMS sub-system level to, for example, call up relevant pictures to screens and move PTZ units to pre-set positions in response to alarm and activate video recordings, modifying recording parameters as necessary.
5. All OPC software shall be fully compliant with the OPC specification as set down by the OPC foundation. Any software or products which are not compliant shall be highlighted in the Technical Proposal return. The SI shall indicate in the technical proposal return how the OPC interface shall be implemented.
6. If an OPC interface cannot be provided, an alternative solution shall be provided for this data using a standard open protocol and confirmation as to how this shall be implemented shall be provided in the technical proposal return.
7. If an SDK solution is provided the system shall allow reconfiguration by (City) and end users without recourse to special languages. A system SDKs shall be supplied with all required supporting software to allow the integration of the system with new devices and systems.

VMS SYSTEM SIZE

1. The VMS shall enable handling of 1000 cameras, on day one, as well as future scalability as may be required.					
4.	Video Analytics Software Licenses	Lot			9357410
<p>Price: 16,51,258 (GeM Reference link - https://gem.gov.in/cart/cart_global/describe_items/46871)</p> <p>CISCO Supplied rate: INR 9357410</p> <p>Surveillance system shall have the capability to deploy intelligent video analytics software on any of the selected cameras. This software shall have the capability to provide various alarms & triggers. The software shall essentially evolve to automate the Suspect activity capture and escalation; eliminate the need of human observation of video on a 24x7 basis.</p> <p>Analytics software shall bring significant benefit to review the incidences and look for suspicious activity in both live video feeds and recorded footages. Minimum video analytics that shall be offered on identified cameras are :</p> <ol style="list-style-type: none"> 1. Presence detection for moving and stopped vehicles 2. Directional sensitive presence detection 3. Congestion Detection 4. Loitering detection 5. Improper Parking 6. Camera Tampering 7. Abandoned objects detection 8. Gun-shot Detection 9. Unattended object 10. Object Classification 11. Tripwire/Intrusion <p>The solution shall enable simultaneous digital video recording from network, intelligent video analysis and remote access to live and recorded images from any networked computer. It shall be able to automatically track and classify objects such as cars and people and push content to the respective security personnel as required for real time analysis. The system shall also have display of time line, customizable site map, live video, video playback, integrated site map, remote live view, multi-site capability, encryption, watermarking and event based recording.</p> <p>All cameras should support motion detection; camera tampering and audio analytics .All cameras must be capable to run two analytics in addition to motion detection and camera tampering as required at any given time.</p> <p>Solution shall be so designed to have Automated PTZ camera control for zooming in on interesting events like motion detection etc. as picked up by camera without the need of human intervention. It shall be completely scalable, with a many-to-many client-server model allowing multiple physical systems to be used in an array of servers. The server specified in the RFP indicates only the minimum requirements. However, SI shall offer the server system to suit the video analytics requirements specified herein.</p> <p><u>System Integration</u></p> <p>The SI shall ensure seamless integration of City Surveillance system with an external Geographical Information System (GIS). The GIS console shall allow operators to get an overview of the entire system and access to all system components. GIS shall enable dynamic view of the location and status of</p>					

resources and objects/sensors. System shall enable authorized user to open a new incident and associate the incident with its geographic location automatically, via the GIS display.

The proposed City Surveillance System shall also provision for seamless integration with other government datasets like Vahan, Sarathi, Dial 100, e-challan etc. as and when they are available from respective agencies. The system shall be capable of providing evidence support for ANPR, RLVD events and be integrable with e-challan system if required.

5.	ANPR Software Licenses	Lot			
----	------------------------	-----	--	--	--

Automatic Number Plate Recognition

SI shall provide Automatic Number Plate Recognition (ANPR) solution at the identified locations. SI shall describe in detail, the design, operational and physical requirements of the proposed ANPR system, to demonstrate compliance with all the specified requirements in this RFP.

ANPR cameras shall provide the feed to the command control center, where the ANPR server shall be located. The ANPR server shall process the image using OCR software for getting the registration number of the vehicle with highest possible accuracy. The system shall be able to detect, normalize and enhance the image of the number plate for detection of alpha numerical characters. System shall be able to identify stolen/ suspected vehicles by cross checking the numbers with vehicle database. ANPR software shall be integrated with video management system.

The ANPR system shall provide a user interface with live view of vehicle entry point 24x7, event notification, image captured, number detection and recognition, event reports customized report generation etc.

The analysis of the image captured shall be done in real time. The database so created from the images captured & analysis shall store the following:

1. Details of vehicle
2. Number and time of entries and exits
3. License plate numbers
4. Validation/Analysis results etc.

The proposed City Surveillance System shall also provision for seamless integration with other government datasets like Vahan, Sarathi, e-challan etc. as and when they are available from respective agencies. The system shall be capable of providing evidence support for ANPR, RLVD events and be integrable with e-challan system if required.

6.	RLVD Software Licenses	Lot			
----	------------------------	-----	--	--	--

Red Light Violation Detection (RLVD) System

Red Light Violation Detection (RLVD) system is a system for capturing details of vehicles that have crossed red light through evidence camera units and other equipment. The information so captured shall be used to issue challans to the violators.

The SI shall describe the stop line at the junction while the traffic light is red. System shall be able to automatically detect in detail, the design, operational and physical requirements of the proposed Red Light Violation Detection system, to demonstrate compliance with all the specified requirements mentioned in this RFP.

RLVD solution shall have an overview camera to capture the zoomed out picture of the entire area when there is a red light violation. Light sensors shall be placed to detect the change in traffic light. Once the

traffic light has turned red, the sensors shall activate the camera to capture images of the vehicles that jumped the traffic light.

RLVD system, in case of an offence detected, shall capture details such as site name, location details, lane number, date & time, registration number of car and type of offence on the image itself. The system shall also be able to generate number of reports for analysis such as the traffic light with maximum offenders, peak time of traffic offence and other reports in discussion and as per the customization requirement of the Authority.

GeM Package by few vendors for more than 100 CCTV including PTZ, ANPR etc

- a) INR 50,50,000 for 98 Bullet, 10 dome and 2 ANPR, etc
(https://gem.gov.in/cart/cart_global/describe_items/426082)
- b) INR 29,99,760 for 120 bullet, 2 PTZ etc
(https://gem.gov.in/cart/cart_global/describe_items/426294)
- c) INR 26,45,667 for 98 Bullet, 2 ANPR etc
(https://gem.gov.in/cart/cart_global/describe_items/418356)

CISCO supplied rate:

2	CCTV feed integration (including 100 old CCTV implementations by existing contractor)	500		
2.1	Video Management software & hardware	a lot	32000000	32000000
2.2	Bullet Camera for monitoring	120	75000	9000000
2.3	PTZ Camera	50	250000	12500000
2.4	Dom Camera	50	75000	3750000
2.5	RLVD Camera, software and Hardware-(for 20 traffic junctions)	80	3rd Party licenses	Pending receipt from partner
2.6	ANPR Camera, Software and hardware -(For 20 traffic junctions and 20 other places for Number plat capturing)	200	3rd Party licenses	Pending receipt from partner
2.7	Video Analytics-Incident/accident detection, Prohibited area trespassing licenses and hardware (40- 50 camera licenses) (broken down/Accidental detection, Wrong driving detection and intrusion detection license)	a lot	2500000	2500000

Annexure C: Detailed BoQ: IT Connectivity and Networking & Cloud Support

C.1. Bandwidth

Component		Brief Description	Bandwidth	Numbers	Cost (In Lacs)
Wi-Fi Hotspots		To be placed with Smart Poles in ABD Area; also distributed across PAN City through Bus Shelters, and CCTV Junction Points	Up to 40 Mbps Till 150 GB, 2 Mbps Beyond	10	0.22x10 = 2.20
External Connectivity		ICCC to City Operations Centre Connectivity	10 Mbps	1 Unit	NILL ¹
		City Operations Centre to Traffic Control Room Connectivity (Leased Line)	10 Mbps	1 Unit	3.30x1= 3.30
Backbone ²	Option 1 (Leased Lines)	From Stand-alone Smart Poles & CCTV Junction Points to City Operations Centre	12 Mbps	15 Units	4.19x15 = 62.85
	Option 2 (MPLS Links)	Stand-alone Smart Poles & CCTV Junction Points	12 Mbps	15 Units	7.21x15 = 108.15
		City Operations Centre mpls link	160 Mbps	1 Unit	60.38x1= 60.38
Internet Links		Skill Development & Safety Training	02 Mbps	10 Units	0.891x10 = 8.91
		Smart Parking	02 Mbps	10 Units	0.891x10 = 8.91
		e-Smart School	02 Mbps	10 Units	0.891x10 = 8.91
		ICCC	20 Mbps	1 Unit	6.22x1 = 6.22
Cost With Option 1					
Total		2.20+3.30+62.85+8.91+8.91+8.91+6.22			101.30
GST		18%			18.23
Grand Total					119.53
Cost With Option 2					
Total		2.20+3.30+108.15+60.38+8.91+8.91+8.91+6.22			206.98
GST		18%			37.26
Grand Total					244.24

¹ ICCC to City Operations Centre Connectivity will be through KSWAN

² Initially considered 60 CCTV cameras for first year; LL is preferable if there is not major increase otherwise MPLS is recommended for gradual increase with coming years

C.2. Hardware & Related Software

Component	Budget from	Numbers	Cost (In Lakhs)
Wi-Fi Access Points (With External Antennas)	Project 27 100% IT connectivity & Project 60 Networking and Cloud Support	10	$0.0575 \times 10 = 0.5750$
Layer 2 Switch with 24 GE Ports	Project 27 100% IT connectivity & Project 60 Networking and Cloud Support	20	$0.13 \times 20 = 2.60$
Junction Box	Project 27 100% IT connectivity & Project 60 Networking and Cloud Support	20	$0.052 \times 20 = 1.04$
UPS	Project 27 100% IT connectivity & Project 60 Networking and Cloud Support	20	$0.03 \times 20 = 0.60$
Total			4.82
GST	18%		0.87
Grand Total			5.69

Annexure D. Air Quality Monitoring: Technical Terms

Terms	Definition
PM10	PM10 is particulate matter 10 micrometers or less in diameter.
PM2.5	PM2.5 refers to atmospheric particulate matter (PM) that has a diameter of less than 2.5 micrometers.
NO2	Nitrogen dioxide is an intermediate in the industrial synthesis of nitric acid.
SO2	Sulphur dioxide is the chemical compound with the formula SO ₂ . At standard atmosphere, it is a toxic gas with a pungent, irritating smell.
CO,	Carbon monoxide (CO) toxic gas above concentration of more than 35ppm.
O3	Ozone, or trioxxygen, is an inorganic molecule with the chemical formula O ₃ . It is a pale blue gas with a distinctively pungent smell.
NH3	Ammonia is a colorless alkaline gas used as a fuel in combustion engines.
Pb	Lead is a chemical element with symbol Pb.
mB	bar is a metric unit of pressure.
Lux	The lux is the SI derived unit of luminance.
dBA	A-weighted decibels, abbreviated dBA, or dBa, or dB(a), are an expression of the relative loudness of sounds in air as perceived by the human ear.
RH	the amount of water vapor in the air, expressed as a percentage of the maximum amount that the air could hold at the given temperature; the ratio of the actual water vapor pressure to the saturation vapor pressure.
°C	base unit of thermodynamic temperature.
ppm	ppm - parts per million - commonly used as a unit of concentration. Parts per million - ppm - is commonly used as a measure of small levels (concentrations) of pollutants in air.
UVI	The ultraviolet index or UV Index is an international standard measurement of the strength of sunburn-producing ultraviolet (UV) radiation at a particular place and time.
ppb	Parts per billion (ppb) is the number of units of mass of a contaminant per 1000 million units of total mass.
µg/ m³	A microgram per cubic meter (µg/m ³) is a derived metric SI (System International) measurement unit of density used to measure volume in cubic meters in order to estimate weight or mass in micrograms

Annexure E. CCTV Camera Locations in Mangaluru

As per the KUIDFC Guidelines the camera count has been kept as total 60 across 15 Junctions though the city Police has identified 181 Locations to be brought under the CCTV surveillance.

Sr. No.	Police Station Jurisdiction	Possible Locations for Camera Placement	Existing Cameras	Number of Roads Meeting	Number of Lanes for each Road	Area Type	Number + Type of Cameras Suggested	Remarks
1	Ullala	Thokkottu Junction	0	4	1 x 1, 1 x 1, 2 x 2, 2 x 2	Circle	4	Crowded + Flyover Construction
2		Over Bridge	0					
3		Kallapu Junction	0	3	2 x 2, 1 x 1, 1 x 1	Junction	2	
4		KC Road Junction	0	2	2 x 2, 1 x 1	Cross	2	
5		Beeru Junction	0	2	2 x 2, 1 x 1	Cross	2	Temples + Festivals
6		Melina Talapady	0	2	2 x 2, 1 x 1	Cross	2	Entry Point to City
7		Kotekar Someshwara Cross	0		2 x 2, 1 x 1	Cross	2	Tourist place
8		Kumpala Bypass	0				0	
9		Chembugudde	0				0	
10		Yenepoya Deralkatte	0	2 Junctions + one circle			1	PTZ
11		Kolya	0	2	2 x 2, 1 x 1	Cross	1	
12		Thokkottu Bus Stop	0	2	2 x 2, 1 x 1	Cross	2	
13		KS Hegde Hospital Deralkatte	0	2	2 x 2, 1 x 1	Cross	2	
14	Konaje	Deralkatte Junction	0	2	2 x 2, 1 x 1	Cross	1	
15	Mangaluru Rural	Baithurli Junction	0	2	1 x 1, 1 x 1	Cross	2	
16		Neermarga Junction	0	3	1 x 1, 1 x 1, 1 x 1	Junction	1	
17		Arukula Junction	0				0	Possible overlap between Arkula Junction, Volachil Junction and Valachil Srinivasa College
18		Adyar Junction	0				0	Possible overlap between Adyar Junction and

Sr. No.	Police Station Jurisdiction	Possible Locations for Camera Placement	Existing Cameras	Number of Roads Meeting	Number of Lanes for each Road	Area Type	Number + Type of Cameras Suggested	Remarks
								Adyar Katte,
19		Volachil Junction	0				0	
20		Adyar Katte	0	3			2	
21		Valachil Srinivasa College Junction	0	2	1 x 1, 1 x 1	Cross	2	
22		Vamanjoor Junction	2	3	1 x 1, 1 x 1, 1 x 1	Junction	1	
23		Mangala Jyoti Junction	0	3	1 x 1, 1 x 1, 1 x 1	Junction	2	
24		Ulaibettu Junction	0	3	1 x 1, 1 x 1, 1 x 1	Junction	2	
25	Kankanady Town	Kannur Mosque Junction	0	3		Junction	2	Overlapping Junctions for Cameras
26		Kannur Checkpost	0					
27		Near Padil Railway Bridge	0		2 x 2, 1 x 1		1	
28		Padil Junction	0		2 x 2, 1 x 1, 1 x 1		2	
29		Faisal Nagar	0	3	1 x 1, 1 x 1, 1 x 1	Junction	2	
30		Padil Railway Station Junction	0	2	1 x 1, 1 x 1, 1 x 1	40 x 80 mtrs area	1	
31		Naguri Junction	0				2	
32		Pumpwell Junction	0	3	2 x 2, 2 x 2, 2 x 2	Junction	3	<ul style="list-style-type: none"> • 2 + 1 PTZ • Under Junction Improvement
33		Yekkuru Junction	0				2	
34		Nethravathi Bridge	0	1	3 x 3		2	
35		Shaktinagar	0				2	
36		Silvergate Bus Stop	0	2	2 x 2, 1 x 1	Cross Road	2	
37		Padil Aryanya Bhavan	0				2	
38		Padavinangady Katte	0	2	2 x 2, 1 x 1	Cross Road	2	
39		Yeyyadi	0	2	2 x 2, 1 x 1	Cross Road	2	
40		Haripadavu Cross	0					
41		Mary Hill	0	3	2 x 2, 1 x 1, 1 x 1	Cross Road	3	
42		Padavinangady Junction	0	3	2 x 2, 2 x 2, 1 x 1	Cross Road	3	
43		Bondel (Pacchanady	2	3	2 x 2, 1 x 1,	Cross	2	

Sr. No.	Police Station Jurisdiction	Possible Locations for Camera Placement	Existing Cameras	Number of Roads Meeting	Number of Lanes for each Road	Area Type	Number + Type of Cameras Suggested	Remarks
		Cross)			1 x 1	Junction		
44	Traffic East	Opp A.J. Hospital	0	1	2 x 2		2	
45		KPT Circle	4	4	2 x 2, 2 x 2, 2 x 2, 2 x 2	<ul style="list-style-type: none"> • Circle • Traffic Signal 	2	<ul style="list-style-type: none"> • Under Junction Improvement
46		Padua Junction	0	3	2 x 2, 1 x 1, 1 x 1	Cross Junction	3	
47		Nanthoor Bikarnakatte Cross	5	4	2 x 2	<ul style="list-style-type: none"> • Circle • Traffic Signal 	2	<ul style="list-style-type: none"> • Nanthoor Circle. • Under Junction Improvement
48		Bikarnakatte Bajjodi Cross	0		2 x 2, 1 x 1		2	Overlapping
49		Bikarnakatte Flyover	0	2		Flyover		
50		Maroli Temple Cross	0	2	2 x 2, 1 x 1	Cross	2	
51		Kulshekar Shakthinagar Cross	0	2	2 x 2, 1 x 1	Cross	2	
52		Kadri Tollgate	0	3	1 x 1	Circle	1	
53		Shivabagh	0	4			2	
54		Horticulture Junction	0			<ul style="list-style-type: none"> • Circle • Traffic Signal 	2	
55		Bendoorwell	1	3		<ul style="list-style-type: none"> • Circle • Traffic Signal 	2	Under Junction Improvement
56		Karavali (Overview)	3	3		<ul style="list-style-type: none"> • Circle • Traffic Signal 	1	
57		Kankanady	2	3	2 x 2, 1 x 1, 1 x 1		1	
58		Valencia Junction	0	3		Circle	2	
59		Gerosa School Junction	0	3		Junction	2	
60		Kotichennayya Junction	0	2	1 x 1, 1 x 1	Cross	2	New Flyover under Construction
61		Marnamikatta	1	2			2	Under Junction Improvement
62		Mahakali Padpu Railway Gate	0	4			2	

Sr. No.	Police Station Jurisdiction	Possible Locations for Camera Placement	Existing Cameras	Number of Roads Meeting	Number of Lanes for each Road	Area Type	Number + Type of Cameras Suggested	Remarks
63		Morgan's Gate	1					Under Junction Improvement
64		Cascia Junction	0					
65		Level Road Bolar	0				0	Overlapping with City Bus Stand cameras
66		Jeppu Market	0	3			2	
67		Mulihithlu	0	2			2	
68		Mangaladevi	2				2	Overlapping with City Bus Stand cameras? Under Junction Improvement.
69		Monkey Stand Attavar	0				2	
70		Pandeshwara	0	3			2	
71		Forum Fiza Mall	0	3			2	
72		AB Shetty Junction	5	4	2 x 2, 2 x 2, 2 x 2, 1 x 1	Circle	2	Under Junction Improvement.
73		Hampankatta	4	4	2 x 2, 2 x 2, 2 x 2, 1 x 1	<ul style="list-style-type: none"> • Circle • Traffic Signal 	2	Crowded Marketplace. Under Junction Improvement.
74		Falnir (Hotel Highland)	0	3	2 x 2, 2 x 2, 1 x 1		2	
75		Falnir Avery - Unity Hospital Junction	0	2			2	
76		Aravinda Junction	0				1	
77		Don Bosco Hall Road, Balmatta	0	3			2	
78		Ambedkar (Jyothi) Circle (from Bavutagudda Road)	3			<ul style="list-style-type: none"> • Circle • Traffic Signal 	1 PTZ	Under Junction Improvement
79		Karangalpady	0	2		Cross	2	
80		Pio Mall Junction	0	3			2	
81		Jail Road	0					
82		Kadri Kambla	0	3			2	
83		Bharath Beedi Junction, Kadri	0	2			1	

Sr. No.	Police Station Jurisdiction	Possible Locations for Camera Placement	Existing Cameras	Number of Roads Meeting	Number of Lanes for each Road	Area Type	Number + Type of Cameras Suggested	Remarks
84		Arya Samaj Road	0	3			1	
85		Kadri Maidana Road	0					Overlapping with Padua Junction and KPT Circle cameras
86		Battagudda Junction	1	2			2	
87		Bejai Junction (Church)	1	3			2	
88		KSRTC	0			<ul style="list-style-type: none"> • Junction • Traffic Signal 	4	Under Junction Improvement
89		Circle House Junction	1				0	
90	Traffic West	Kottara Chowki Junction	0	2			2	Under Junction Improvement
91		Kottara Junction	0	3			2	
92		Infosys	0					
93		Ashok Nagar	0	4			2	
94		Chilimbi	0				2	
95		Lady Hill Circle	4	3		<ul style="list-style-type: none"> • Circle • Traffic Signal 	1	Under Junction Improvement
96		Lalbagh	4			<ul style="list-style-type: none"> • Junction • Traffic Signal 	2	
97		Mannagudda	1				2	
98		Ballalbagh	0				2	
99		Kodial Guttu	0				2	
100		PVS Circle	3	3	2 x 2	<ul style="list-style-type: none"> • Circle • Traffic Signal 	2	Under Junction Improvement
101		Navabharath Circle	1	3	2x 2; 1 x 1; 1 x 1	Circle	3	
102		City Centre Mall	0				2	
103		KSR Junction	0				2	
104		Bavutagudda	0				1	
105		KB Katta	0				2	
106		Mangalore Central Market	0				4	
107		GHS Road, Hampankatta	0	2			2	
108		Venkataramana Temple	0				2	

Sr. No.	Police Station Jurisdiction	Possible Locations for Camera Placement	Existing Cameras	Number of Roads Meeting	Number of Lanes for each Road	Area Type	Number + Type of Cameras Suggested	Remarks
109		Lady Goschen Junction	0				2	
110		Service Bus Stand (Maidan)	0				2	
111		City Bus Stand	0				2	
112		Bunder Police Station Junction	0				2	
113		Kudroli Junction	0				2	
114		Balaji Junction - Bunder	0				2	
115		Chitra Junction	0				2	
116		Kasai Galli Masjid	0				2	
117		State Bank Junction	0				2	
118		Rosario Junction	0	3			2	
119		Hoige Bazaar	0				2	
120		Kapikad	0				2	
121		Kuntikana Junction	2	4		Crossroads	2	Under Junction Improvement
122	Traffic North	Surathkal near Suraj International Hotel					2	
123		Near Govinda Dasa College					2	
124		Kudremukh Junction Kulur					3	
125		Kolluru near Ayyappa Temple					2	
126		Kolluru Junction					2	
127		Malemar Cross Konchady Junctions					2	
128		Marakada Junction					2	
129		Kanna Junction					2	
130		Krishnapur 5th Block					2	
131		Panchmarhi Cross					2	
132		Panambur beach Cross					2	
133		Meenakaliya Cross					2	
134		NITK Junction					2	
135		Kulai junction					2	
136		PanjiMogaru Junction					2	
137		Jyothi Nagar Junction					2	
138		KHB colony Cross					2	

Sr. No.	Police Station Jurisdiction	Possible Locations for Camera Placement	Existing Cameras	Number of Roads Meeting	Number of Lanes for each Road	Area Type	Number + Type of Cameras Suggested	Remarks
139		Kunjathbail Junction					2	
140	Traffic South	Jeppinamogaru Cross					2	
141		Sahyadri college Adyar Junction					2	
142		Badariya Nagar					2	
143		Kumpala Bypass					1	
144	Traffic East	Mahakalipadpu Cross					2	
145		Kadri Maidan Circle					3	
146	Traffic West	Dakke Junction					2	
147		Badirya Junction					2	
148		rao and rao circle					2	
149		Ajayjuddin Road Urdu school					1	
150		Kandath Palli Junction					2	
151		Flower Market Ratha Beedi					1	
152		Alake Junction					2	
153		Jodu palli					1	
154	Barke Police Station	Urwa Market Junction					2	
155		urwa store kavitha residency					1	
156		Kodikal Cross					1	
157		Daddal Kadu Cross					1	
158		Urwa Store Junction					3	
159		Hind Prachar Samithi Nehru Avenue Road					1	
160		BG School					2	
161		sulthan bathery bus stop					2	
162		Canara school urwa					1	
163		Ware House Junction					1	
164		Kori rotti Junction					1	
165		Bishop House Junction					1	
166		Felix Pai Bazar					2	
167		SP Circle					1	
168		Hosabettu Junction					2	
169		Baikampady Junction					2	

Sr. No.	Police Station Jurisdiction	Possible Locations for Camera Placement	Existing Cameras	Number of Roads Meeting	Number of Lanes for each Road	Area Type	Number + Type of Cameras Suggested	Remarks
170		Jokatte Cross					2	
171		Panambur Junction					2	
Total			50				294	

Locations where Cameras are Already Placed and No Additional Requirement is Stated by Mangaluru City Police:

Sr. no.	Locations for Camera Placement	Number of Cameras Placed	Remarks
172	St. Agnes Junction	3	
173	Avery Junction	3	
174	Bunts Hostel	2	Traffic Signal
175	City Hospital	1	
176	Balmatta Junction	2	Under Junction Improvement
177	Clock Tower Circle	3	
178	Hamilton Junction	3	
179	Jyothi Circle	3	
180	Kavooru Junction	4	
181	Mallikatte Junction	3	
	Total	25	

Junctions Under Improvement Project Suggested to Mangaluru City Police for Shortlisting:

Sr. no.	Junction	ABD / Outside ABD	Remark	Existing Cameras	Cameras Proposed
1.	Kottara Chowki junction	Outside ABD		0	2
2.	Kuntikana junction			4	2
3.	Ladyhill junction			3	1
4.	Lalbag junction		Traffic Signal	4	2
5.	KSRTC junction		Traffic Signal	0	4
6.	KPT junction		Traffic Signal	4	2
7.	Nanthoor Junction		Traffic Signal	5	2
8.	PVS Junction	ABD	Traffic Signal	3	2
9.	Mallikatte Junction	Outside ABD		3	0
10.	Jyothi Circle	ABD	Traffic Signal	3	2+1 PTZ
11.	Balmatta Junction	ABD	Traffic Signal	2	0
12.	Lower Bendorwell Junction	Outside ABD	Traffic Signal	1	2
13.	Karavali Junction		Traffic Signal	3	1
14.	Kankanady Junction			2	1
15.	Hampankatta Junction	ABD	Traffic Signal	4	2
16.	Clock Tower Junction	ABD		3	0
17.	Pumpwell Junction	Outside ABD		0	2 + 1 PTZ
18.	Rao and Rao Circle	ABD		0	2
19.	Hamilton Circle	ABD		3	0
20.	AB Shetty Circle	ABD		5	2
21.	Marnamikatta Junction	Outside ABD		1	2

Sr. no.	Junction	ABD / Outside ABD	Remark	Existing Cameras	Cameras Proposed
22.	Morgan's Gate Circle	ABD		1	2
23.	Jeppinamogaru Junction	Outside ABD		0	2
24.	Eemmekere Cross Street Junction	ABD		0	0
25.	Mangaladevi Junction	ABD		2	2

Final 15 Junctions / Locations Identified in February 2018 by Mangaluru City Police:

Sr. no.	Junction Name
1.	Morgan's Gate
2.	Kottara Chowki Junction
3.	Kuntikana Junction
4.	Mallikatte Junction
5.	Rao and Rao circle
6.	Horticulture Junction
7.	Deralkatte Junction
8.	Neermarga Junction
9.	Volachil Junction
10.	Vamanjoor Junction
11.	Kulshekar Shakthinagar Cross
12.	Kavooru Junction
13.	Falnir Avery – Unity Hospital Junction
14.	Bejai Junction
15.	Jokkate Cross

Annexure F. Minutes of Meetings with Stakeholders

For brevity, we are including only those MoMs which have direct or indirect relevance to the smart city components in focus of this DPR.

May 31 – June 01 2017 – BSNL, Police Department, MESCOM

Present at meeting:	From Mangalore City Department/Govt. Org./PSU: Mr. G. R. Ravi (General Manager, BSNL) Mr. Thilakchandra (ACP, Traffic Sub-division) Mr. Rangegowda (Inspector, Mangalore City Police) Mr. Manjhara (Superintending Engineer's Office, MESCOM) From PMC: Urja Vora (C-DAC), Anupam Saxena (C-DAC)		
Meeting:		Date:	May 31, 2017 June 01, 2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
	Meeting was held with GM, BSNL, ACP, Traffic Subdivision and Executive Engineer, MESCOM to get better understanding of the IT/ICT related interventions (100% IT Connectivity, Road Surveillance and Electricity SCADA integration and Smart Meters respectively) proposed in Mangaluru SCP. Mentioned below are the points of discussion:		
	Meeting with GM BSNL.		May 31, 2017
1	PMC team discussed their understanding of the IT connectivity requirements under ABD as well as Pan City Components of Mangalore Smart City Requirements with GM BSNL.		
2	BSNL being the government organisation, the possibility of their involvement on nomination basis could be considered.		
3	BSNL team confirmed that the 100% IT Connectivity could be provided in the 3 areas identified for ABD components.		
4	BSNL team confirmed that the Wifi hotspots in the smart bus shelters could be provided in the 3 areas identified for ABD components.		
5	BSNL team assured that the last mile connectivity could be taken care of to establish communication among any of the smart city components.		BSNL
6	BSNL team asked for the specifications, that include, (i)type of connection; (ii)bandwidth	PMC team	

	requirement (iii) location of the component deployment, for each of the connections between the smart city projects.		
7	GM, BSNL confirmed to involve the PMC team in the meeting they have requested with the Municipal Commissioner to discuss their possible participation in the smart city projects execution.		June, 06, 2017
	Meeting with ACP, Traffic Subdivision.		June 01, 2017
1	The brief explanation about the smart city projects and the PMC's positioning in the execution of the same was given to the ACP, Subdivision. It was discussed that the PMC will require support from city police department for the surveillance related components.		
2	ACP stated the need for a letter from the Municipal Commissioner to be submitted to the Police Commissioner's office to take forward the information sharing process.		
3	<p>It was informed that:</p> <ul style="list-style-type: none"> the city police already have 75 CCTV cameras deployed majorly in Hampankatta area and 50 more cameras are in process of being deployed. Out of 75 cameras around 10 are placed at higher heights with the purpose of safety surveillance whereas other 65 are purely for traffic surveillance. There is no automated surveillance analytics run currently on the video captured by CCTVs. 		
4	The ACP discussed about going for a planned CCTV cameras placement under smart city project so that the surveillance could be used effectively and could improve the city's traffic as well as law and order situation.		
	Meeting with Executive Engineer, MESCOM.		June 01, 2017
1	A brief about the PMCs responsibilities and the smart city projects related to the electricity distribution in the city was given to the MESCOM team.		
2	The brief explanation was requested by the MESCOM team for "Smart Energy Meters for LT (Residential)" component.		

3	<p>The executive engineer informed that:</p> <ul style="list-style-type: none"> • 50% - 70% of the mechanical meters were replaced by the static electronics meters. • The replacement of remaining approximately 30%-50% of the meters is been approved under another project of MESCOM. • The electricity SCADA system is deployed for 33KV substation and is deployed at Kadri. • The SCADA software solution is from ABB. • Instead of considering the “Smart Energy Meters for LT (Residential)” as a smart city project, it could be considered to deploy SCADA for other substations. 		
4	<p>The MESCOM team agreed to provide all the details and discuss the enhancement in electrical infrastructure of the city further in the next meeting that is to be fixed in coming weeks.</p>	PMC team	

June 12, and 13, 2017 – KUIDFC, CeG, KEONICS, MRC, NIC

Present at meeting:	<p>From Karnataka Government Departments: Mr. Sathish Kumar (KUIFDC) Mrs.R.Chandrika, Mr. Parameshwaran, Mr. Suresh Rathod, (KEONICS) Mr. Shashidar Sarangamath (Project Manager, Centre for e-Governance) Mr. K. Rangaswamy (Deputy Director, Municipal Reforms Cell) Mr. B. Vinaya, (State Informatics Officer & Senior Technical Director), Mr. Venkatesh, Mrs. Jayanti (NIC, Karnataka) Mr. Rajeev Chawla (Additional Chief Secretary, DPAR, (eGovernance) From PMC: Urja Vora (C-DAC), Peeyush Chomal (C-DAC)</p>
----------------------------	---

Meeting:		Date:	June 12, 2017 June 13, 2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
	<p>Meetings were held with Mr. Sathish, KUIFDC, Ms. Chandrika and team of KEONICS, Mr. Shashidar Sarangamath of CeG, Mr. K. Rangaswamy of MRC, Mr. B. Vinaya, Mr. Venkatesh, Mrs. Jayanti of state NIC, and a brief interaction with Mr. Rajeev Chawla (Additional Chief Secretary) to get better understanding of the IT/ICT related interventions (Majorly, CCC, MangaloreOne: web-based & mobile app and Skill Development and Safety Training Centre) proposed in Mangaluru SCP. Mentioned</p>		

Meeting:		Date:	June 12, 2017 June 13, 2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
	below are the points of discussion.		
	Meeting with KUIFDC		June 12, 2017
1	<p>PMC team discussed their understanding of the software systems currently working at multiple levels such as:</p> <ul style="list-style-type: none"> • Developed and Operationalised by State MRC, • Developed and Operationalised by Mangalore MRC • Developed and Operationalised by CeG • Developed and Operationalised by State NIC • Deployed at State Government Departments' Websites • Developed and Operationalised by MCC • Part of Proposed Mangalore Smart City Projects <p>PMC team explained the current requirements gathering from the perspective of segregation of the application integration with CCC and Mangalore One.</p> <p>Mr. Sathish explained that Command, Control and Communications Centre (C³C) is composed of Command and Control Centre, Command and Operations Centre and Disaster Response Centre. The PMC needs to understand the actual objectives of the CCC depending on the city officials' preferences.</p> <p>On integration aspects, Mr. Sathish talked about following three approaches, subject to readiness and maturity of integrating applications:</p> <ul style="list-style-type: none"> • Integrate and View • Integrate and Operations • Integrate, View and Control <p>Mr. Sathish also expressed that these system providers, for example, MRC, should be ready for API level integration for making the statistical data available at CCC. He further explained about the</p>		

Meeting:		Date:	June 12, 2017 June 13, 2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
	<p>prioritisation his team followed in the conceptualisation process of the CCC for Belgavi Smart City. Smart Water distribution and Smart Solid Waste Management are a couple of areas that have been identified as focus areas for integration with CCC of Belgavi Smart City.</p> <p>When PMC team inquired about usage of Water SCADA system as part of Smart Water Distribution, he explained that without using SCADA, they have considered a sensor based system for detection of Water Distribution and Transmission losses.</p> <p>Mr. Sathish talked about exploiting RFID based solutions:</p> <ul style="list-style-type: none"> • To Monitor and review door to door push cart based waste collection. • Bus passing through bus shelters on their prescribed routes. <p>Mr. Sathish also shared his opinion about infeasibility of establishing data centre in each smart city, instead, PMC may consider utilizing State Data Centres for the ease of maintenance and quality of service.</p> <p>Mr. Sathish shared the approved draft of RFP for Belgavi Smart City CCC. He suggested the PMC team to share their inputs if any. He also suggested that having a few focused areas in CCC conceptualisation may result in a sustainable project rather than anticipating a large number of components with the CCC design. The priority and identification of the areas should be owned by the Smart City SPV officials.</p> <p>The inputs shared about the CCC conceptualisation were a great support for use by the PMC team in the Mangalore CCC design process.</p>		
	Meeting with Officials at KEONICS.		June 12, 2017
2	PMC team explained the objective behind requesting the meeting as Skill Development and Safety Training Centre is one of the smart city project. They also inquired about existing skill development programs of KEONICS. KEONICS team		

Meeting:		Date:	June 12, 2017 June 13, 2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
	<p>informed that their programs are purely IT / ICT and Electronics related where the training is delivered through franchisee model linked to candidates employment guarantee. Franchisee is not paid if even a single Student fails to get employment. KEONICS further clarified that it doesn't execute courses such as the ones conducted by Industrial Training Institutes or polytechnic and provide diplomas or certification. They suggested that based on the demography of Mangalore city, PMC may consider proposing courses in port-related / shipping, related to fisheries, pipelining, paramedical, nursing, health worker, CAD/CAM training etc.</p> <p>Based on the funding estimated in the Mangalore Smart City Proposal, INR 3.3 Crores for 5 years, one possible / feasible solution KEONICS team suggested was to develop the complete infrastructure (civil + hardware + other) of such a centre using the funding and floating an RFP for running the training centre using the PPP model. KEONICS team agreed to be involved in performance monitoring from the government side to ensure the sustainability of such an idea if implemented.</p> <p>PMC inquired whether online Content delivery for courses and certifications are undertaken by KEONICS. They informed that this work is under progress.</p>		
3	<p>PMC team discussed about the information shared by DC, MCC about KEONICS capabilities in providing solutions for other Smart City Projects such as LED Lighting in the Streets. KEONICS team informed about they winning 4 bids against the RFPs published by the corresponding municipal societies where they are providing the LED-based street lighting under PPP model. They also shared that they have capabilities of providing other Smart City Components, Smart Poles, Smart Parking, Intelligent Traffic Management with Video Analytics</p>		

Meeting:		Date:	June 12, 2017 June 13, 2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
	etc. KEONICS is having MoU with Robert Bosch and BSNL for provision of such services. The other possible opportunity that may occur if KEONICS could be considered on nomination basis however they are willing to participate in Bid process as well.		
4.	They shared their experience about issues with adaptive lighting that it is not cost effective since expenditure on dimming technology is equal to the cost of one LED light. The Smart poles solutions that they provide include variable components that are such as – LED lights, SoS button, emergency request, a small kiosk for eGovernance Services, LED advertisements, camera with zoom embedded possibly with analytics to some extent, environmental sensor. PA system.		
5.	Mangalore IT park under KEONICS intend to facilitate skill developments and start-ups from the incubation centres. The feasibility of positioning the Skill Development and Safety Training Centre at Mangalore IT Park will be checked.		
6.	PMC team assured then the approach document for the components can be shared with KEONICS team to get their inputs on the same.		
	Meeting with CeG Official.		June 12, 2017 June 13, 2017
7.	The PMC team explained the varied systems that are listed in Point 1, may integrate with MangaloreOne as a single window for: <ul style="list-style-type: none"> • Citizens of Mangalore to consume the services • Mangalore Smart City Officials for MIS Reporting The systems may integrate with CCC for: <ul style="list-style-type: none"> • The SPV, Mangalore Smart City Limited, for governing and facilitation of the strategy making • The inline departments for analytics results and subsequent decision making. 		

Meeting:		Date:	June 12, 2017 June 13, 2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
8.	Mr. Sarangmath explained the CeG systems being about front-ending components and the backend is under the ownership and responsibility of the in-line departments. The data integration with CCC requires the departments' approvals and readiness technically. He suggested to obtain the priorities from the MCC team and then share the same with CeG team so that CeG may be able to clarify the backend readiness of the departments. These systems' in tegration can be taken within the first phase. The request for such involvement from CeG side requires the routing of the request through proper channel and approval of the CeG, CEO.		
9.	The CeG runs the State Data Centre and has hosting facilities under two modes, (i) the shared infrastructure and (ii) co-hosting facilities. For Mangalore Smart City we need to take the decision of deploying Primary Data Centre and /or Disaster Recovery Centre at the CeG data centre. DC representatives informed that DC can provide for both shared hosting as well as colocation basis, however space is not readily available for new few months. Any infrastructure positioned in DC will have to abide by their policies about firewall, internet connectivity and security audits. SDC affirmed to PMC inquired whether a non-internet connectivity to Govt Departments operating in State as well as and Mangalore City could connect to Mangalore Smart City infrastructure hosted in SDC over KSWAN/NKN and citizen accessing these services over internet channel.		
	Meeting with Deputy Director, MRC.		June 13, 2017
10.	The PMC team discussed the list of applications that are distributed as defined in the Point 1. The need to access the application with possible single sign-on and integration of the data for analytics purpose was discussed with Mr. Rangaswamy. Mr. Rangaswamy assured the positive technical feasibility of both types of solution provision. He also stated that they have local small setup for DC		

Meeting:		Date:	June 12, 2017 June 13, 2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
	that is maintained by STPI. He assured they may be able to provide support in hosting Mangalore Smart City Project(s). The final consideration will depend in the requirement requested from Mangalore Smart City team.		
11.	He insisted on getting the official letter from MCC stating exactly which systems to integrate and if statistical data is required by the SPV. He also indicated that post delivery of necessary letter communication to Director, MRC, it will take a minimum of two working days to initiate the process discussion and start integration activity.	PMC Team	
	Meeting with NIC Officials.		June 13, 2017
12.	The brief explanation about the smart city projects and the PMC's positioning in the execution of the same was given to Ms. Jayanti of NIC. She raised the concern about data required for integration with CCC being owned by the in-line department. Identifying the departments and finding possible ways of acquiring the data is to be approved by the department.		
13.	Once the applications to be integrated are approved by MCC as well as the corresponding team leader at NIC, the department data could be shared with PMC.		
14.	Ms. Jayanti suggested to meet Mr. B. Vinay the SIO. Mr. Vinay shared a number of his experiences with the PMC Team.		
15.	He discussed the base requirement of all the smart city projects is IT connectivity. He stated that Mangalore get 100 MBPS bandwidth SIO inquired if new application is to be developed as a smart city component. The PMC team negated any such requirement. SIO suggested to have monitoring of network / hardware health and accessible to the citizens as well as the officials to avoid blaming of the system on unnecessarily. SIO said that the silicon gel if applied to the solar panels contact points then the agility increases.		

Meeting:		Date:	June 12, 2017 June 13, 2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
	Data centre having in a place where the electricity is down frequently even for rainy season can be less cost effective as the running of the generator for long periods is expensive.		
16.	PMC team discussed about Single sign-on and stated by NIC as single sign on will be difficult.		
17.	NIC is implementing eHealth for state. Lady Goshen is gone live with eHealth and Wenlock will go live in one month.		
18.	NIC has operationalised a number of departments' applications. To get the data through web services is feasible. PMC team will share the details with the PIO and team so that corresponding updates could be taken up.		
19.	Mr. Ashwin Rai from DC office and Mr. Vishnubatti from zilla Parishad office in Mangalore could be contacted for system data in context of Mangaore. NIC officials suggested interacting with Rajeev Chawla the Addl. Chief Secretary, eGovernance.	PMC Team	
	Meeting with Addl. Chief Secretary, eGovernance		June 13, 2017
20.	The PMC team explained their intent of meeting about designing CCC and Mangalore One systems so that avoidance of effort duplication and at the same time ensuring that the state government and municipal corporation applications are available from single window. The data required to be analysed from these applications to be integrated with CCC so that decision making could be facilitated and policy planning could be highly effective. The PMC team requested his involvement as integrating all eGovernance systems developed for the departments could be then done with ease		
21.	Mr. Chawla agreed with the discussion and has asked the PMC team to take an appointment with his office for detailed discussion further	PMC team	

June 20, 2017: Mangaluru City Police Department

Present at meeting:	Shri Hanumantharaya, DCP Shri Thilakchandra, ACP
----------------------------	---

	Shri Sureshkumar, Shri Mohan, Traffic Enforcement Automation Centre Sharanu Patil, Service Engineer Vinod Garg, TL, PMC Peeyush Chomal & Mohasin Sutar, IT/ICT, PMC
--	--

Meeting:		Date:	June 20. 2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
1	PMC apprised DCP and ACP about the agenda for the meeting. Objective primarily was to conduct As-is survey of existing setup and understand requirements of Mangaluru Police under Smart City Project. DCP conveyed that 75 CCTV cameras are operational and managed through control room at Traffic Enforcement Automation Centre in the east division. DCP and ACP lead the survey team from PMC office to engage with East division office.		
2	<p>DCP/ACP stressed upon following points to be considered based on past experiences:</p> <ul style="list-style-type: none"> • Long term support should be considered over short term contracts/engagements • System go bad after 2/3 years with repair activity becoming difficult to undertake • Position of CCTV cameras should be such that repair can be easily undertaken. In past, a few installations were in difficult spot causing quite inconvenience in undertaking repairs. • CCTV cameras are vulnerable to riot incidents and occasional damages by miscreants. It would be desirable to have concealed or concealable cameras at some locations so that intentional harms from miscreants be preventable. • Additional 100+ cameras may be required. Location identification will be undertaken through site survey. DCP will nominate officials to accompany and guide PMC team for location selection. 		
3	PMC inquired about existing Patrolling vehicles. ACP informed that Mangaluru has 25 Patrolling vehicles and 3 interceptor vehicles. Patrolling vehicles are reachable through Police Control Room.		

Meeting:		Date:	June 20. 2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
4	<p>PMC conducted a primary survey of installation at Traffic Enforcement Automation Centre (TEAC). Following devices were identified in the current setup</p> <ul style="list-style-type: none"> • Panasonic 300 TV (Count 6) • AVTRON appliance (Count 5) • 20U rack put up by vendor encasing Radio IP devices connected with a switch to Appliances and two desktops. • Each TV is showing feed from 16 CCTVs • AVTRON appliance is capable of retaining feed data for a period of 20 days which can be extended to 30 days subject to Vendor reducing image/video quality to 3MP from 4MP. • Cameras in presence of street light show yellow tinted videos in night time. Cameras show video in black and white in absence of any street/support light. • Only one CCTV camera is PTZ capabilities. Remaining are fixed with Zoom capabilities. • Connectivity for receiving feed is over radio-ip channel. They have put up radio devices on towers in some places and on terrace of apartments where available. • UPS with battery backups in place. • 6 desks are present. Each desk has 1 desktop PC. • Ricoh Multifunction Printer (MFP) installed with preprinted sheets for generating challans/notices. 		
5	<p>PMC had small meeting with officials of TEAC in regards to following possibilities</p> <ul style="list-style-type: none"> • Capacity enhancement of existing setup in event of additional cameras being put up under Smart City project as directed by DCP. It was felt that current control room cannot accommodate additional TVs on TV wall. • Feed and analytical data sharing between 		

Meeting:		Date:	June 20. 2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
	<p>CCC/COC setup under Mangalore smart city and TEAC Control Room in a decentralized model.</p> <ul style="list-style-type: none"> • Possibility of shifting TEAC control room infrastructure to centralized CCC setup under MSC. 		
6	<p>PMC discussed following points with Service Engineer (Sharanu Patil) at TEAC Control Room</p> <ul style="list-style-type: none"> • Feed quality and storage requirements. Per AVTRON box is equipped with 2TB harddisk capable of feed retention for a period of 20 days. Feeds are stored in size of 3 minutes recordings. • IT connectivity through Radio channel between CCTV and Control Room. • Possibility of enhancing capacity in event of additional CCTV deployments • Repair model in place for the 5 cameras that stopped working in 19th night rains. OEM requires sending of cameras back to them with OEM dispatching either repaired cameras or replacing them with new cameras. • Image focusing capacities within software demonstrated • Red light violation detection support is there • Suspicious activity detection analytics is not built into the software • Contact number of Mr Balu: 09845999305 		

June 22, 2017: Meeting (telecom) with Maurya Infotech, SI for Police CCTV project

Present at meeting:	<p>Mr. Balu, Maurya Infotek Pvt Ltd, Urjaswala Vora, PMC Avani Vakharwala, PMC Anupam Saxena, PMC Rakesh T, PMC Mohasin Sutar, PMC Peeyush Chomal, PMC</p>
----------------------------	--

Meeting:		Date:	June 22, 2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
	Following questions were shared with Mr Balu prior to telecom along with responses received from him are listed below:		
1	<p>91 cameras are currently operational as per police. Kindly confirm this count from your side as well. Is there any provision to add more cameras in your current contract?</p> <p>A) Installation was done in two phases. One Phase 75 Cameras were installed. 2 Year ago 16 cameras were installed. All 91 Cameras are operational.</p>		
2	<p>How many cameras can your current setup in control room support?</p> <p>A) Up to 136 Cameras can be supported at the Enforcement Automation Centre (Control room) at Kadri. Currently we have provided support of 66 GB Data Storage which can store data for 20 days. If current capacity is to be increased by 46 additional cameras the data storage will be reduced to 15 days. Data Storage capacity depends on camera resolution so storage capacity needs to be increased if additional cameras are installed.</p>		
3	<p>What is the bandwidth between each CCTV device and your control room receiver? What setup do you put up with each CCTV mounted on Terrace, on pole? Do multiple transmitter relay to single receiver? What is the ratio maintained?</p> <p>A)Each Camera bandwidth consumption is approximate 6 to 8 Mbps. Of all 75 Cameras, each camera is of 4 Mega Pixel and 30 fps (Frame per Second). Depending upon zooming requirement the bandwidth will change. The Lens length is 2.8 mm to 6 mm so the bandwidth ranges between 6 to 10 Mbps.</p> <p>We have created 4 POPS within city to collect data from Cameras. The complete network backbone of cctv network is RF based. At Camera Junction a</p>		

Meeting:		Date:	June 22, 2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
	<p>Device is installed which transmits the data to POP. Communication between Junction and POP is RF based, so these points are within line of sight. Currently there is no obstruction between the Junction and POP.</p> <p>From the POP it is again transmitted to Kadri Centre where camera feed is stored on NVR.</p>		
4	<p>Name the software and its capabilities. Does it allow for zooming focusing, low light image/video enhancement, MP change, ANPR, RLVD etc?</p> <p>A) We use AVTRON Software. Following features are supported by software Zooming, Video enhancement in low light, Trip-wire, Perimeter Security, Face Detection Crowd gathering, Crowd calculation.</p> <p>ANPR and RLVD features are not currently present. These features were proposed to client but were not taken up by client due to fund issues</p>		
5	<p>If fibre is/was available what capacity will suffice for you?</p> <p>A) Not using fibre network. Network backbone is RF based.</p>		
6	<p>If backup of your feeds are to be maintained in Data centre, what bandwidth will be required between control room and DC? What storage capacity will be recommended by you?</p> <p>A) For integration Minimum 3 things are required</p> <ol style="list-style-type: none"> 1. Client Software 2. Server 3. Bandwidth. <p>For Each location it will require 100 Mbps bandwidth to transfer the feeds with current setup of 91 cameras.</p>		
7	Do you currently have or planning to have in future		

Meeting:		Date:	June 22, 2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
	analytics software A) ANPR and RLVD already planned for major city junctions. These features were proposed to client but were not taken up by client due to fund issues		
8	If the area expands can your current communication model work? A) Additional POP needs to be setup with RF communication or OFC (Optical Fibre Channel)		
9	Is your system ONVIF compliant? A) Camera and recorder are ONVIF compliant		
10	Following additional questions were posted by PMC team 10) Any possibility of feed sharing? A)Yes. It will require Client software and small server setup with required bandwidth. Already tested with sharing feed with CoP. Maintaining in two sites is difficult though. 1 to 1.2 Mbps per camera for feed sharing. If you want to share all 91 cameras then 100 Mbps bandwidth requirement will be there if sharing through NPR. Live feed sharing will require additional PoP with additional hardware with small server. 11) Storage requirement of 66 TB, is it with DR? A) 66 TB is current storage for high resolution recording gives 20 days backup. Low resolution recording can go upto 30 days. 12) Additional features will require change in license? A) Yes. ANPR, Perimeter analysis, face detection, missing objects, crowd detection, Low light recognition, People counting etc are already available. 13) If any prior permission required to install the junction boxes. A) Require permission from 2-3 departments to		

Meeting:		Date:	June 22, 2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
	<p>install junction boxes. Power (Electricity board) department, Traffic Police Department and Municipality/local corporation.</p> <p>14) Maintenance involves cleaning of camera housing? You take it up? Is there separate pricing? A) We are maintaining for 3 years in our current contract. Earlier project was for 2.5 years but we are still maintaining it. Two engineers are maintaining all cameras and entire setup.</p> <p>15) We surveyed Lalbagh location. Four cameras feed is collected on a switch. A) We created multiple POP in multiple locations viz., Commissioner police office, centre one high rise building, kadri. Line of sight between these four POP.</p> <p>16) Who performed the survey of locations, any support from Municipal Corporation provided? A) Survey was done with the help of traffic department. No intervention of Municipal Corporation.</p>		

June23, 2017: iDSI Technologies – SI for MCC’s PLO project

Present at meeting:	Mr Lajith, iDSI Technologies Peeyush Chomal, PMC Mohasin Sutar, PMC
----------------------------	--

Meeting:		Date:	June 23, 2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
	<p>IDSI is the agency responsible for implementing 19 services under Paperless Office (PLO) for MCC.</p>		
1	<p>Lajith demonstrated the test portal as well as ready portal from following URLs</p> <ul style="list-style-type: none"> http://117.247.188.53/TGMCCTEST/ (Officer dashboard) http://117.247.188.53/TGMCCTESTPort 		

Meeting:		Date:	June 23, 2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
	al/ (Test Portal)		
2	Portal has provisions for adding tags, previewing attachments, notification alerts etc for officers. Portal is developed on DotNET framework. Portal is HTML5 compliant so that same site could be uniformly operated across mobile and desktop platforms. Town hall booking was demonstrated.		
3	<p>PMC discussed requirements of integration with the upcoming Mangalore one with dual access. Following points were discussed</p> <ul style="list-style-type: none"> • Mangalore one shall serve as gateway to all eGovernance services applicable for Mangalore citizens. • Citizen should not require to authenticate self multiple times when accessing portal services through Mangaluru one app or portal. • A uniform single sign-on model needs to be worked out which would enable SSO across all the integrating services. • IDSI suggested API approach for enabling SSO. Details will be worked out in future discussions. 		
4	<p>Contact details of Lajith: 9845132670</p> <p>iDSI Technologies site:</p> <p>http://idsitechnologies.com/</p>		

June 24, 2017: Meeting with the RTO Officials.

Present at meeting:	<p>Shri J S Hegde, Deputy Commissioner & Sr. RTO Incharge</p> <p>Mr Rakesh, RTO office</p> <p>Peeyush Chomal, PMC, Mohasin Sutar, PMC</p>
----------------------------	--

Meeting:		Date:	June 24, 2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
1	PMC enquired if RTO has any surveillance requirements. DC informed that RTO doesn't have any surveillance requirements and surveillance comes under purview of Police		

Meeting:		Date:	June 24, 2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
	alone. However, if information of incidents such as rash driving, unlawful behaviour is communicated to them, then they can initiate actions such as revoking of license etc.		
2	PMC inquired about SI for the existing automation. It was informed that NIC was responsible for building and managing applications for RTO. The data syncing with servers at RTO are updated in 24 hrs.		
3	PMC inquired if RTO can enforce mounting of GPS/RFID/Any other smart component in Private Buses. DC informed that RTO can issue directions for benefits of citizen.		
4	PMC inquired if there are any services/applications that they would like to be implemented afresh under Smart City Project. DC informed that renewal of licenses, registrations with online payment can be considered.		
5	DC informed that Vahan Sarathi integration are in place already with Police.		
6	PMC requested for following: a) Total number of bus routes b) Private buses running on each route. DC directed PMC to seek information through Mr. Rakesh.		
7	PMC collected route information from Mr. Rakesh. Though the sheet indicates the route number, source and destination point however, the number of buses indicated on the sheet is outdated information and cannot be relied upon.		
8	Contact points of a) Mr Rakesh: 9483137747 b) Shri J S Hegde: 9449864019		

June 24, 2017: Meeting with the Municipal Commissioner.

Present at meeting:	Shri Mohammed Nazeer, Municipal Commissioner, MCC Peeyush Chomal, PMC Mohasin Sutar, PMC
----------------------------	---

Meeting:		Date:	June 23, 2017, June 24, 2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
	<p>Agenda:</p> <ul style="list-style-type: none"> • Identification of services requiring integration with CCC • Level of integration required with CCC • Location fixation of CCC and DC • Contract documents copies for existing/ongoing IT automation in MCC, State Departments • Smart School discussion 		
1	<p>PMC informed MC about them being conveyed about new civil work for extension of MCC building in Lalbagh can be considered for CCC and DC. MC directed PMC to study model taken up in Belgavi RFP and apprise him of same. PMC informed that Belgavi is collocating their Infrastructure for DC in SDC at Bengaluru. MC recommended adopting same model for utilizing SDC services at Bengaluru for collocating Mangaluru DC infrastructure.</p>	Completed	June 24, 2017
2	<p>PMC demonstrated Concept note to MC consisting of list of services offered through various channels. PMC has already shared list of services on 14th June 2017 and will be gathering directions from MC as to which services will need to integrate with CCC and the level of integrations to aim for.</p>	Completed	June 14, 2017
3	<p>PMC expressed possibility of existing System Integrators engaged by various departments for their respective IT/Automation activities, to demand extra payment for integrating with various Smart components to be undertaken in Smart City project. PMC requested copies of contract documents so as to study the existing contractual obligations and scope of their work. MC suggested PMC to get in touch with various other departments to seek copies of contract documents. If PMC faces difficulty in getting these documents, MC will intervene and coordinate with respective officials.</p>		
4	<p>PMC will seek to get contract documents from following departments</p> <ul style="list-style-type: none"> • MCC for PLO • Mangaluru Police for the existing 		

Meeting:		Date:	June 23, 2017, June 24, 2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
	<p>surveillance (TEAC) and portal/app systems</p> <ul style="list-style-type: none"> • Water Board • Electricity Board • Health • Land/Property Registration • RTO • MRC, CeG, NIC at Bengaluru <p>This list will be further revised based on directions of MC and/or interactions with these departments</p>		
5	Mr Melwyn informed that PLO contract was signed through Keonics which engaged IDSI Technologies as SI. The current contract is in file sent for certain administrative approvals and activities. MCC will try to get the contract document by Tuesday, 27 June 2017	MCC	27 June 2017
6	Mr Melwyn shared the Business Process Documentation submitted by IDSI and Keonics for PLO/eOffice.	Completed	24 June 2017
7	<p>PMC apprised MC about progress about Smart School component. PMC survey gathered 10 schools with 25 classrooms, 50 teachers and 458 students in total. Shri Srinivasan, DC had directed PMC to aim for following components in Smart School</p> <ul style="list-style-type: none"> • Educational Audio-Visual (AV) content preparation in Kannada for these 10 schools. • Student Management Software with biometrics authentication and assessment/evaluation tracking. <p>PMC apprised MC that many vendors are demonstrating lack of interest in undertaking the aforementioned activities due to minuscule volume. MC asked PMC to work out strategy to enhance current scope/volume that will benefit students and schools, and also encourage vendors to participate.</p>		

July 25, 2017: Meeting with BSNL

Present at meeting:	<p>From Bharat Sanchar Nigam Limited :</p> <p>GR Ravi GM,BSNL</p> <p>Shyamla Bhatt,DGM,BSNL</p> <p>Archana Joshi,AGM,BSNL</p>
----------------------------	---

	Ravi Kumar Bhatt,SDE,BSNL From PMC : Avani (C-DAC)
--	---

Meeting:	BSNL, Telecom House, Telecom House Road, Pandeshwar, Mangalore	Date:	25-July-2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
1.	Handed over the letter regarding information about BSNL network's presence in Mangaluru City to GM. He said that the letter should have clear requirements about type of connectivity required, bandwidth, location and components which require IT connectivity. PMC ensured that document would be shared with them about the details.	PMC	26-July-2017
2.	Briefed GM about the budget allocation of IT connectivity in ABD area. Explained how last mile connectivity term is used in smart city components. Explained him which type of smart components will require what type of connectivity		
3.	GM inquired about Command Control Centre. Explained that 3 types of centers are proposed across 7 smart cities of Karnataka where each smart city will have Command Operation Centers, Common Data Centre and Disaster Recovery will come in near future. The above concept would require MPLS, Leased Line or VPN connectivity or Cloud services.		
4.	It was committed that we would be sharing the location of CCTV cameras for checking the availability of current OFC layout in Mangaluru what we got as inputs from Police but it is waiting an approval from MD, MSCL.	PMC	26-July-2017
5.	For Free Wi-fi, what will be the time duration of free hours to citizen and how the citizen will be authenticated needs to be worked out by BSNL.		
6.	It was communicated that in purview of Make in India, we had briefed the client that BSNL can be awarded contract on nomination basis but client refused that private vendors should also be approached. Concept of smart pole was also conveyed to MSCL, but the client insisted on separation of components.		
7.	GM BSNL said that they could demonstrate a Proof of Concept if small model is laid out for smart city it connectivity features and components offered by BSNL.		
8.	PMC briefed that current process is to prepare the concept notes, get it approved by KUDIFC and then prepare DPR		

Meeting:	BSNL, Telecom House, Telecom House Road, Pandeshwar, Mangalore	Date:	25-July-2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
	based on the financial and technical proposal approved by MSCL and KUIDFC and then float a tender and award to winning bidder.		
9.	GM inquired how much bandwidth is required max. Responded with an example that CCTV would require 10 mbps based on FPS (Frame per second) transmission, video quality, streaming of high quality video. Gave an example that basic CCTV for home usage requires storage of 1 GB per one hour recording, hence one can decide that wired net connectivity should be good enough to relay and store the same in DVR.		
10.	Gave an example that they can prepare price list based on their award of contract in smart cities like Bhagalpur, Dharamshala, Ahemadabd and Rajkot. Requested him to share the price list of various types of connectivity offered in the city.		
11.	Submitted the copy of Letter to DC Office. Got the acknowledgment of the letter from both DC Office and BSNL office.		

July 26, 2017: Meeting with BSNL

Present at meeting:	From Bharat Sanchar Nigam Limited : Shyamla Bhatt,DGM,BSNL Archana Joshi,AGM,BSNL Ravi Kumar Bhatt,SDE,BSNL From PMC : Avani (C-DAC)
----------------------------	--

Meeting:	BSNL, Telecom House, Telecom House Road, Pandeshwar, Mangalore	Date:	26-July-2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
1.	BSNL conveyed that they have approached Davangree and Hubli Smart City for IT Connectivity.		
2.	BSNL has shared tariff documents exclusive of GST and Installation Charges : 1. WIFI new retail plans (1).pdf –Contains details about Wi-Fi Hotspots which can be used for citizen. Term used by BSNL is Retail Plan.		

Meeting:	BSNL, Telecom House, Telecom House Road, Pandeshwar, Mangalore	Date:	26-July-2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
	<p>2. TARIFF SC.xls –Contains details about MPLS and Leased Line</p> <p>3. fth plan latest.pdf-BSNL unlimited plans for FTTH Fibre to the Home</p> <p>4. FRESH BB-FTTH NEW PLANS AS ON 18 7 2017 big size.xls-</p> <p>5. Wi-Fi_Bulk_User_Plan (1).pdf – Contains details about bulk usage of Wi-Fi</p>		
3.	BSNL suggested that for CCTV camera one can use Fibro ULD(Unlimited Data Usage) 3999 Up to 20 Mbps Till 300 GB, 2 Mbps Beyond per month. If upfront payment amount is done for 11 months, one month free data usage will be available.		
4.	One has to pay for the Optic Fibre router is also known as Optical Network Terminal (ONT), and it is used for authentication purpose. It also converts the optical signal to Ethernet in downstream & Ethernet to optical in Upstream. Nominal charge for installation of the same Rs. 90 needs to be paid to BSNL.		
5.	Point to Point connection and Tariff can be provided by BSNL depending on the factors like location and distance between two places.		
6.	For VPN service you may pl refer http://www.bsnl.co.in/opencms/bsnl/BSNL/services/broadband/vpn.html . One can use this tariff for e-governance service.		
7.	Feasibility for B/W for CCTV coverage at all the places as per list submitted by PMC can be made available on request.		
8.	Last mile connectivity at Mangalore City can be made feasible through OFC.		

July 27, 2017: Meeting with MCC

Present at meeting:	<p>From MCC : Mr. Mohammed Nazeer (Municipal Commissioner), Mr. Melwyn (IT In-charge),Midhun(Urban Planner),Prabhu (Urban Planner)</p> <p>From PMC : Ajith Mihsra (Wadia Engg), Dilip Pradhan (Wadia Engg), Jayraj (Wadia Engg), Avani (C-DAC)</p>
----------------------------	--

Meeting:	Mangaluru City Corporation	Date:	27-July-2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
1.	MC reviewed the status of smart city components to be presented to Secretary MouD to be held on 28-July.		
2.	Hard Copy of CCTV Locations suggested by Police was handed over to MC. He would review later and give feedback about		

Meeting:	Mangaluru City Corporation	Date:	27-July-2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
	the same.		
3.	For smart water component, 80,000 water connections are to be converted to smart water meter in commercial and industrial establishment. This activity can be undertaken only after the DPR submitted Karnataka Integrated Urban Waste Water Management Investment Program (KIUWMIP) Sewerage System for Mangalore City gets approved.		
4.	PMC requested to identify the locations where the new bus shelters or existing bus shelter to be developed. MC said relocation of bus shelters would be required which are just to close to circle and need to be shifted. PMC was given contact details of person handling the bus shelter.		

July 27, 2017: Meeting with MCC

Present at meeting:	From MCC : Shrinivas (Deputy Commissioner), Midhun (Urban Planner) From PMC : Ajith Mihsra (Wadia Engg), Dilip Pradhan (Wadia Engg), Jayraj (Wadia Engg), Avani (C-DAC)
----------------------------	--

Meeting:	Mangaluru City Corporation	Date:	27-July-2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
1.	<p>DC explained the workflow process of how the proposal for the smart city project for Mangaluru needs to be followed.</p> <ol style="list-style-type: none"> Concept Note Preparation Review of the concept note by Technical Scrutiny Committee (TSC) KUIDFC Based on the approval of TSC, SPV will approve the concept note. DPR needs to be prepared DPR will be reviewed and approved by Technical Scrutiny Committee KUIDFC. DPR to be approved by SPV. <p>The above process would take minimum 30 days.</p> <ol style="list-style-type: none"> If the cost of the project exceeds 10 crores, the project needs to be approved by Cabinet. If the cost of the project is less than 10 crores, the project will be sanctioned by TSC (KUIDFC). If the project gets approved, Detailed Tender Sheet needs to be prepared. The Tender will be reviewed and approved by TSC (KUIDFC). The Tender needs to be published in news paper, e-procurement portal along with date of tender and start and end date of tender. 		

Meeting:	Mangaluru City Corporation	Date:	27-July-2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
	<p>The above process would take minimum 30 days.</p> <ol style="list-style-type: none"> From the date of publication in Tender in newspaper/e-procurement portal, the last date of receipt of tender should not be less than 60 days. The Tender would be of Techno Commercial type. Technical Bid cover will be opened. The technical bids will be evaluated and approved by SPV. The Financial bids will be opened. If the financial bid exceeds 10 crore, it will go to cabinet for approval for warding the contract to bidder. <p>The above process would take minimum 30 days.</p>		
2.	DC gave the guidelines about the content to be covered for concept note presentation.		
3.	DC instructed that every PMC staff should be well aware of the following documents <ol style="list-style-type: none"> Mangalore Smart City Proposal and its annexure Project Management Consultant Copy Timelines of Smart City Components Report on Mangaluru Smart City -12 page 		
4.	DC instructed Midhun to check the attendance of the PMC staff and create a checklist of the deliverables to be submitted by PMC on regular basis.		

August 01, 2017: Meeting with RTO

Present at meeting:	Mr Rakesh, RTO office Raakesh T, PMC
---------------------	---

Meeting:		Date:	1 Aug 2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
1	Discussed on the updated bus route.		
2	Collected the updated bus route detail.		

August 01, 2017: Meeting with RTO

Present at meeting:	From MCC: Mr. Madhu, Mob.: 9886403029 From Smart City PMC : Mr. Anupam Saxena (C-DAC)
---------------------	--

Meeting:		Date:	28 Aug 2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When

Meeting:		Date:	28 Aug 2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
1.	Currently mechanized vehicles directly collect garbage from houses and buildings across city; also the Litter bins are deployed all over the city. Currently Secondary Collection Vehicles enabled with GPS tracking.		
2.	MCC has already subcontracted for the Garbage collection with Mechanized vehicles having GPS tracking for Secondary Collection.		
3.	Mr. Madhu suggested to include the Waste Processing & Disposal part with the proposal instead of Smart-Bins.		
4.	C-DAC suggested this can be done with the approval from Municipal Commissioner Office; Mr. Madhu said he will talk to Municipal Commissioner regarding this and accordingly C-DAC team will be called for this.	Mr. Madhu, PMC	

November 18, 2017: Interdepartmental Meeting (MSCL, RTO, KSPCB, KGTTI, Police, MESCOM)

Present at meeting:	<p>From MSCL : Mr. Mohammed Nazeer (Municipal Commissioner), Mr. Melwyn (IT In-charge), Midhun (Junior Urban Planner).</p> <p>From RTO : B.K. Sathuha</p> <p>From KSPCB: Rajshekar Puranik, Environment Officer</p> <p>From KGTTI : Giridhar Salian, Principal KGTTI</p> <p>From Police : M Manjunath Shetty (ACP Traffic), Suresh Kumar (Police Inspector Traffic (E)), Mohan Kottarey (Police Traffic)</p> <p>From MESCOM : Mr. Manjappa ,(EE), Chandrashekar Poojary, (AEE)</p> <p>From PMC : Nelson Pais(Team Leader), Piyush Badukale (Project Coordinator), Avani (C-DAC)</p>
---------------------	---

Meeting:	Mangaluru City Corporation	Date:	18-Nov-2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
1.	PMC shared the list of CCTV locations and consent form of CCTV surveillance with Police and RTO. The same document was handed over in person to RTO office personnel and DCP, office Pandeshwar on 17 November.		
2.	<p>Meeting started with the presentation of status of concept note of Skill Development. PMC briefed that out of 113 courses, 71 were shortlisted.</p> <p>Total MES modules covered were 14.</p> <p>PMC briefed that six govt institutes will be undertaking courses as suggested by MD, MSCL.</p> <p>Methodology adopted in concept of skill development courses was explained.</p> <p>Each govt ITI's would propose the infrastructure requirement for conducting these courses.</p> <p>Principal ITI acknowledged that 80% of the infrastructure is available for conducting these courses. Remaining 20% would be required from funding.</p>		

Meeting:	Mangaluru City Corporation	Date:	18-Nov-2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
	<p>PMC will gather the information about which course will be conducted by each govt ITI and accordingly update the concept note of Skill development and submit the concept note to MSCL in next week.</p> <p>MD, MSCL recommended clear segregation of courses undertaken by each of the six Govt ITI's.</p> <p>MD, MSCL suggested that the courses should be inline with upcoming smart city component projects to create better job opportunities.</p> <p>MSCL will take approval from the SPV board to transfer this smart city component from ABD to PAN city. This will be taken up in upcoming board meeting of SPV.</p>		
3.	<p>Meter count shared by MESCOM to PMC in previous meetings was presented. Features of smart meter -single phase meter and three phase meter were explained. Reference of the same taken from http://www.hplindia.com/product-listing/hpl-smart-meters.aspx.</p> <p>PMC requested MESCOM to share the following things :</p> <p>Number of Mechanical meters to be replaced by Smart energy Meters.</p> <p>Number of static/digital meters to be enhanced for smart energy meter.</p> <p>Mr. Manjappa assured PMC about sharing of the final count of meters to be replaced with smart energy meters.</p> <p>Manjappa informed that three phase smart meters are already in place, are compatible with the proposed smart energy meters, one needs to inspect the same.</p> <p>MD, MSCL suggested to incorporate the advantages of smart meter and benefits of replacing the static meters with smart meters in the concept note.</p>		
4.	<p>PMC explained the concept of environmental sensor, parameters measured by the sensor. KSPCB enquired whether there are guidelines for installing the same and area of sensing covered by environmental sensor. PMC briefed about the budget of the air quality sensor in smart city project. PMC explained that the parameters captured by the sensor will be in line with National Air Quality Index programme: One Colour, One description. The same will be integrated with One touch Mangaluru App .The count of sensor was decided as 7 but it can be reduce based on the area covered by the sensor. Locations where the sensors can be placed are not decided as of now. During floating of RFP, the locations will be shared by MSCL and the same will be mentioned in concept note as the locations are not finalised as of now.</p> <p>PMC handed over one copy of the air quality sensor concept</p>		

Meeting:	Mangaluru City Corporation	Date:	18-Nov-2017
Agenda Item	Matters arising from meeting / Actions Agreed	Who Responsible	By When
	note and technical specification to KSPCB official. Air quality concept note would be updated and will be submitted in coming week to MSCL.		
5.	Police pointed out one road stretch was missing in the CCTV Location list. PMC requested to fill the CCTV surveillance form and give recommendations. The form will have to be collected in person from the ACP on Monday 20 November evening from Pandeshwar office. PMC made clear that smart city funds will not bearing the cost of the feeds sharing by Maurya InfoTech. PMC explained the gaps present in current CCTV surveillance setup by Maurya InfoTech. Police enquired whether speeding vehicle can be detected using CCTV or not. PMC explained the features of Video analytics which is absent in current CCTV surveillance setup. PMC requested whenever the CCC is operational, police personnel should be deployed at CCC for monitoring CCTV surveillance. Police will be given training on how to operate the Surveillance system once the CCC is live.		
6.	PMC requested RTO that GPS needs to be installed on private city buses but there is constraint whether govt funds can be used to mount GPS device on these buses operated by private bus operators. PMC requested RTO to provide make and model of the buses. PMC to get in touch with Mr. Rakesh of RTO for the same.		

Minutes (Work in Progress) of Meetings held with CCC Solution Vendors and other Observations:

Meetings were held with following vendors to understand their solution offerings:

- CISCO
- BOSCH
- Synetics (from Synergy)
- NEC
- IBM has yet to revert back on meeting request that was initially schedules in the 2nd week of July, 2017.

Summary:

Every vendor claims to meet the Smart City CCC, CCOC requirements completely with few customizations. They also claim that their tools are extensible in order to undertake integration with new devices and other platform provided the API/SDK is made available to them. The variance noted in terms of the approach for implementing CCC/CCOC solution is as follows:

- 1) CISCO can implement solution on Rack mount, Blade Servers and Cloud Providers with deferred license support on each implementation platform.
- 2) Synetics have appliance model wherein their single appliance can cater to as many as 10000 CCTV cameras with licenses against number of devices connected with their

platform. However, they do not operate in India till now and are looking for implementation partners.

- 3) NEC can implement solution on Rack Servers only. They will share the necessary documents/datasheet only after signing of NDA with PMC and/or client.
- 4) BOSCH has analytics platform for transport and surveillance that operates on top of existing CCC platform. They do not have CCC/CCOC platform offering as such.

Other Observations:

- There are a number of open source IoT Platforms that have been reviewed well in the community such as :
 - Project Kaa (<https://www.kaaproject.org/overview/>)
 - Project Sofia2 (http://sofia2.com/home_en.html)
 - Eclipse IoT (<https://iot.eclipse.org/>).

Proceedings from KUIDFC review held on October 03, 2017 of revised architecture based on Centralized CCC and City CCC model

PMC explained the architecture diagram with bifurcation on what IoT devices will communicate with Central COP and which will communicate with City CCC. KUIDFC explained that all IoT devices except CCTV can communicate with Central COP over KSWAN without any problems. Mangalore PMC doesn't need to work on IoT aggregation layer at City CCC.

KUIDFC inquired functionalities we are targeting in each subsystem. Following explanations were given by PMC

ITMS: RTO has clarified that they can issue advisories for private bus owners to put up GPS devices. We need to invest only for GPS devices in Government owned vehicles such as ambulance, police patrolling vehicles, fire brigade, waste trucks etc. There is no command or control but only implement and view. Display at bus shelter will show order of arrival of bus along with estimated time of arrival. One Touch Mangaluru app will help citizen to find bus routes running through queried Source and Destination and the closest bus shelter based on his/her current position.

ATMS: PMC informed that we are not implementing ATMS for Mangalore city. KUIDFC concurred with it.

CCTV: PMC informed that existing police control room does not have VMS or video analytics. They only do real time manual surveillance. KUIDFC inquired how are we going to integrate with them. PMC informed that feed sharing is proposed. KUIDFC informed that without VMS in place, feed sharing will not work. Also that we don't need to take all feeds. For 100 cameras feedsharing will require 400 mbps connectivity which is impractical. Identify only few camera of whose feed will be important. But then without VMS, selection of camera and feed sharing anyways won't be possible. PMC will cross check with the police control room vendor and accordingly update the integration modalities between police control room and City CCC. KUIDFC inquired the total number of cameras to be put up under

this project. PMC informed that Traffic Police has conveyed 75 locations for putting up cameras along with count for bullet and PTZ cameras. It is coming to around 300 which we have reduced to 195. KUIDFC stated that we should also be conservative about deciding number of cameras. Bangalore city has 250 CCTV. A judicious approach for selecting important locations should be there. PMC to revise the count after discussions with client (Police, MCC). KUIDFC also suggested that eChallan generation and RTO integration with Vahan Sarathi has to be shown as part of Surveillance with RLVD and ANPR.

IT Connectivity: PMC informed that wherever available existing ISP OFC connectivity will be utilized. Rates from BSNL are applied for costing whereas Vodafone and airtel haven't shared rates yet. Areas where OFC is not available, Belgavi model will be utilized wherein WiFi Access point mesh will be created to share connectivity over 802.11 protocol. IT connectivity was being utilized for CCTV feeds and for WiFi access points.

WiFi access points: PMC mentioned that around 100 access points are envisaged considering 27 smart poles and some select bus shelters. KUIDFC mentioned that there is no revenue model in free wifi provisioning. It is therefore not self sustaining and all burden will come on MSCL. KUIDFC suggested that MSCL should start with just 10 locations to start with in first phase and based on experience and benefits, expand it in later phase.

SCADA integration: PMC informed that integration of SCADA will happen with City CCC. KUIDFC corrected that SCADA integration should be with Central CCC as the visualization layer is only at Central level. KUIDFC inquired what level of integration is envisaged in SCADA. PMC stated that only integrate and view as there is no control element for CCC and it will be managed and controlled only at SCADA for Water, Electricity and Waste Water.

Smart Meters: KUIDFC suggested that SCADA integration won't be useful in waste, leak detection. Instead AMR can be utilized for leak detection which need not be for distribution but only transmission lines by KWIP which will be around 10-12 meters alone. WTP element should also be considered.

SWM: PMC informed that Mangalore is going to be binless city. Door to door collection and Waste trucks are the only two elements to manage through Smart Elements. KUIDFC suggested to consider weigh bridge in addition to RFID for door to door collection and GPS tracking in waste trucks. PMC informed that MCC already has awarded contract on SWM to some vendor who is not responding to PMC requests for meeting. KUIDFC suggested to have joint meeting through MCC with vendor.

One Touch App/Helpdesk: KUIDFC inquired about complaint/grievance management. PMC informed that help desk shall provide for complain/grievance management.

Action items:

- PMC to prepare costing sheet per subsystem module along with BoQ

- PMC to prepare package breakup for tender processing. KUIDFC suggested that eGovernance and One Touch Mangaluru should be worked out as separate tender and CCC along with city wide elements could be separate tender.
- PMC to prepare revised architecture diagram based on feedback from KUIDFC.

Annexure G. Compliances with the Reviews by the ICT based Technical Committee

Compliance with Minutes of the Review Meeting held on 21.08.2017 under the Chairmanship of General Manager (Tech), KUIDFC.

Sr. no.	Smart City Project	Point Raised by	Point Raised	Response from Mangaluru Smart City PMC	Action to be Taken
1.	Command and Control Centre (CCC) (Project ID: 57)	Secretary, UDD	RFP for Central Command and Control Centre (C4) based projects in the remaining smart cities shall be based on Belagavi “RFP” model with minor changes as per individual city’s requirement	The projects clustered with CCC in Mangaluru are different based on the city priorities and overlaps in the system deployments	Compliance is already verified.
2.	General	KUIFDC	Concept note for CCC, Smart Schools, 100% IT Connectivity, One Touch Mangalore	<ul style="list-style-type: none"> • Concept Notes Submitted: (i)CCC; (ii)eSmart Schools; (iii)100% IT Connectivity + Networking and Cloud Support; (iv)One Touch Mangaluru; (v) City Wide CCTV Surveillance System; (vi) Skill Development Centre. • Draft DPRs Submitted (i)CCC + One Touch Mangaluru; (ii) eSmart Schools; (iii)100% IT Connectivity + Networking and Cloud Support. 	
3.	General	Prof. Ramchandra (IISc)	Assessment and consultation of the concerned stakeholders is required.	Stakeholders consulted for requirements: <ul style="list-style-type: none"> • CeG, State NIC, MRC, MCC, RTO for CCC + One Touch Mangaluru. • All 10 schools authorities + DDPI BEOs + Mr. Pradeep D’Souza, Deputy Director, Sports & Youth Welfare for eSmart School • Mangaluru ITI Principals + Mr. Gokuldas Nayak (DC, MCC + Joint Director, District Industries 	
4.			Baseline information needs to be captured.		
5.			Present status and gaps analysis need to be conducted.		

Sr. no.	Smart City Project	Point Raised by	Point Raised	Response from Mangaluru Smart City PMC	Action to be Taken
				Centre) for Skill Development Centre <ul style="list-style-type: none"> • GM, BSNL and team + state NIC + private vendors for IT Connectivity • Mr. Hanumantharaya, DCP, Traffic & Crimes, + Mr. Thilakchandra, ACP, Traffic + Mr. Sureshkumar and Control Room team + current surveillance system integrator (Maurya Infotek) for CCTV Surveillance. 	
6.			Likely improved scenario with the interventions (without ICT and how the benefits are boosted with ICT) needs to be detailed.	Added Likely improved scenarios with the interventions (without ICT and how the benefits are boosted with ICT) (Sections: Section: 2.9 Section: 3.5.4	
7.			All proposals appeared to be towards the grant matching than meeting the local social necessities.	Social necessities have been considered in discussion with the stakeholders.	
8.			Indicators of SMART governance and validation parameters needs are to be discussed.	SLAs aligned with SMART governance indicators are considered but will be revisited and detailed our further. Standards Compliance with Smart City Indicators published by BIS is listed as one of the technology principles.	
9.	General	Prof. Rajagopalan (IIIT)	Integrating with utilities and transport companies like KSRTC requires a detailed MOU with respect to role delineation, and who will bear the cost after the initial years and a mandate to integrate from the Government.	<ul style="list-style-type: none"> • MoU will be proposed to MCC and MSCL and the actions will be taken as per the SPV directives. • As per Secretary, UDD's directive we would like to request Belagavi team to take initiative in the process and other cities can follow the 	

Sr. no.	Smart City Project	Point Raised by	Point Raised	Response from Mangaluru Smart City PMC	Action to be Taken
				same.	
10.			Any data acquisition and updating requirement for any module (like GIS) must be clearly defined, cost estimated and responsibility fixed. For example, who owns GIS data and how will it be updated? Sign off must be obtained from everyone who has to share their resources or infrastructure.	<p>Stakeholders consulted for requirements:</p> <ul style="list-style-type: none"> • CeG, State NIC, MRC and MCC for CCC + One Touch Mangaluru. • All 10 schools authorities + DDPI BEOs for eSmart School • Mangaluru ITI Principals + Mr. Gokuldas Nayak (DC, MCC + Joint Director, District Industries Centre) for Skill Development Centre • GM, BSNL and team + state NIC + private vendors for IT Connectivity • Mr. Hanumantharaya, DCP, Traffic & Crimes, + Mr. Thilakchandra, ACP, Traffic + Mr. Sureshkumar and Control Room team + current surveillance system integrator (Maurya Infotek) for CCTV Surveillance. 	
11.			Responsive Design principles must be used in designing all UIs. Responsive Web design is the approach that suggests that design and development should respond to the user's behavior and environment based on screen size, platform and orientation. The practice consists of a mix of flexible grids and layouts, images and an intelligent use of CSS media queries.	<p>http://egovstandards.gov.in/ has already been identified for Standards Compliance. Guidelines for Indian Government Websites: An Integral Part of Central Secretariat Manual of Office Procedure, January 2009 will be explicitly listed in Standards Compliance.</p> <p>Sections: 2.3.3</p>	
12.			Requirements for each of the application portfolios (like BI, Data analytics, GIS, dash board) must be clearly drawn up. Response	Details will be provided in DPR and vetted by the Domain experts from MCC and MSCL as well as	

Sr. no.	Smart City Project	Point Raised by	Point Raised	Response from Mangaluru Smart City PMC	Action to be Taken
			times for results to appear after a query must be specified.	the Department stakeholders for the analytics specific requirements. Sections: 1.1.1, 1.1.2 and 1.1.3	
13.			Specifications for all hardware and devices must be vendor neutral, as far as possible based on open standards and adequately designed for task at hand. We tend to under design to reduce costs.	The BoQ is vendor neutral and GeM products are referred for the indicative pricing.	
14.			Why not a common applications across all smart cities? For example, why replicate ITS in every city, with may be different vendors?	The collaborative efforts definitely avoid duplication.	The issue to be conveyed to SPV and their directive will be abided by.
15.	CCC	Prof. Rajagopalan (IIIT)	What are the IoT devices planned? Some details about them may be provided.	<ul style="list-style-type: none"> IoT devices like GPS devices are already in the annexure of the DPR of CCC. Concept Notes for CCTV Cameras, Environmental Sensors, WiFi Devices are separate and will be referred to avoid inconsistencies in specifications. Compliance is already specified to Cyber Security Framework for Smart Cities regarding the following factors: <ul style="list-style-type: none"> Protocols on which IoT device operate. Standard Compliance Network communication Channels Adherence to guidelines issued by CERT-IN and NIIPC 	

Sr. no.	Smart City Project	Point Raised by	Point Raised	Response from Mangaluru Smart City PMC	Action to be Taken
16.			Details on SCADA integration (which utility scada, how, real time or once in a few minutes etc) you have mentioned water, waste water and electricity SCADA. Do they have integrable SCADA now?	Currently the SCADA systems are part of ABD projects and are in process of requirements elicitation from the stakeholders.	Earlier experience / discussions with SCADA solution providers have confirmed web-service based integration which is technology / platform independent.
17.	One Touch Mangaluru		Disaster and emergency response is a novel and much needed application. Some details please. Please use the guidelines issued by National Disaster Management Authority (please see http://www.ndma.gov.in/images/policyplan/NDMA-SOP-for-Disaster-Management.pdf)	Reference to not only NDMA is done in concept note of One Touch Mangaluru, but also State level Karnataka State Natural Disaster Monitoring Centre (KSNDMC) and Karnataka State Disaster Management Authority (KSDMA).	
18.			On mobility app see https://www.solutions.moovitapp.com/?utm_source=insights_website , you may even use it.	In the Concept Note of One Touch Mangaluru, Subcomponent of Public Mobility App refers to the said link in the sections 1.3.3.2 and 1.3.3. References will include the same.	
	General	Mr. Annarao Kulkarni (C-DAC Bengaluru)	Requirement specification, deliverables, technical specifications, technology used, for each sub system must be clearly specified.	Directives to adhere by Design Guidelines and Standards compliance given by the government bodies in the areas of eGovernance and Cyber Security have been already incorporated.	
19.			Specifications for all hardware and devices must be vendor neutral and issues related to integrating sub systems with ICC	The BoQ is vendor neutral and GeM products are referred for the indicative pricing.	

Sr. no.	Smart City Project	Point Raised by	Point Raised	Response from Mangaluru Smart City PMC	Action to be Taken
			must be addressed.		
20.			MOU may be signed with various stakeholders and roles and responsibilities of concerned departments are to be clearly specified.	<ul style="list-style-type: none"> MoU will be proposed to MCC and MSCL and the actions will be taken as per the SPV directives. As per Secretary, UDD's directive we would like to request Belagavi team to take initiative in the process and other cities can follow the same. 	
21.			ICERT guidelines must be followed and security certification of web sites may be obtained to address cyber security concerns.	Complied and standards compliance requirements in the submitted documents refer to the same.	
22.	CCC		Most of the documents talk about establishing ICCC and integrating sub systems with ICCC. Rather bottom up approach may be followed so that specifications for ICCC will be clear.	The same requirement has been considered in Mangaluru Smart City Projects conceptualisation and CCC is clustered with One Touch Mangaluru and not any other ICT projects.	
23.			Mechanism of integrating current applications with ICCC may be furnished.	CCC is clustered with One Touch Mangaluru. And the integration mechanism is worked out with existing eGovernance Service implementing agencies that are CeG, state NIC, MRC and MCC.	
24.	One Touch Mangaluru		Details of integration mechanism of MRC Online Services (15), Mangalore-One Online Services (30), MCC Software Systems (5), State Department Software Applications (19), Karnataka Mobile One (28), Proposed Smart City Projects (19) may be furnished.	Integrations based on the APIs to be published by the implementing agencies (CeG, state NIC, MRC and MCC) in consensus with the in-line departments have been discussed with them. Details will be added in the final DPR. Sections 1.5	
25.	CCC		Details of IoT Sensor Network Layer and SCADA may be	Currently the SCADA systems	Earlier experience

Sr. no.	Smart City Project	Point Raised by	Point Raised	Response from Mangaluru Smart City PMC	Action to be Taken
			furnished.	are part of ABD projects and are in process of requirements elicitation from the stakeholders.	/ discussions with SCADA solution providers have confirmed web-service based integration which is technology / platform independent.
26.	Skill Development Centre		Details of who will issue certificates for Skill development may be furnished. Technology and eLearning platform, syllabus details may be furnished.	<ul style="list-style-type: none"> Syllabus is already defined in the approved list of courses listed by National Council for Vocational Training (NCVT) as on 9 June 2016 under the Development Initiative Scheme (SDIS) based on Modular Employable Skills (MES). Stakeholder list in concept note includes NSDA, SSC and NSDC under The National Skill Certification and Monetary Reward Scheme STAR that will provide the certification to trainees. 	
27.	eSmart School	Technical Committee (TC)	TC suggested to explore the State govt. schemes available as convergence to take up this component.	The state schemes are not suggested in the Mangaluru Smart City Proposal. The current state of the schools does not reflect well on the same. Discussions with MSCL along with DDPI will be conducted and the directive given by them will be followed.	

Sr. no.	Smart City Project	Point Raised by	Point Raised	Response from Mangaluru Smart City PMC	Action to be Taken
28.			TC informed to give cost estimation details for one school to check the feasibility to scale it up for remaining schools.	<p>Cost estimate at one smart classroom level is already mentioned in DPR. For the implementation of eSmart school in government schools, a number of critical factors have to be taken into consideration before investing in hardware and software infrastructure. Following are the educational indicators proposed by National Council of Educational Research and Training (NCERT) (Source of Information : http://www.ncert.nic.in/programmes/education_survey/index_education.html):</p> <ul style="list-style-type: none"> Indicators are calculated for the implementation of eSmart school as the main stake holder of this program are Teachers and Students. Indicative figures will help in deciding the approval of investment in setting up the ICT infrastructure in each classroom based on the Students Teacher Ratio. 	
29.			Technology and e-Learning platform, syllabus details shall be decided in consultation with concerned department and incorporated in the DPR.	It is incorporated in DPR as well as Concept Note	
30.		Technical Committee (TC)	After compliance with the above suggestions, SPV shall submit the DPR with detailed cost estimates, data rate analysis, implementation arrangement and Service Level Agreements (SLA) prior to tendering.	Final DPR after accommodating all the suggestions will be submitted to SPV.	

Sr. no.	Smart City Project	Point Raised by	Point Raised	Response from Mangaluru Smart City PMC	Action to be Taken
31.		Technical Committee (TC)	TC accorded in-principal approval for this project, subject to compliance to the above-mentioned points.		
32.	Skill Development Centre	Technical Committee (TC)	Department/s empowered to issue certificates for Skill development courses needs to be identified.	Stakeholder list in concept note includes NSDA, SSC and NSDC under The National Skill Certification and Monetary Reward Scheme STAR who will provide the certification to trainees. The concept note will include the same.	
33.			After compliance with the above suggestions, SPV shall submit the DPR with detailed cost estimates, data rate analysis, implementation arrangement and Service Level Agreements (SLA) prior to tendering.	Updated concept note and the draft DPR after accommodating all the suggestions will be submitted to SPV.	
34.			TC accorded in-principal approval for this project, subject to compliance to the above-mentioned points.		
35.	CCC	Technical Committee (TC)	Technical Committee felt that it would be prudent to seek and await clear guidelines / policy from the competent authority / Government for the establishment of Central Command and Control Centre (C4), before approval of the concept plans / DPRs for smart cities by the TC and accordingly the matter was deferred to the next Technical Committee meeting.	Directives will be awaited from KUIFDC.	-

Compliance with Minutes of the Review Meeting held on 30.10.2017 with KUIDFC Team.

Sr. no.	30 Oct Review Points	Compliance
1	KUIDFC explained that all IoT devices except CCTV can communicate with Central COP over KSWAN without any problems. Mangalore PMC doesn't need to work on IoT aggregation layer at City CCC.	Architecture redefined

Sr. no.	30 Oct Review Points	Compliance
2	There is no command or control but only implement and view in ITMS	Complied
3	Also that we don't need to take all feeds. For 100 cameras feedsharing will require 400 mbps connectivity which is impractical. Identify only few camera of whose feed will be important.	On demand feed sharing proposed.
4	KUIDFC stated that we should also be conservative about deciding number of cameras. Bangalore city has 250 CCTV. A judicious approach for selecting important locations should be there.	Phased implementation worked out with RFP planned to keep an open scope for extensibility upto 300 cameras (as list received from DCP, Crime and Traffic) in next 10 years.
5	KUIDFC also suggested that eChallan generation and RTO integration with Vahan Sarathi has to be shown as part of Surveillance with RLVD and ANPR.	Architecture redefined
6	KUIDFC mentioned that there is no revenue model in free wifi provisioning. It is therefore not self sustaining and all burden will come on MSCL. KUIDFC suggested that MSCL should start with just 10 locations to start with in first phase and based on experience and benefits, expand it in later phase.	Complied
7	KUIDFC suggested that SCADA integration won't be useful in waste, leak detection. Instead AMR can be utilized for leak detection which need not be for distribution but only transmission lines by KWIP which will be around 10-12 meters alone. WTP element should also be considered.	SCADA Integration for the Dashboard and Analytics purpose. Software for Smart Water Meters (for AMR purpose) will be integrated with CCC as well.
8	KUIDFC suggested to consider weigh bridge in addition to RFID for door to door collection and GPS tracking in waste trucks.	Specs for weigh bridge referred from Belagavi RFP and added in the DPR
9	PMC to prepare revised architecture diagram based on feedback from KUIDFC	Prepared and submitted.

Sr. no.	30 Oct Review Points	Compliance
10	PMC to prepare package breakup for tender processing. KUIDFC suggested that eGovernance and One Touch Mangaluru should be worked out as separate tender and CCC along with city wide elements could be separate tender.	One Touch Mangaluru comprises 4 sub-projects that include ITMS, Emergency Response and Disaster Management and Hardware & GPS Support along with the eGovernance Service Integrations. The other three are to be deployed at the Centralised Command and Control Centre, hence need to be part of the CCC DPR. The eGovernance Integration to be part of a separate phase as an independent component of the same project. The eGovernance development scope has been redefined as per the discussion held at KUIIDFC and the discussion with KMDS who confirmed the development at their end of Asset Management Software as well as Projects/Works Monitoring Software Systems.
11	PMC to prepare costing sheet per subsystem module along with BoQ	Prepared and submitted.

Compliance with Minutes of the Review Meeting held on 14.11.2017 under the Chairmanship of General Manager (Tech), KUIDFC.

Agenda Item	Matters arising from meeting / Actions Agreed	Compliance	Sections Updated
1.	<p>Mangaluru Smart City PMC team presented the following projects that are scoped under CCC DPR which is revised as per the Centralised Command and Control Centre architecture Proposed by KUIDFC:</p> <ul style="list-style-type: none"> • Command & Control Centre • One Touch Mangaluru <ul style="list-style-type: none"> ○ ICT and Disaster Safety Components ○ Public Mobility App ○ Hardware & GPS Support ○ MCC- Citizen Interface App • 100% IT Connectivity • Networking & Cloud Support • CCTV System with Fixed Zoom Telescopic Camera • CCTV for Road Surveillance (PTZ) with WP • CCTV for Road Surveillance (Fixed Tele) with WP • Control Room Hardware • Cabling & Other Hardware 	-	-
2.	<p>The Technical Committee acknowledged that ICT and Disaster Safety component is part of only Mangaluru Smart City.</p> <p>Technical Committee enquired if the ICT Disaster Safety component deals with Emergency Response of call-types 100 as well as 108. PMC confirmed that the proposal covers the above as well as man-made and natural disasters.</p> <p>Further, The Technical committee also wanted to know if Computer-aided Dispatch is part of the Emergency Response workflow. PMC informed that the above is out of scope under current</p>	Complied	Section 3.3

Agenda Item	Matters arising from meeting / Actions Agreed	Compliance	Sections Updated
	proposal consideration.		
3.	The Technical Committee informed the PMC team to ensure that RFP mentions the requirement for the SI to provide for interfacing with all the components through APIs. Also the city-level SI needs to propose the solutions based on open architecture and providing the maximal interoperability.	Complied	Section 2.6, 3.1, 3.2
4.	<p>With regards to the Centralised Architecture and discussion with KUIDFC with regard to the Mangalore CCC DPR, it was understood that along with the Hardware and Software Stack and CCC platform the other Common Components will be made available for deployment/integrations by KUIDFC. The city level SI will be responsible for the deployment + integrations + operations part of the same.</p> <p>PMC has detailed all the Smart City Project Components that are to be deployed at the State Data Centre which are:</p> <ul style="list-style-type: none"> • CCC / IoT Platform • One Touch Mangaluru including ITMS + Emergency Response / Disaster Management Software + eGovernance Citizen Interface. <p>The Technical Committee clarified that other than CCC Platform all other components are under the responsibility of city level SI.</p> <p>After all the cities detailed out the use-cases for all IT Components, KUIDFC may work out the common components across cities having similar use-cases and look at possibility of centralised procurement.</p>	Complied	Section
5.	The PMC Team clarified that though they have mentioned the said components are under the purview of City Operations Platform to be provided by KUIDFC, the submitted DPR includes detailing of the scope of these components, functionally as well financially.		

Agenda Item	Matters arising from meeting / Actions Agreed	Compliance	Sections Updated
6.	It was agreed that PMC will update the functional scope defined for each IT Components by adding the detailed use-cases of the same. Further, along with the benefit and impact of these use-cases, Priorities, Phasing and Compute and Storage requirements for each Component will also be included in the DPR.	Complied	Sections 2.9. 3.3.1, 3.4.1, 3.6.1, 4.5.1, 6.1.
7.	The Technical Committee informed about an application being developed in conjunction for KSRTC, BMTS, North Western KSRTC and North Eastern KSRTC. The cities may look into using the same platform for ITS. Mangaluru has intra-city transport provided by the private bus vendors. The KSRTC will be contacted for their readiness to extend for providing support for such specific these use-cases.	KUIDFC	Section 2.4, 2.9. 3.3.1, 3.4.1. 3.6.1
8.	The PMC team suggested it can be useful from the sustainability purpose to create a Common Repository for the documentations and Code of the IT solutions being used by the cities The technical committee agreed to the above suggestion.	KUIDFC	-
9.	It was agreed that Vehicle Tracking System is part of ITMS. VMD + PA to be merged as Unified Messaging Service. The authentication and authorisation framework to choose the right workflow and right output channel.	Complied	Section 3.4.1
10.	It was agreed that Smart Parking scope under CCC is about API integration only.	-	-
11.	It was agreed that CCTV Surveillance to be phased to align with the Guidelines for Establishing CCC circulated by KUIDFC.	Complied	Sections 2.9. 3.3.1, 3.4.1, 3.6.1, 4.5.1, 6.1.
12.	It was agreed that KUIDFC team will share the Compute & Storage Requirements given by Shivmogga Smart City team with Mangaluru Smart City team for the reference.	KUIDFC	November 16, 2017

Compliance with Minutes of the Review Meeting held on 4.12.2017 under the Chairmanship of General Manager (Tech), KUIDFC.

Sr. no.	Review Points	Compliance
1	KUIDFC suggested to formalize the buy-ins by the respective departments. MoUs to be signed with the departments	Letter from MSCL in process to be sent to City Police, RTO, KSPCB. MESCOM, BSNL, Disaster Management Cell,
2.	SoP for each Intervention to be defined	Sections Updated to comply 2.10, 4.3.2, 4.4.2, 4.6.2, 5.5.2
3.	Standard SRS format to be used by the SI	RFP to mention the ISO standard for Requirements Specifications to be followed.
4.	Stakeholders MoMs and Quotes by Vendors to be added as Annexure	Annexure A, B, C
5.	Role of SI at City Level and at Centralised CCC level to be defined along with the SoP between the two Sis.	Section 2.10
6.	DPR Project Costing to be controlled.	Section 7

Annexure H. Quotations / Estimates Received From the Service Providers / Vendors

H.1. Airtel

Airtel Pricing			
Location	B/W	OTC	ARC
1. Thokkottu Junction	10 Mbps	50,000	600000
2. Over Bridge	10 Mbps	50,000	600000
3. Kallapu Junction	10 Mbps	50,000	600000
4. KC Road Junction	10 Mbps	50,000	600000
5. Beeri Junction	10 Mbps	50,000	600000
6. Melina Thalapady	10 Mbps	50,000	600000
7. Kotekar Someshwara Cross	10 Mbps	50,000	600000
8. Kumpala Bypass	10 Mbps	50,000	600000
9. Chembugudde	10 Mbps	50,000	600000
10. Yenepoya Deralkatte	10 Mbps	50,000	600000
11. Kolya	10 Mbps	50,000	600000
12. Thokkkottu Bus Stop	10 Mbps	50,000	600000
13. KS Hedge Hospital Deralkatta	10 Mbps	50,000	600000
14. Deralkatta Junction	10 Mbps	50,000	600000
15. Baithurli Junction	10 Mbps	50,000	600000
16. Neerumarga Junction	10 Mbps	50,000	600000
17. Arukula Junction	10 Mbps	50,000	600000
18. Adyar Junction	10 Mbps	50,000	600000
19. Volachil Junction	10 Mbps	50,000	600000
20. Adyar Katte	10 Mbps	50,000	600000
21. Valachil Srinivasa College Junction	10 Mbps	50,000	600000
22. Vamanjur Junction	10 Mbps	50,000	600000
23. Mangala Jyoti Junction	10 Mbps	50,000	600000
24. Ulaibettu Junction	10 Mbps	50,000	600000
25. Kannuru Mosque Junction	10 Mbps	50,000	600000
26. Kannuru checkpost	10 Mbps	50,000	600000
27. Near Padil Railwa Bridge	10 Mbps	50,000	600000
28. Padil Junction	10 Mbps	50,000	600000
29. Faisal Nagar	10 Mbps	50,000	600000
30. Padil Railwa Station Junction	10 Mbps	50,000	600000
31. Naguri Junction	10 Mbps	50,000	600000
32. Pumpwell Junction	10 Mbps	50,000	600000
33. Yekkuru Junction	10 Mbps	50,000	600000
34. Nethravathi Bridge	10 Mbps	50,000	600000
35. Shaktinagar	10 Mbps	50,000	600000
36. Silvergate	10 Mbps	50,000	600000

Airtel Pricing			
Location	B/W	OTC	ARC
37. Padil Aryabavan	10 Mbps	50,000	600000
38. Padavinangady Katte	10 Mbps	50,000	600000
39. Yeyyady	10 Mbps	50,000	600000
40. Haripadavu Cross	10 Mbps	50,000	600000
41. Merihill	10 Mbps	50,000	600000
42. Padavinangady Junction	10 Mbps	50,000	600000
43. Bondel (Pacchanady Cross)	10 Mbps	50,000	600000
44. Opp A.J. Hospital	10 Mbps	50,000	600000
45. KPT	10 Mbps	50,000	600000
46. Paduva Junction	10 Mbps	50,000	600000
47. Nanthoor Bikarnakatta Cross	10 Mbps	50,000	600000
48. Bikarnakatta Bijodi Cross	10 Mbps	50,000	600000
49. Bikarnakatta Flyover	10 Mbps	50,000	600000
50. Maroli Temple Cross	10 Mbps	50,000	600000
51. Kulshekar Shakthinagar Cross	10 Mbps	50,000	600000
52. Kadri Tollgare, (Egg Sunday)	10 Mbps	50,000	600000
53. Shivabagh	10 Mbps	50,000	600000
54. Articulture Junction	10 Mbps	50,000	600000
55. Bendurwell	10 Mbps	50,000	600000
56. Karavali (Overview)	10 Mbps	50,000	600000
57. Kankanady	10 Mbps	50,000	600000
58. Velencia Junction	10 Mbps	50,000	600000
59. Gerosa School Junction	10 Mbps	50,000	600000
60. Kotichennayya Junction	10 Mbps	50,000	600000
61. Marnamikatta	10 Mbps	50,000	600000
62. Mahakalipadpu Railwayagate	10 Mbps	50,000	600000
63. Morgansgate	10 Mbps	50,000	600000
64. Casia Junction	10 Mbps	50,000	600000
65. Bolara livel	10 Mbps	50,000	600000
66. Jeppu Market	10 Mbps	50,000	600000
67. Mulihithu	10 Mbps	50,000	600000
68. Mangaladevi	10 Mbps	50,000	600000
69. Mankistand	10 Mbps	50,000	600000
70. Pandeshwara	10 Mbps	50,000	600000
71. Forum Mall	10 Mbps	50,000	600000
72. AB Shetty Junction	10 Mbps	50,000	600000
73. Hampankatta	10 Mbps	50,000	600000
74. Falnir (Highland)	10 Mbps	50,000	600000
75. Falnir Unity Hospital Junction	10 Mbps	50,000	600000
76. Aravinda Junction	10 Mbps	50,000	600000
77. Danbasco Hall Road	10 Mbps	50,000	600000
78. Ambedkar Circle (from Bavutagudda Road)	10 Mbps	50,000	600000

Airtel Pricing			
Location	B/W	OTC	ARC
79. Karangalpady	10 Mbps	50,000	600000
80. Pio Mall Junction	10 Mbps	50,000	600000
81. Jail Road	10 Mbps	50,000	600000
82. Kadrikambala	10 Mbps	50,000	600000
83. Bharath Beedi Junction	10 Mbps	50,000	600000
84. Aryasamaja Road	10 Mbps	50,000	600000
85. Kadri Maidana Road	10 Mbps	50,000	600000
86. Battagudda Junction	10 Mbps	50,000	600000
87. Bejai Junction (Church)	10 Mbps	50,000	600000
88. KSRTC	10 Mbps	50,000	600000
89. Circle House Junction	10 Mbps	50,000	600000
90. Kotta Chuki Junction	10 Mbps	50,000	600000
91. Kottara Junction	10 Mbps	50,000	600000
92. Infosys	10 Mbps	50,000	600000
93. Ashokanagar	10 Mbps	50,000	600000
94. Chilimbi	10 Mbps	50,000	600000
95. Lady Hilla	10 Mbps	50,000	600000
96. Lalbagh (Command center)	10 Mbps	50,000	8500000
97. Mannagudde	10 Mbps	50,000	600000
98. Ballalbagh	10 Mbps	50,000	600000
99. Kodial Guttu	10 Mbps	50,000	600000
100. PVS	10 Mbps	50,000	600000
101. Navabharath Circle	10 Mbps	50,000	600000
102. City Center	10 Mbps	50,000	600000
103. KSR Junction	10 Mbps	50,000	600000
104. Bavutagudda	10 Mbps	50,000	600000
105. KB Katta	10 Mbps	50,000	600000
106. Central Market	10 Mbps	50,000	600000
107. GHS Road	10 Mbps	50,000	600000
108. Venkataramana Temple	10 Mbps	50,000	600000
109. Lady Gochean Junction	10 Mbps	50,000	600000
110. Busstand (Maidan)	10 Mbps	50,000	600000
111. City Busstand	10 Mbps	50,000	600000
112. Bunder Police Station Junction	10 Mbps	50,000	600000
113. Kudroli Junction	10 Mbps	50,000	600000
114. Balaji Junction	10 Mbps	50,000	600000
115. Chitra Junction	10 Mbps	50,000	600000
116. Kasaigalli	10 Mbps	50,000	600000
117. State Bank Junction	10 Mbps	50,000	600000
118. Rosario Junction	10 Mbps	50,000	600000
119. Hoige Bajar	10 Mbps	50,000	600000
120. Kapikad	10 Mbps	50,000	600000

Airtel Pricing			
Location	B/W	OTC	ARC
121. Kuntikana Junction	10 Mbps	50,000	600000

Corporate Office (T&C-CFA Branch)
2nd floor, Room No. 227-A,
Eastern Court, Janpath,
New Delhi 110 001
Phone – 011-23734321
Fax – 011-23734319 / 23734322
Email id : tccfa.bsnl@gmail.com

No. 1-1/2016-R&C [CFA]



भारत संचार निगम लिमिटेड

(भारत सरकार का उपक्रम)

BHARAT SANCHAR NIGAM LIMITED

(A Govt. of India Enterprise)

Dated: 16-03-2017

Circular R&C-CFA No. 231/16-17

Subject: Introduction of new Bulk user BSNL WiFi (BSNLFi) Hot Spot plans 'BSNLFi-BU-14' & 'BSNLFi-BU-56' under BSNL WiFi offload project in all the Circles-reg.

1. Following have been decided by the Competent Authority:

a) *To introduce Bulk user BSNL WiFi (BSNLFi) Hot Spot plans under BSNL WiFi offload project in all the circles as follows:-*

S. No.	Plan Name	No. of Access Points (AP)	Annual AP Charges In Rs. (Excl. of Taxes)	Backhaul Bandwidth Charges
1	BSNLFi-BU-14	1 to 4	2,00,000/-	As per the Internet leased line tariffs of required Bandwidth
2	BSNLFi-BU-56	5 to 6	2,90,000/-	

Note:-

(i) All APs in a plan shall be connected to single PoE switch.

(ii) In case of requirement for more number of APs, above plans may be offered to the customer in multiples.

b) The backhaul Bandwidth charges shall be extra. The Backhaul Bandwidth shall be charged by the circles separately as per Internet Leased Line Tariffs vide letter no. 112-5/2010 BP ENT dated 02-12-2015 & other instructions issued by DP-Enterprise unit of BSNL C.O. and revised from time to time.

c) Since above Bulk users plans are to be provided by BSNL on CAPEX model, complete revenue shall be to BSNL account and there shall not be any revenue share with HSSP on above plans.

2. The circles shall ensure to comply with all regulatory mechanism.

3. All other terms and conditions shall remain same as per earlier circulars.

4. The above instructions shall be effective w.e.f. 24-03-2017 in all the circles.

5. This circular is issued based on the approval of Competent Authority in Broadband Cell File No. 64-392/2015-16/WiFi Hotspot/Tariff. For any queries/clarification in this regard, matter may be taken up with Broadband Section, BSNL Corporate Office, Janpath, New Delhi-110001 (Tel. No. 011-23322064 and Fax No. 011-23734052).

AGM (T&C)-CFA

DETAILED PROJECT REPORT – CITY LEVEL COMMAND & CONTROL CENTRE + CITY WIDE SURVEILLANCE + IT CONNECTIVITY

BSNL FTTH/LANDLINE BROADBAND PLAN DETAILS																								
Nomenclature	BBG Speed Combo ULD 1091 CS70	BBG Combo ULD 1199	BBG Combo ULD 1441	BBG Combo ULD 1445	BBG Combo ULD 1495	BBG Combo ULD 2091	BBG Speed Combo ULD 2295	BBG Combo ULD 2799	BBG Speed Combo ULD 2841	BBG Combo ULD 1745 VDSL CS56	BBG Super Speed Combo ULD 2845 VDSL	BBG Super Speed Combo ULD 3445 VDSL	Stand Alone Plan 1891	Stand Alone Plan 2641	Stand Alone Plan 2645	Fibro Combo ULD 1100- CS71	Fibro Combo ULD 1400- CS72	Fibro Combo ULD 1950- CS73	Fibro Combo ULD 2400- CS74	Fibro ULD 3999	Fibro ULD 5999	Fibro ULD 9999	Fibro ULD 16999	
Bandwidth (Download Speed)	Upto 8 Mbps Till 60 GB, 1 Mbps Beyond	Upto 4 Mbps Till 20 GB, 2 Mbps Beyond	Upto 8 Mbps Till 40 GB, 1 Mbps Beyond	Upto 4 Mbps Till 60 GB, 1 Mbps Beyond	Upto 4 Mbps Till 70 GB, 1 Mbps Beyond	4 Mbps Till 100 GB, 1 Mbps Beyond	8 Mbps Till 100 GB, 1 Mbps Beyond	4 Mbps Till 100 GB, 2 Mbps Beyond	8 Mbps Till 175 GB, 1 Mbps Beyond	8 Mbps Till 70 GB, 1 Mbps Beyond	Upto 16 Mbps Till 100 GB, 1 Mbps Beyond	Upto 24 Mbps Till 100 GB, 1 Mbps Beyond	Upto 4 Mbps Till 100 GB, 1 Mbps Beyond	Upto 8 Mbps Till 175 GB, 1 Mbps Beyond	Upto 16 Mbps Till 100 GB, 1 Mbps Beyond	Upto 20 Mbps Till 75 GB, 1 Mbps Beyond	Upto 40 Mbps Till 100 GB, 1 Mbps Beyond	Upto 40 Mbps Till 150 GB, 1 Mbps Beyond	Upto 60 Mbps Till 150 GB, 1 Mbps Beyond	Upto 10 Mbps Till 200 GB, 1 Mbps Beyond	Upto 20 Mbps Till 300 GB, 1 Mbps Beyond	Upto 50 Mbps Till 400GB, 2 Mbps Beyond	Upto 100 Mbps Till 600GB, 4Mbps Beyond	
Applicability	All Users										All Users													
Monthly Charges (Rs)	1091	1199	1441	1445	1495	2091	2295	2799	2841	1745	2845	3445	1891	2641	2645	1100	1400	1950	2400	3999	5999	9999	16999	
Annual (Rs) [11 x FMC]	12001	13189	15851	15895	16445	23001	25245	30789	31251	19195	31295	37895	20801	29051	29085	12100	15400	21450	26400	43989	65989	109989	186989	
Two Years (Rs) [21 x FMC]	NA	25179	30261	30345	31395	NA	NA	58779	NA	NA	59745	72345	39711	55461	55545	23100	29400	40650	50400	83979	125979	209979	356979	
Three Years (Rs) [30 x FMC]	NA	35970	43230	43350	44850	NA	NA	83970	NA	NA	85350	103350	56730	79230	79350	33000	42000	58500	72000	119970	179970	299970	509970	
Download/Upload (MB/GB in m)	NA																							
Free E-mail IDs/Space (Per E-mail ID)	1/1 GB	1/1 GB	1/5 MB	2/1 GB	2/1 GB	1/1 GB	1/1 GB	2/1 GB	2/1 GB	1/1 GB	1/1 GB	2/1 GB	1/1 GB	1/1 GB	1/1 GB	1/1 GB	1/1 GB	1/1 GB	1/1 GB	4/5MB	4/5MB	4/5MB	4/5MB	
Static IP Address (On written Request)	One@2000/- p.a. additional	One @ Rs. 2000/- per annum additional	One @ Rs. 2000/- p.a. additional	One @ Rs. 2000/- p.a. additional	One@2000/- p.a. additional	One@1800/- p.a. additional	One@1800/- p.a. additional	One@1800/- p.a. additional	One@1800/- p.a. additional	One@1800/- p.a. additional	One@1800/- p.a. additional	One@1800/- p.a. additional	One@1800/- p.a. additional	One@1800/- p.a. additional	One@1800/- p.a. additional	One@1800/- p.a. additional	One@1800/- p.a. additional	One@1800/- p.a. additional	One@1800/- p.a. additional	One Free	One Free	One Free	One Free	
Security Deposit	One Month charges																							
Minimum Hire Period	One Month charges																							
Telephone fixed monthly charges in Rs.	NIL										NIL													
Free Calls(with in BSNL n/w)*	NA	24 hrs U/L Free calls any n/w in India	500	250	250	1000	1000	250	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	1000	
MCU Charges/ pulse in Rs. (to BSNL n/w after Free Calls)	1	NA	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
MCU Charges/ pulse in Rs. (to Other Network)	12	NA	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	
Additional Facility	Unlimited Free calls between 9 PM to 7 AM on Landline and Mobile of any network within INDIA and All sundays 24Hrs Unlimited Free calls.																							

WITHOUT VOICE THESE FTTH PLANS

<u>MPLS Tariff (Band Width Wise)</u>						
2Mbps	4 Mbps	6 Mbps	8 Mbps	10 Mbps	20 Mbps	
Rs 1,57,648	281148	4,05,298	5,29,448	5,63,248	7,29,792	
<u>Internet Leased Line Tariff(Band Width Wise)</u>						
2Mbps	4 Mbps	6 Mbps	8 Mbps	10 Mbps	20 Mbps	100 Mbps
Rs 89100	1,63,350	2,16,769	270,188	3,30,000	6,22,188	17,50,000

Note- All items GST@ 18%

DETAILED PROJECT REPORT – CITY LEVEL COMMAND & CONTROL CENTRE + CITY WIDE SURVEILLANCE + IT CONNECTIVITY

BSNL FTTH (FIBRE TO THE HOME)LAND LINE-BROADBAND PLAN DETAILS															BSNL FTTH (FIBRE TO THE HOME)LAND LINE-BROADBAND PLAN DETAILS																	
Nom encla ture	BBG Comb o ULD 1091 CS70	BBG Combo ULD 1199	BBG Comb o ULD 1441	BBG Combo ULD 1445	BBG Comb o ULD 1495	BBG Combo ULD 2091	BBG Spee d Comb o ULD 2295	BBG Comb o ULD 1599	BBG Comb o ULD 2799	BBG Spee d Comb o ULD 2841	BBG Combo ULD 1745 VDSL CS56	BBG Super Speed Combo ULD 2845 VDSL	BBG Super Speed Combo ULD 3445 VDSL	Stand Alone Plan BBG ULD 865 CS 50	Stand Alone Plan BBG ULD 1275	Stand Alone Plan BBG ULD 1491	Stand Alone Plan BBG ULD 1891	Stand Alone Plan BBG ULD 2641	Stand Alone Plan BBG ULD 2645 VDSL	Fibro Comb o ULD 1100-CS71	Fibro Comb o ULD 1400-CS72	Fibro Comb o ULD 1950-CS73	Fibro Comb o ULD 2400-CS74	Fibro ULD 1045	Fibro ULD 1995	Fibro ULD 3999	Fibro ULD 5999	Fibro ULD 9999	Fibro ULD 16999			
Band width (Dow nload Speed)	Upto 8 Mbps Till 60 GB, 2 Mbps Beyond	Upto 4 Mbps Till 40 GB, 2 Mbps Beyond	Upto 8 Mbps Till 40 GB, 2 Mbps Beyond	Upto 4 Mbps Till 60 GB, 2 Mbps Beyond	Upto 4 Mbps Till 70 GB, 2 Mbps Beyond	Upto 4 Mbps Till 100 GB, 2 Mbps Beyond	Upto 8 Mbps Till 100 GB, 2 Mbps Beyond	Upto 4 Mbps Till 100 GB, 2 Mbps Beyond	Upto 4 Mbps Till 100 GB, 2 Mbps Beyond	Upto 8 Mbps Till 175 GB, 2 Mbps Beyond	Upto 8 Mbps Till 70 GB, 2 Mbps Beyond	Upto 16 Mbps Till 100 GB, 2 Mbps Beyond	Upto 24 Mbps Till 100 GB, 2 Mbps Beyond	Upto 4 Mbps Till 30 GB, 2 Mbps Beyond	Upto 4 Mbps Till 60 GB, 2 Mbps Beyond	Upto 4 Mbps Till 70 GB, 2 Mbps Beyond	Upto 4 Mbps Till 100 GB, 2 Mbps Beyond	Upto 8 Mbps Till 175 GB, 2 Mbps Beyond	Upto 16 Mbps Till 100 GB, 2 Mbps Beyond	Upto 20 Mbps Till 75 GB, 2 Mbps Beyond	Upto 40 Mbps Till 100 GB, 2 Mbps Beyond	Upto 40 Mbps Till 150 GB, 2 Mbps Beyond	Upto 60 Mbps Till 150 GB, 2 Mbps Beyond	Upto 20 Mbps Till 50 GB, 2 Mbps Beyond	Upto 60 Mbps Till 100 GB, 2 Mbps Beyond	Upto 20 Mbps Till 300 GB, 2 Mbps Beyond	Upto 30 Mbps Till 400 GB, 2 Mbps Beyond	Upto 50 Mbps Till 600 GB, 2 Mbps Beyond	Upto 100 Mbps Till 800 GB, 4 Mbps Beyond			
Appli cabili ty	All Users														All Users																	
Mont hly Charg es (Rs)	1091	1199	1441	1445	1495	2091	2295	1599	2799	2841	1745	2845	3445	865	1275	1491	1891	2641	2645	1100	1400	1950	2400	1045	1995	3999	5999	9999	16999			
Annu al (Rs) [11 x FMC]	12001	13189	15851	15895	16445	23001	25245	17589	30789	31251	19195	31295	37895	9515	14025	16401	20801	29051	29085	12100	15400	21450	26400	11495	21945	43989	65989	109989	186989			
2 Years (Rs) [21 x FMC]	NA	25179	30261	30345	31395	NA	NA	33579	58779	NA	NA	59745	72345	18165	26775	31311	39711	55461	55545	23100	29400	40950	50400	21945	41895	83979	125979	209979	356979			
3 Years (Rs) [30 x FMC]	NA	35970	43230	43350	44850	NA	NA	47970	83970	NA	NA	85350	103350	25950	38250	44730	56730	79230	79350	33000	42000	58500	72000	31350	59850	119970	179970	299970	509970			
Down load/	NA																															

DETAILED PROJECT REPORT – CITY LEVEL COMMAND & CONTROL CENTRE + CITY WIDE SURVEILLANCE + IT CONNECTIVITY

BSNL FTTH (FIBRE TO THE HOME)LAND LINE-BROADBAND PLAN DETAILS															BSNL FTTH (FIBRE TO THE HOME)LAND LINE-BROADBAND PLAN DETAILS																		
Nom encla ture	BBG Comb o ULD 1091 CS70	BBG Combo ULD 1199	BBG Comb o ULD 1441	BBG Combo ULD 1445	BBG Comb o ULD 1495	BBG Combo ULD 2091	BBG Spee d Comb o ULD 2295	BBG Comb o ULD 1599	BBG Comb o ULD 2799	BBG Spee d Comb o ULD 2841	BBG Combo ULD 1745 VDSL CS56	BBG Super Speed Combo ULD 2845 VDSL	BBG Super Speed Combo ULD 3445 VDSL	Stand Alone Plan BBG ULD 865 CS 50	Stand Alone Plan BBG ULD 1275	Stand Alone Plan BBG ULD 1491	Stand Alone Plan BBG ULD 1891	Stand Alone Plan BBG ULD 2641	Stand Alone Plan BBG ULD 2645 VDSL	Fibro Comb o ULD 1100-CS71	Fibro Comb o ULD 1400-CS72	Fibro Comb o ULD 1950-CS73	Fibro Comb o ULD 2400-CS74	Fibro ULD 1045	Fibro ULD 1995	Fibro ULD 3999	Fibro ULD 5999	Fibro ULD 9999	Fibro ULD 16999				
Band width (Dow nload Spee d)	Upto 8 Mbps Till 60 GB, 2 Mbps Beyond	Upto 4 Mbps Till 40 GB, 2 Mbps Beyond	Upto 8 Mbps Till 40 GB, 2 Mbps Beyond	Upto 4 Mbps Till 60 GB, 2 Mbps Beyond	Upto 4 Mbps Till 70 GB, 2 Mbps Beyond	Upto 4 Mbps Till 100 GB, 2 Mbps Beyond	Upto 8 Mbps Till 100 GB, 2 Mbps Beyond	Upto 4 Mbps Till 100 GB, 2 Mbps Beyond	Upto 4 Mbps Till 100 GB, 2 Mbps Beyond	Upto 8 Mbps Till 175 GB, 2 Mbps Beyond	Upto 8 Mbps Till 70 GB, 2 Mbps Beyond	Upto 16 Mbps Till 100 GB, 2 Mbps Beyond	Upto 24 Mbps Till 100 GB, 2 Mbps Beyond	Upto 4 Mbps Till 30 GB, 2 Mbps Beyond	Upto 4 Mbps Till 60 GB, 2 Mbps Beyond	Upto 4 Mbps Till 70 GB, 2 Mbps Beyond	Upto 4 Mbps Till 100 GB, 2 Mbps Beyond	Upto 8 Mbps Till 175 GB, 2 Mbps Beyond	Upto 16 Mbps Till 100 GB, 2 Mbps Beyond	Upto 20 Mbps Till 75 GB, 2 Mbps Beyond	Upto 40 Mbps Till 100 GB, 2 Mbps Beyond	Upto 40 Mbps Till 150 GB, 2 Mbps Beyond	Upto 60 Mbps Till 150 GB, 2 Mbps Beyond	Upto 20 Mbps Till 50 GB, 2 Mbps Beyond	Upto 60 Mbps Till 100 GB, 2 Mbps Beyond	Upto 20 Mbps Till 300 GB, 2 Mbps Beyond	Upto 30 Mbps Till 400 GB, 2 Mbps Beyond	Upto 50 Mbps Till 600 GB, 2 Mbps Beyond	Upto 100 Mbps Till 800 GB, 4 Mbps Beyond				
Uploa d (MB/ GB).p. m																																	
FreeE Mail DS/Sp ace (Per E- mail ID)	1/1 GB	1/1 GB	1/5 MB	2/1 GB	2/1 GB	1/1 GB	1/1 GB	1/1 GB	2/1 GB	2/1 GB	1/1 GB	1/1 GB	2/1 GB	1/1 GB	1/1 GB	1/1 GB	1/1 GB	1/1 GB	1/1 GB	1/1 GB	1/1 GB	1/1 GB	1/1 GB	1/1 GB	1/1 GB	1/1 GB	4/5M B	4/5M B	4/5M B	4/5MB			
Static IP Addr ess (On writt en Requ est)	One @200 0/-p.a additi onal	One@ 2000/- p.a additi onal	One @200 0/-p.a additi onal	One @Rs 2000/- p.a. additi onal	One @200 0/-p.a additi onal	One@1800/- p.a additi onal	One @180 0/-p.a additi onal	One@1800/- p.a additi onal	One @180 0/-p.a additi onal	One Free	One@1800/- p.a additi onal	One Free	One Free	One@2 000/- p.a additi onal	One@2000/- p.a additi onal	One@2000/- p.a additi onal	One@1800/- p.a additi onal	One@1800/- p.a additi onal	One@1800/- p.a additi onal	One@1 800/- p.a additi onal	One@2000/- p.a additi onal	One@2000/- p.a additi onal	One@1800/- p.a additi onal	One@1800/- p.a additi onal	One@2000/- p.a additi onal	One@1800/- p.a additi onal	One Free	One Free	One Free	One Free			
Secur ity Depo sit	One Month charges																																

DETAILED PROJECT REPORT – CITY LEVEL COMMAND & CONTROL CENTRE + CITY WIDE SURVEILLANCE + IT CONNECTIVITY

BSNL FTTH (FIBRE TO THE HOME)LAND LINE-BROADBAND PLAN DETAILS															BSNL FTTH (FIBRE TO THE HOME)LAND LINE-BROADBAND PLAN DETAILS																
Nom encla ture	BBG Comb o ULD 1091 CS70	BBG Combo ULD 1199	BBG Comb o ULD 1441	BBG Combo ULD 1445	BBG Comb o ULD 1495	BBG Combo ULD 2091	BBG Spee d Comb o ULD 2295	BBG Comb o ULD 1599	BBG Comb o ULD 2799	BBG Spee d Comb o ULD 2841	BBG Combo ULD 1745 VDSL CS56	BBG Super Speed Combo ULD 2845 VDSL	BBG Super Speed Combo ULD 3445 VDSL	Stand Alone Plan BBG ULD 865 CS 50	Stand Alone Plan BBG ULD 1275	Stand Alone Plan BBG ULD 1491	Stand Alone Plan BBG ULD 1891	Stand Alone Plan BBG ULD 2641	Stand Alone Plan BBG ULD 2645 VDSL	Fibro Comb o ULD 1100-CS71	Fibro Comb o ULD 1400-CS72	Fibro Comb o ULD 1950-CS73	Fibro Comb o ULD 2400-CS74	Fibro ULD 1045	Fibro ULD 1995	Fibro ULD 3999	Fibro ULD 5999	Fibro ULD 9999	Fibro ULD 16999		
Band width (Dow nload Spee d)	Upto 8 Mbps Till 60 GB, 2 Mbps Beyond	Upto 4 Mbps Till 40 GB, 2 Mbps Beyond	Upto 8 Mbps Till 40 GB, 2 Mbps Beyond	Upto 4 Mbps Till 60 GB, 2 Mbps Beyond	Upto 4 Mbps Till 70 GB, 2 Mbps Beyond	Upto 4 Mbps Till 100 GB, 2 Mbps Beyond	Upto 8 Mbps Till 100 GB, 2 Mbps Beyond	Upto 4 Mbps Till 100 GB, 2 Mbps Beyond	Upto 4 Mbps Till 100 GB, 2 Mbps Beyond	Upto 8 Mbps Till 175 GB, 2 Mbps Beyond	Upto 8 Mbps Till 70 GB, 2 Mbps Beyond	Upto 16 Mbps Till 100 GB, 2 Mbps Beyond	Upto 24 Mbps Till 100 GB, 2 Mbps Beyond	Upto 4 Mbps Till 30 GB, 2 Mbps Beyond	Upto 4 Mbps Till 60 GB, 2 Mbps Beyond	Upto 4 Mbps Till 70 GB, 2 Mbps Beyond	Upto 4 Mbps Till 100 GB, 2 Mbps Beyond	Upto 8 Mbps Till 175 GB, 2 Mbps Beyond	Upto 16 Mbps Till 100 GB, 2 Mbps Beyond	Upto 20 Mbps Till 75 GB, 2 Mbps Beyond	Upto 40 Mbps Till 100 GB, 2 Mbps Beyond	Upto 40 Mbps Till 150 GB, 2 Mbps Beyond	Upto 60 Mbps Till 150 GB, 2 Mbps Beyond	Upto 20 Mbps Till 50 GB, 2 Mbps Beyond	Upto 60 Mbps Till 100 GB, 2 Mbps Beyond	Upto 20 Mbps Till 300 GB, 2 Mbps Beyond	Upto 30 Mbps Till 400 GB, 2 Mbps Beyond	Upto 50 Mbps Till 600 GB, 2 Mbps Beyond	Upto 100 Mbps Till 800 GB, 4 Mbps Beyond		
Mini mum Hire Peri od	One Month charges																														
Telep hone fixed mont hly charg es in Rs							NIL														NIL										
Free Calls(with in BSNL n/w)*	NA	24 hrs U/LFree calls to any n/w with in India	500	250	250	1000	1000	250	1000	1000	1000	1000	1000	As Per Existing Landlin e Plan	As Per Existin g Landlin e Plan						NA				As Per Existin g Landlin e Plan		Without Voice These FTTH Plans.				
MCU Charg es/ pulse in Rs. (to	1	NA	1	1	1	1	1	NA	1	1	1	1	1								1.2	1.2	1.2	1.2							

DETAILED PROJECT REPORT – CITY LEVEL COMMAND & CONTROL CENTRE + CITY WIDE SURVEILLANCE + IT CONNECTIVITY

BSNL FTTH (FIBRE TO THE HOME)LAND LINE-BROADBAND PLAN DETAILS															BSNL FTTH (FIBRE TO THE HOME)LAND LINE-BROADBAND PLAN DETAILS																	
Nom encla ture	BBG Comb o ULD 1091 CS70	BBG Combo ULD 1199	BBG Comb o ULD 1441	BBG Combo ULD 1445	BBG Comb o ULD 1495	BBG Combo ULD 2091	BBG Spee d Comb o ULD 2295	BBG Comb o ULD 1599	BBG Comb o ULD 2799	BBG Spee d Comb o ULD 2841	BBG Combo ULD 1745 VDSL CS56	BBG Super Speed Combo ULD 2845 VDSL	BBG Super Speed Combo ULD 3445 VDSL	Stand Alone Plan BBG ULD 865 CS 50	Stand Alone Plan BBG ULD 1275	Stand Alone Plan BBG ULD 1491	Stand Alone Plan BBG ULD 1891	Stand Alone Plan BBG ULD 2641	Stand Alone Plan BBG ULD 2645 VDSL	Fibro Comb o ULD 1100-CS71	Fibro Comb o ULD 1400-CS72	Fibro Comb o ULD 1950-CS73	Fibro Comb o ULD 2400-CS74	Fibro ULD 1045	Fibro ULD 1995	Fibro ULD 3999	Fibro ULD 5999	Fibro ULD 9999	Fibro ULD 16999			
Band width (Dow nload Spee d)	Upto 8 Mbps Till 60 GB, 2 Mbps Beyo nd	Upto 4 Mbps Till 40 GB, 2 Mbps Beyon d	Upto 8 Mbps Till 40 GB, 2 Mbps Beyo nd	Upto 4 Mbps Till 60 GB, 2 Mbps Beyon d	Upto 4 Mbps Till 70 GB, 2 Mbps Beyon d	Upto 4 Mbps Till 100 GB, 2 Mbps Beyon d	Upto 8 Mbps Till 100 GB, 2 Mbps Beyon d	Upto 4 Mbps Till 70 GB, 2 Mbps Beyon d	Upto 4 Mbps Till 100 GB, 2 Mbps Beyon d	Upto 8 Mbps Till 175 GB, 2 Mbps Beyon d	Upto 8 Mbps Till 100 GB, 2 Mbps Beyon d	Upto 16 Mbps Till 100 GB, 2 Mbps Beyond	Upto 24 Mbps Till 100 GB, 2 Mbps Beyon d	Upto 4 Mbps Till 30 GB, 2 Mbps Beyond	Upto 4 Mbps Till 70 GB, 2 Mbps Beyon d	Upto 4 Mbps Till 100 GB, 2 Mbps Beyon d	Upto 8 Mbps Till 175 GB, 2 Mbps Beyon d	Upto 16 Mbps Till 100 GB, 2 Mbps Beyon d	Upto 20 Mbps Til 75 GB, 2 Mbps Beyon d	Upto 40 Mbps Till 100 GB, 2 Mbps Beyon d	Upto 40 Mbps Till 150 GB, 2 Mbps Beyon d	Upto 60 Mbps Till 150 GB, 2 Mbps Beyon d	Upto 20 Mbps Till 50 GB, 2 Mbps Beyon d	Upto 60 Mbps Till 100 GB, 2 Mbps Beyon d	Upto 20 Mbps Till 300 GB, 2 Mbps Beyon d	Upto 30 Mbps Till 400 GB, 2 Mbps Beyon d	Upto 50 Mbps Till 600 GB, 2 Mbps Beyo nd	Upto 100 Mbps Till 800 GB, 4 Mbps Beyon d				
BSNL n/w after Free Calls)																																
MCU Charg es/ pulse in Rs. (to Other Netw ork)	1.2	NA	1.2	1.2	1.2	1.2	1.2	NA	1.2	1.2	1.2	1.2	1.2							1.2	1.2	1.2	1.2									
Additi onal Facilit y	Unlimited Free calls between 9 PM to 7 AM on LandLine and Mobile of any Network Within INDIA and All Sundays 24 Hrs Unlimited Free calls													U/Lfre e calls betwe en 9 PM-7 AM on LandLi ne/Mo bile of any N/W Within																		

DETAILED PROJECT REPORT – CITY LEVEL COMMAND & CONTROL CENTRE + CITY WIDE SURVEILLANCE + IT CONNECTIVITY

BSNL FTTH (FIBRE TO THE HOME)LAND LINE-BROADBAND PLAN DETAILS															BSNL FTTH (FIBRE TO THE HOME)LAND LINE-BROADBAND PLAN DETAILS														
Nom encla ture	BBG o ULD 1091 CS70	BBG Combo ULD 1199	BBG Comb o ULD 1441	BBG Comb o ULD 1445	BBG Comb o ULD 1495	BBG Comb o ULD 2091	BBG Spee d Comb o ULD 2295	BBG Comb o ULD 1599	BBG Comb o ULD 2799	BBG Spee d Comb o ULD 2841	BBG Comb o ULD 1745 VDSL CS56	BBG Super Speed Comb o ULD 2845 VDSL	BBG Super Speed Comb o ULD 3445 VDSL	Stand Alone Plan BBG ULD 865 CS 50	Stand Alone Plan BBG ULD 1275	Stand Alone Plan BBG ULD 1491	Stand Alone Plan BBG ULD 1891	Stand Alone Plan BBG ULD 2641	Stand Alone Plan BBG ULD 2645 VDSL	Fibro Comb o ULD 1100- CS71	Fibro Comb o ULD 1400- CS72	Fibro Comb o ULD 1950- CS73	Fibro Comb o ULD 2400- CS74	Fibro ULD 1045	Fibro ULD 1995	Fibro ULD 3999	Fibro ULD 5999	Fibro ULD 9999	Fibro ULD 16999
Band width (Dow nload Spee d)	Upto 8 Mbps Till 60 GB, 2 Mbps Beyon d	Upto 4 Mbps Till 40 GB, 2 Mbps Beyon d	Upto 8 Mbps Till 40 GB, 2 Mbps Beyon d	Upto 4 Mbps Till 60 GB, 2 Mbps Beyon d	Upto 4 Mbps Till 70 GB, 2 Mbps Beyon d	Upto 4 Mbps Till 100 GB, 2 Mbps Beyon d	Upto 8 Mbps Till 100 GB, 2 Mbps Beyon d	Upto 4 Mbps Till 70 GB, 2 Mbps Beyon d	Upto 4 Mbps Till 100 GB, 2 Mbps Beyon d	Upto 8 Mbps Till 175 GB, 2 Mbps Beyon d	Upto 8 Mbps Till 70 GB, 2 Mbps Beyon d	Upto 16 Mbps Till 100 GB, 2 Mbps Beyon d	Upto 24 Mbps Till 100 GB, 2 Mbps Beyon d	Upto 4 Mbps Till 30 GB, 2 Mbps Beyon d	Upto 4 Mbps Till 60 GB, 2 Mbps Beyon d	Upto 4 Mbps Till 70 GB, 2 Mbps Beyon d	Upto 4 Mbps Till 100 GB, 2 Mbps Beyon d	Upto 8 Mbps Till 175 GB, 2 Mbps Beyon d	Upto 16 Mbps Till 100 GB, 2 Mbps Beyon d	Upto 20 Mbps Till 75 GB, 2 Mbps Beyon d	Upto 40 Mbps Till 100 GB, 2 Mbps Beyon d	Upto 40 Mbps Till 150 GB, 2 Mbps Beyon d	Upto 60 Mbps Till 150 GB, 2 Mbps Beyon d	Upto 20 Mbps Till 50 GB, 2 Mbps Beyon d	Upto 60 Mbps Till 100 GB, 2 Mbps Beyon d	Upto 20 Mbps Till 300 GB, 2 Mbps Beyon d	Upto 30 Mbps Till 400 GB, 2 Mbps Beyon d	Upto 50 Mbps Till 600 GB, 2 Mbps Beyon d	Upto 100 Mbps Till 800 GB, 4 Mbps Beyon d
															INDIA & All Sunda ys 24 Hrs U/Lfre e calls														

H.3. BSCL

Estimate for Project Belgavi CCC (Shared by KUIDFC Team)				
No	BoM Line Item	No	Unit Rate	Total Price
A. Command Control Center				
1	Video Wall (along with hardware & software) Solution - 6x3 Display (18 Units Package)	1	14,800,000	14,800,000
2	Projector for Meeting Room	1	100,000	100,000
3	Fire & Smoke Detectors	2	500,000	500,000
4	Clour Printers	1	85,000	85,000
5	Core Router	2	1,900,000	3,800,000
6	Internet Router	2	1,175,000	2,350,000
7	Core Switch	2	1,950,000	3,900,000
8	Internal and External Firewall and IPS/IDS	2	1,250,000	2,500,000
9	wan accelerators	-	1,000,000	-
10	2 Screen –Operators Client Workstations for Command Control Center	10	150,000	1,500,000
11	L2 Switch - 24 port	2	275,000	550,000
12	UPS Online min 40 KVA with Batery Back up of	2	1,800,000	3,600,000
13	Air Conditioning - 10 Ton - A/C	2	1,500,000	3,000,000
14	CCTV camera	5	50,000	250,000
15	Biometric access control system	1	192,308	192,308
16	Operating System Licence	10	100,000	1,000,000
17	Public IP	-	100,000	-
18	Networking & cabling	1	1,000,000	1,000,000
19	SAN Switch	-	600,000	-
20	Storage - 100 TB (usable)	-	20,000,000	-
21	Gen Set - 100 KVA	1	1,000,000	1,000,000
22	Video IP phones	10	40,000	400,000
23	Civil	-	1,050,000	-
24	IBMS Solution	1	2,500,000	2,500,000
Sub Total (A)				43,027,308
B. Data Center				
1	Server Racks - 42 U, with complete electrical connections	2	1,500,000	3,000,000
2	Core Router	2	1,900,000	3,800,000
3	Internet Router	2	1,175,000	2,350,000
4	Firewall and IPS/IDS	2	1,250,000	2,500,000
5	Core Switch (L3)	2	1,950,000	3,900,000
6	L2 Switch -24 Port	2	275,000	550,000
7	San Switch	2	600,000	1,200,000

Estimate for Project Belgavi CCC (Shared by KUIDFC Team)				
No	BoM Line Item	No	Unit Rate	Total Price
8	Storage - 100 TB (usable)	1	20,000,000	20,000,000
9	Anti virus Suite / Gateway	1	2,000,000	2,000,000
10	Back up s/w	1	1,000,000	1,000,000
11	LTO (Back Up Drives)	1	2,000,000	2,000,000
12	Blade chassis	2	4,800,000	9,600,000
13	Blade Server	10	750,000	7,500,000
14	Virtualization Software (VM ware)	10	200,000	2,000,000
15	Cluster Suite	1	1,200,000	1,200,000
16	Multi-tenancy City Operations Platform - IoT Platform/Data Normalization software & City Operation Centre Software	1	70,000,000	70,000,000
17	City Tenant activation license with one lakh device connection	1		
18	Integration of various for sensors, applications/systems	1		
19	Operator Client License	25		
20	Data Center Site Preparation	1	1,500,000	1,500,000
21	SLA, Helpdeck & EMS Solution	1	15,000,000	15,000,000
22	IBMS Solution	1	2,500,000	2,500,000
Sub Total (B)				151,600,000
C. Application server				
1	Smart Water	1	1,000,000	1,000,000
2	Integration of other services	1	1,000,000	1,000,000
Sub Total (C)				2,000,000
D. Intelligent Poles				
1	Intelligent Poles	9	250,000	2,250,000
2	Environmental Sensors	9	500,000	4,500,000
3	4 line LED Display	9	500,000	4,500,000
4	Bill Boards	9	1,000,000	9,000,000
5	Panic Button	9	32,050	288,450
6	Twin speaker @ junction/Public Address System	9	1,000,000	9,000,000
7	UPS -1 KVA	9	45,000	405,000
8	Fixed Cameras with Video Analytics	18	125,000	2,250,000
9	360 Panoramic Camera	9	100,000	900,000
10	Application Server for all the Above	1	5,000,000	5,000,000
Sub Total (D)				38,093,450
E. ATMS				
1	Traffic signal aspects	20	-	-
2	Pedestrian signal aspects	20	-	-
3	Timer display	20	-	-
4	Traffic signal controller	20	805,000	16,100,000

Estimate for Project Belgavi CCC (Shared by KUIDFC Team)				
No	BoM Line Item	No	Unit Rate	Total Price
5	Traffic detector	20	805,000	16,100,000
6	Power & communication	20	690,000	13,800,000
7	Civil works	LS	650,000	13,000,000
8	ATS Software	1	5,750,000	5,750,000
9	Mobile application	1	1,000,000	1,000,000
10	Traffic engineering services	1	2,300,000	2,300,000
Sub Total (E)				68,050,000
F. Smart Water				
1	Existing Bulk Flow Meter - (Water Mine)	7	40,000	280,000
2	Replacement of non working Bulk flow meters	7	155,000	1,085,000
3	Additional Bulk Flow Meter	14	155,000	2,170,000
4	Installation of pressure transducers at critical zone point	2	100,000	200,000
5	Sensors at WTP			-
6	Turbidity measurement	2	250,000	500,000
7	pH	2	250,000	500,000
8	Chlorine Content	2	250,000	500,000
9	Cloud based Billing Data Base Management	100,000	40	4,000,000
Sub Total (F)				9,235,000
G. Smart Transport				
1	GPS Device for city buses	67	18,000	1,206,000
2	RFID receiver for City Buses	67	35,000	2,345,000
3	RFID Tagging for bus shelters	31	250	7,750
4	Passenger Information System (VMS)	31	750,000	23,250,000
5	LED Display In City buses	17	55,000	935,000
6	Digital Bill board -2 / Bus Shelter one on Either Side (10 Smart bus shelters)	20	1,000,000	20,000,000
7	Surveillance Camera	10	65,000	650,000
8	Smart Transport Application Server	1	9,500,000	9,500,000
	Vehicle Scheduling and Dispatch System			
	Incident Management System			
	Web Portal for bus schedule, bus route and ETA			
	Mobile Application			
	Integration with Smart City Dashboard			
Sub Total (G)				57,893,750
H. ICT Solid Waste Management				
1	Vehicle Tracking System (VTS) GPS Device	102	18,000	1,836,000
2	RFID tagging for All House Holds	110,000	200	22,000,000
3	RFID receiver for push carts	34	50,000	1,700,000
4	RFID receiver for Auto tippers	50	120,000	6,000,000
5	RFID Tagging for Tippers (Waste Treatment	52	250	13,000

Estimate for Project Belgavi CCC (Shared by KUIDFC Team)				
No	BoM Line Item	No	Unit Rate	Total Price
	Plant)			
6	RFID Receiver with all accessories at weigh bridge & entry point	1	125,000	125,000
7	RFID receiver will all accessories at exit point	1	125,000	125,000
8	Bullet Camera	28	65,000	1,820,000
9	ICT enabled Waste Management Software	1	8,500,000	8,500,000
10	Waste Management Monitoring Application			
11	Mobile Application			
12	Integration with existing Map			
13	Weigh bridge integration application			
Sub Total (H)				42,119,000
I. Access point on Smart Pole				
1	Wireless Controller	1	1,000,000	1,000,000
2	Access Point	16	95,000	1,520,000
Sub Total (I)				2,520,000
J.GPS Device for Emergency Services				
1	GPS Device for Ambulances & Fire Engines (97+5)	102	18,000	1836000
Sub Total (J)				1836000
K. Project Management & Infrastructure Set-up				
1	Control Room Site Preparation covering Partitioning, Enclosures , Earthing, Power Cabling etc. (safety)	1	625,000	625,000
2	Cubicles with Table and Chair for operators (As required) - for 25 operators	LS	575,000	575,000
3	Detailed systems/site wise survey study of above Systems	As Required	500,000	500,000
4	Installation, Configuration and Customization for complete project	As Required	21,002,420	21,002,420
5	Capacity Building and Administrative Expenses	As Required	500,000	500,000
6	Other item (if Required)		-	
Sub Total (K)				23,202,420
GRAND TOTAL (A+B+C+D+E+F+G+H+I+J+K)				439,576,928

H.4. CISCO and Partners

Sr No	Integration Points	Connection Points	Unit price (INR)	Total price (INR)	Technical description
1	GPS Integration & tracking or Intelligent transport management system				
1.1	GPS Device	3000	7500	22500000	
1.2	Driver Display Unit	400	12500	5000000	
1.3	In Bus PIS (Front, Rear, Inner, Voice announcement and Route Making Controller) as per UBS 2	400	187000	74800000	1. GPS device in Public transport buses, Emergency vehicles and other smart fleets
1.4	Station PIS (Multi Color LED Display)	60	120000	7200000	2. Display unit in emergency vehicles, and other smart fleet components (I have assumed 400 total such fleets)
1.5	SIM Cards(Per month) for one year	340	1200	408000	3. PIS system, Scheduling & dispatching system and LED Display at bus stops
1.6	Mobile Application	1	2900000	2900000	considering 60 bus stops
1.7	Automated Vehicle Location System (AVLS)	1	4500000	4500000	4. Mobile App for Citizens
1.8	Access License for each fleet per year	3000	950	2850000	5. Business intelligence for revenue generation
1.9	Passenger Information System (PIS)	1	6500000	6500000	6. Integration the Intelligent transport system with Cisco Command control Center
1.1	Vehicle Scheduling & Dispatch System	1	9800000	9800000	
1.11	Incident Management System	1	3200000	3200000	
1.12	Business Intelligence	1	2905000	2905000	
1.13	GPS System integration with Cisco Command center platform	1	1000000	1000000	
		Total		143563000	
2	CCTV feed integration (including 100 old CCTV implementations by existing contractor)	500			
2.1	Video Management software & hardware	a lot	32000000	32000000	1. VMS software and required hardware for recording & Management and monitoring
2.2	Bullet Camera for monitroing	120	75000	9000000	2. Required number of servers for VSOM -2 no's (in 1+1 HA) and for recording server - 16 no.s (with 5:1 failover)
2.3	PTZ Camera	50	250000	12500000	3. Recording/Media server could be Virtualized or Appliance based
2.4	Dom Camera	50	75000	3750000	
2.5	RLVD Camera, software and Hardware-(for 20 traffic junctions)	80	3rd Party licenses	yet to receive the price from our eco partner	4. Three types of monitoring cameras are proposed with 40-50 camera with video analytic licenses (Broken/accident vehicle detection, directional

Sr No	Integration Points	Connection Points	Unit price (INR)	Total price (INR)	Technical description
2.6	ANPR Camera, Software and hardware -(For 20 traffic junctions and 20 other places for Number plat capturing)	200	3rd Party licenses	yet to receive the price from our eco partner	control, and Intrusion detection 5. RLVD/ANPR camera and analytic software and hardware prices are mentioned separately.
2.7	Video Analytics- Incident/accident detection, Prohibited area trespassing licenses and hardware (40- 50 camera licenses) (broken down/Accidental detection, Wrong driving detection and intrusion detection license)	a lot	2500000	2500000	
		Total			
3	Environmental Sensors for Ambient Air Quality	5	600000	3000000	Environmental Sensor and Integration with CDP for real-time update about environment parameters
		Total		3000000	
4	Water Quality sensors for fisheries	50	3rd party		Sensor price is not available but we have considered the price for integration with CDP
5	Soil Sensors	50	3rd Party		Sensor price is not available but we have considered the price for integration with CDP
	Solid Waste management				
6	Waste Vehicle	400	3rd party		GPS device already covered in Point no.-1. Price for waste vehicles is not included.
7	Smart Waste Bins	1500	3rd party or existing		We have assumed here waste bins would be provided by municipal. I not then need to be procured from 3rd party.
7.1	RFID Tag	1900	275	522500	1. RFID Tag would be placed at waste bins and vehicle for pick-up the garbage 2. Level sensor would be placed in waste bins for fill-up status 3. RFID reader will be placed at Weighbridge & entry/exit
7.2	Vehicle Tracking Platform for GPS data Aggregation	1	150000	150000	
7.3	Level Sensor	1500	24000	36000000	
7.4	Controller Unit for data processing and communication	750	16500	12375000	

Sr No	Integration Points	Connection Points	Unit price (INR)	Total price (INR)	Technical description
7.5	RFID Reader with Mountings clamps, Power Supply and Accessories (Weighbridge)	2	187000	374000	gates for vehicle entry 4. we have considered 4 Entry/exit gates in city & 2 Weighbridge 5. Have considered 6 poles at these RFID reader locations to place the reader 6. Waste management software, Mobile app for vehicle driver/Citizen complaint and integration with CDP
7.6	Weighbridge Application Integration	1	75000	75000	
7.7	RFID Reader with Mountings clamps, Power Supply and Accessories (Entry/Exit Gate)	4	187000	748000	
7.8	Poles for RFID Reader Installation	6	22000	132000	
7.9	Solid Waste VTS Software with business rules of SWM Processes	1	3200000	3200000	
7.1	Map (Two Year)	1	1800000	1800000	
7.11	Integration with CDP	1	50000	50000	
7.12	Mobile Application	1	700000	700000	
		Total		56126500	
8.1	WiFi Access points	600	100000	60000000	1. Wifi App's- 600 no's with WLC in HA 2. AAA for Device management and user Authentication and portal redirection 3. Wireless management system 4. CMX for presence analytics and device location analytics 5. Cisco UCS server running with vmware virtualization for CMX and Prime management system 6. SMS Gateway price is not included, will be extra for SMS OTP authentication
8.2	Wirless Controller	a lot	6000000	6000000	
8.3	CMX software with base licenses	a lot	2000000	2000000	
8.4	AAA for Wireless users and device management and Hardware	a lot	7000000	7000000	
8.5	Wireless management system (600AP's)	a lot	2500000	2500000	
8.6	Hardware for CMX and Management system	a lot	2500000	2500000	
		Total		80000000	
9	Display Panels at Smart Bus Shelters	150	3rd Party	yet to receive the price from our eco partner	
10	PA Systems at Important locations	100	3rd Party	yet to receive the price from our eco	

Sr No	Integration Points	Connection Points	Unit price (INR)	Total price (INR)	Technical description
				partner	
11	VMS at Traffic Junctions and Important locations	35	3rd Party	yet to receive the price from our eco partner	
12	SOS on Pole		3rd Party	yet to receive the price from our eco partner	
13	eToilet sensors for usage statistics etc	100	3rd Party	yet to receive the price from our eco partner	
14	Kiosk at Government Offices (Hospitals, MCC, RTO, Police etc)	100			Kiosk includes Hardware for KIOSK, Content creation for URL redirection
14.1	Kiosk hardware and Content management for Hospitals	10	1400000	14000000	Each hospital will have different content, so each kiosk would require different URL redirection or content creation.
14.2	Kiosk hardware and Content management for MCC	20	450000	9000000	Content or URL redirection for each MCC Kiosk will be common, only main/web page would be different. So price includes for one Content/URL redirection, Howe page for each location and Kiosk box. If content in each MCC requires different then price will not be valid
14.3	Kiosk hardware and Content management for RTO	20	450000	9000000	Content or URL redirection for each RTO Kiosk will be common, only main/web page would be different. So price includes for one Content/URL redirection, Howe page for each location and Kiosk box. If content in each RTO Kiosk requires different then price will not be valid

Sr No	Integration Points	Connection Points	Unit price (INR)	Total price (INR)	Technical description
14.4	Kiosk hardware and Content management for Police	20	450000	9000000	Content or URL redirection for each Police Kiosk will be common, only main/web page would be different. So price includes for one Content/URL redirection, Howe page for each location and Kiosk box. If content in each Police requires different then price will not be valid
14.5	Tourism or city information	30	650000	19500000	Content or URL redirection for each Tourism Kiosk will be common, only main/web page would be different. So price includes for one Content/URL redirection, Howe page for each location and Kiosk box. If content in each Tourism requires different then price will not be valid
		Total		60500000	
15	Sensors, Cameras for Tow Vehicles	50			
16	Smart Parking sensors at MLCP as well as Road side parking solution integration	5000			
16.1	MLCP - Indoor Rooftop Ultrasonic Sensors with Transceivers, Gateways, Mobile Application, Central Software Platform	3000	18000	54000000	we have assumed 3000 indoor parking sensors
16.2	Outdoor Magnetic Surface Sensors, Mobile Application, Central Software Platform	2000	23000	46000000	We have assumed 2000 Outdoor parking sensors
16.3	Integration with CDP	a lot	1000000	1000000	Integration with Command & control center
		Total		101000000	
17	Smart Poles with Charging points, SOS, CCTV/Router/LED mounting	500			

Sr No	Integration Points	Connection Points	Unit price (INR)	Total price (INR)	Technical description
17.1	Smart Pole-with 2 arms for lighting, 3m height nacelle to cover the telecom antennas, 3 cut-outs for fitting the equipment on the pole, One 19U size enclosure on ground for telecom/electrical/ups equipment.	400	800000	320000000	
17.2	Smart Pole- 25m hot galvanized powder coated pole with 2 arms for lighting, 3m height nacelle to cover the telecom antennas, 3 cut-outs for fitting the equipment on the pole, One 19U size enclosure on ground for telecom/electrical/ups equipment.	100	1550000	155000000	
17.3	LED based Smart Street Light (LED Luminaire-120W) with 0-10 V Dimming	500	15000	7500000	
17.4	LED Light Controller per light - WiFi Based	500	16000	8000000	
17.5	Small LED signage's – 96x128 P10 size 1 sq.m Full Color Outdoor Display	200	600000	120000000	
17.6	VMS -192x288 P10 2x3 mts Full Color Outdoor Video Display	50	1600000	80000000	
17.7	Centralized Software to manage the Lighting, Signage & VMS	a lot	5000000	5000000	
17.8	Integration with CDP for all the components including the environmental sensor	a lot	1000000	1000000	
		Total		696500000	

Sr No	Integration Points	Connection Points	Unit price (INR)	Total price (INR)	Technical description
18	Smart Energy Meters (for residential/commercial consumption)	150000	3rd Party component		3rd party component. However we have included the price for Integrating the Smart Water system with CDP for displaying the information about Supplied/Consumed water for area wise or Water tank or resource wise. We have not considered the integration with each household.
19	Smart Water Meters (for residential/commercial consumption)	150000	3rd party component		3rd party component. However we have included the price for Integrating the Smart Every system with CDP for displaying the information about Supplied/Consumed electricity for powerhouse wise or City power unit. We have not considered the integration with each household.
20	Command and Control Center				
20.1	CDP Platform Including the Software, Licenses for each sensors & Application to onboarded for dashboarding (Sensors/Application includes Parking Sensor, Lighting, Environment, CCTV camera, Wifi, Solid waste mnagment, Intelligent transport management system and Integration of smart water, Smart Energy meter, soil sensor etc)	a lot	140000000	140000000	1. CDP Software & Licenses for onboarding each sensor and South bound integration of each Applications. It includes the Data aggregation, normalization and Visualization. (IOT player will provide the data aggregation & Normalization and Visualization layer will provide alert & notification, incident response system, SOP, Collaboration and secure access for developer. 2. Application for CDP's are Data, Core, Common database, Dashboard, webserver, Monitoring, OOB reporting etc

Sr No	Integration Points	Connection Points	Unit price (INR)	Total price (INR)	Technical description
20.2	CDP & Analytics Platform Hardware (Compute & Storage)	a lot	12000000	12000000	1. Approx. Server required for CDP is 90-100 virtual core, 300-400 GB RAM and 10TB Harddisk 2.Third party softwares / Applications which are not included would be extra are: DB, OS, Certificates and Virtualization Mgmt. software & recovery manager etc 3. Solution is considered with HA 4. Approximate 5-6 Servers running with Vmware are considered
20.3	Intelligent Analytics software & Hardware	a lot	10000000	10000000	1. Advanced Intelligent Analytics software and licenses 2. Server Hardware- approximate 20-30VCPU, 300-350 GB RAM and 4-5Bb Storage
		Total		162000000	
	Field Switches with Enclosure for CCTV, Wifi Access points and Sensors				
24	Field ruggedized switches with GE POE ports & GE fiber ports & Modules for Uplink	500	500000	250000000	
		Total		250000000	
25	Data Center Infrastructure Component				
25.1	Core Router in HA	2	2500000	5000000	
25.2	Internet Router in HA	2	1000000	2000000	
25.3	Firewall & IPS in HA	2	2500000	5000000	
25.4	Core Switch in HA	2	3500000	7000000	
25.5	Data Center Switch in HA	2	2000000	4000000	
25.6	Access switches	2	300000	600000	
25.7	Server Infra for Web, AD and other server	2	1700000	3400000	
		Total		27000000	

Terms & Conditions

Prices quoted are Ex-works Bangalore.

Any additional government Taxes/Levies will be extra on actual at the time of billing.

GST @18% etc on all products and services.

Sr No	Integration Points	Connection Points	Unit price (INR)	Total price (INR)	Technical description
-------	--------------------	-------------------	------------------	-------------------	-----------------------

Will be applicable at the time of billing and will be charged to SI's Account.

Warranty Conditions

Prices are in INR and subject to dollar rate increase and with 1 year warranty.

H.5. HPE

Sl#	Line Item	Unit of Measurement	Remarks	Quantity Proposed	Unit base price (in Rs.) with 3 years	Total (in Rs.) with 3 yr (in Rs.)
A	Command and Control Center					
1	Projector for Meeting Rooms	No.	CCC Operations	2	INR 150,000.00	INR 300,000.00
2	Color Printers	No.	CCC Operations	2	INR 70,000.00	INR 140,000.00
3	Core Router for MPLS	No.		2	INR 4,800,000.00	INR 9,600,000.00
4	Internet Router	No.		2	INR 4,000,000.00	INR 8,000,000.00
5	Core Switch	No.		2	INR 7,500,000.00	INR 15,000,000.00
6	Access Switch	No.		2	INR 400,000.00	INR 800,000.00
7	Internal and External Firewall and IPS/IDS (NGFW)	No.		4	INR 8,500,000.00	INR 34,000,000.00
8	3 Screen –Operators Client Workstations for Command Control Center (20 Seats)	No.		20	INR 80,000.00	INR 1,600,000.00
9	ToR/ Connectivity Switch	No.		10	INR 1,500,000.00	INR 15,000,000.00
10	Server Blade chassis	No.		5	INR 2,100,000.00	INR 10,500,000.00
11	Blade Server(Application Server)	No.		50	INR 850,000.00	INR 42,500,000.00
12	Operating System License	No.	As per requirement	LS	INR 10,000,000.00	INR 10,000,000.00
13	IP phones	No.		20	INR 10,000.00	INR 200,000.00
14	IPPBX and Contact Center	No.		2	INR 1,000,000.00	INR 2,000,000.00
15	Centralize Wireless Controller	No.		2	INR 5,500,000.00	INR 11,000,000.00
16	SSO (Single Sign On)	No.		2	INR 7,000,000.00	INR 14,000,000.00
17	DLP (Data Leak Protection)	No.		2	INR 1,600,000.00	INR 3,200,000.00
18	Threat Intelligence	No.		2	INR 400,000.00	INR 800,000.00
19	Site Preparation - Approx 4000 Sq Ft as per RFP	Lump sum		1	INR 135,000,000.00	INR 135,000,000.00
20	San Switch	No.		2	INR 900,000.00	INR 1,800,000.00
21	Storage – in TB for Video (usable)	200 TB		2000 TB	INR 160,000,000.00	INR 160,000,000.00
22	Storage - in TB (usable- Application)	200 TB		200 TB	INR 30,000,000.00	INR 30,000,000.00

Sl#	Line Item	Unit of Measurement	Remarks	Quantity Proposed	Unit base price (in Rs.) with 3 years	Total (in Rs.) with 3 yr (in Rs.)
23	Anti virus Suite	No.		500	INR 3,000.00	INR 1,500,000.00
24	Back up software	lot	As per requirement	1	INR 7,200,000.00	INR 7,200,000.00
25	Tape Library (LTO)	No.		1	INR 3,500,000.00	INR 3,500,000.00
26	Virtualization Software	Lot.	As per requirement	1	INR 15,000,000.00	INR 15,000,000.00
27	IoT Platform and Command Control Center	Lot.		1	INR 150,000,000.00	INR 150,000,000.00
28	Enterprise Management System	Lot.		1	INR 30,000,000.00	INR 30,000,000.00
29	SIEM (Security Incident and Event Management)	Lot.		1	INR 20,000,000.00	INR 20,000,000.00
30	AAA Server	Lot.		1	INR 8,500,000.00	INR 8,500,000.00
31	End Point Protection - Zero day anti malware	No.		50	INR 30,000.00	INR 1,500,000.00
32	Distribute Denial of Service (DDoS)	No.		2	INR 17,000,000.00	INR 34,000,000.00
33	Application Load Balancer	No.		2	INR 9,000,000.00	INR 18,000,000.00
34	Wireless NMS	Lot.		1	INR 1,650,000.00	INR 1,650,000.00
B DR (Disaster Recovery at Hosted Location in Different Sesmic Zone)						
1	DRM Software	Lot	As per requirement	1	INR 19,900,000.00	INR 19,900,000.00
2	Server Racks - 42 U, with complete electrical connections	No.		4	INR 150,000.00	INR 600,000.00
3	Core Router- DR	No.		1	INR 4,800,000.00	INR 4,800,000.00
4	Internet Router DR	No.		1	INR 2,500,000.00	INR 2,500,000.00
5	Internal and External Firewall and IPS/IDS(NGFW)	No.		2	INR 8,500,000.00	INR 17,000,000.00
6	Core Switch (L3)	No.		1	INR 7,500,000.00	INR 7,500,000.00
7	Top of the Rack Switch(ToR Switch)	No.		4	INR 1,500,000.00	INR 6,000,000.00
8	San Switch	No.		2	INR 900,000.00	INR 1,800,000.00
9	Storage - in TB (usable- Application)	200 TB		200 TB	INR 10,000,000.00	INR 10,000,000.00
10	Anti virus Suite / Gateway	No.		400	INR 3,000.00	INR 1,200,000.00

Sl#	Line Item	Unit of Measurement	Remarks	Quantity Proposed	Unit base price (in Rs.) with 3 years	Total (in Rs.) with 3 yr (in Rs.)
11	Back up software	lot		1	INR 4,800,000.00	INR 4,800,000.00
12	Tape Library (LTO)	No.		1	INR 3,000,000.00	INR 3,000,000.00
13	Server Blade chassis	No.		4	INR 2,100,000.00	INR 8,400,000.00
14	Blade Server(Application Server)	No.		35	INR 1,000,000.00	INR 35,000,000.00
15	Virtualization Software (VM ware)	Lot.	As per requirement	1	INR 10,100,000.00	INR 10,100,000.00
16	Operating System License	Lumpsum	As per requirement	20	INR 800,000.00	INR 16,000,000.00
17	IoT Platform	Lot.	Included in DC	1	INR 0.00	INR 0.00
18	Command and Control Center Platform	Lot.	Included in DC	1	INR 0.00	INR 0.00
19	Enterprise Management System	Lot.		1	INR 20,000,000.00	INR 20,000,000.00
20	SIEM (Security Incident and Event Management)	Lot.		1	INR 10,000,000.00	INR 10,000,000.00
21	AAA Server	Lot.		1	INR 2,000,000.00	INR 2,000,000.00
22	Distribute Denial of Service (DDoS)	No.		1	INR 17,000,000.00	INR 17,000,000.00
23	Application Load Balancer	No.		2	INR 9,000,000.00	INR 18,000,000.00
C	ICT Solid Waste management					
1	Vehicle Tracking System (VTS) GPS Device	No		40	INR 15,000	INR 600,000.00
2	ICT enabled Waste Management Software	Lot		1	INR 7,285,714	INR 7,285,714.29
3	Integration with existing Map/ New Map	Lot		1	INR 1,428,571	INR 1,428,571.43
4	Weigh bridge integration application	Lot		1	INR 1,428,571	INR 1,428,571.43
5	Compost Stations Attendance System - Biometric with GPRS enabled	No		70	INR 20,000	INR 1,400,000.00
6	GPS Tracking Module and the Mobile data terminal at Collection Vehicles with attendance system at Truck	Lot		40	INR 15,000	INR 600,000.00
7	RFID Tags on Bins - 70 locations , Per locations (4-5) Bins	Lot		350	INR 286	INR 100,000.00

Sl#	Line Item	Unit of Measurement	Remarks	Quantity Proposed	Unit base price (in Rs.) with 3 years	Total (in Rs.) with 3 yr (in Rs.)
8	QR Code at the House Hold Level	No		200000	INR 14	INR 2,857,142.86
9	Devices for the connection Staff (QR code reader and GPRS , GPS)			150	INR 15,000	INR 2,250,000.00
10	Handheld devices to Supervisors			20	INR 15,000	INR 300,000.00
D City WiFi - Access Point on Pole						
1	Outdoor Access Point (100 Hot Spots nodes)	No.		250	INR 40,000	INR 10,000,000.00
2	OSS/BSS Software for WiFi	No.		1	INR 17,500,000.00	INR 17,500,000.00
E City Parking						
1	Parking Sensors (4 Wheelers)	No.		500	INR 6,994	INR 3,497,142.86
2	LORA Gateway Device	No.		10	INR 61,429	INR 614,285.71
3	Parking Application web and Mobile version	No.		1	INR 388,571	INR 388,571.43
4	Display UNIT	No.		50	INR 2,271,429	INR 113,571,428.57
F City Surveillance system						
1	Fixed Camera	No		140	INR 58,500	INR 8,190,000.00
2	PTZ Cameras	No		25	INR 222,300	INR 5,557,500.00
3	ANPR Camera	No		0	INR 93,600	INR 0.00
4	Panromic Camera	No		5	INR 234,000	INR 1,170,000.00
5	Video Management System (At DC and DR)	Lot		1	INR 10,028,571	INR 10,028,571.43
6	Video Analytics	Lot		1	INR 25,500,000	INR 25,500,000.00
G Environmental Sensor						
1	Environmental Sensor	No		6	INR 1,000,000	INR 6,000,000.00
H Junction Box and Accessories at pole						
1	Junction Box	No.		420	INR 22,857	INR 9,599,940.00
2	UPS and Batteries	No.		420	INR 121,428	INR 50,999,760.00
I City Network						
1	L2 Edge Switch	No.		420	INR 60,000	INR 25,200,000.00
K Project Management & Infrastructure Setup						

Sl#	Line Item	Unit of Measurement	Remarks	Quantity Proposed	Unit base price (in Rs.) with 3 years	Total (in Rs.) with 3 yr (in Rs.)
1	Detailed systems/site wise survey study of above Systems Installation, Configuration and Customization for complete project			1	INR 149,821,120	INR 149,821,120
2	Capacity Building and Administrative Expenses			1	INR 11,274,979	INR 11,274,979.06
	Total					1,479,053,299.06
	Terms and Conditions					
1	These are Budgetary & non-binding prices as per HPEs T&Cs.					
3	Taxes Extra at Actuals					
4	Power requirements in the form of diesel, Electricity and consumables shall be arranged and paid by customer directly to respective Authorities / Vendors .					
5	Bandwidth and Last mile Fiber is out of the scope and will be arranged by customer appointed service provider.					
6	Validity of this budgetary offer is 30 days .					
7	Base price for HW, NW is considered with 3 years support as most the products comes with 3 years warranty. Additional 4 years prices are quoted as AMC.					
8	This prices are subject to HPE Standard terms and conditions					
	Exclusions & points to note:					
1	BCP is not considered with DR solution.					
2	Data Center will be hosted at ICC ,					
3	Necessary data Center build has been considered accordingly					
4	The DR site shall be arranged by customer. Necessary hardware , software and security has been factored in the proposal					
5	DR site - space , Racks , Power and Cooling will be responsibility of customer and costing for the same has not been factored					
6	DR has been considered with no HA , QA development					

H.6. BOSCH

Sr. no.	Component -	Quantity	Make	Model	Price per unit	Capex exclusive of commissioning and installation)	Opex for 1st year	Opex for 2nd Year	Opex for 3rd Year	Opex for 4th Year	Opex for 5th Year
City Surveillance Supply, Installation, Testing and Commissioning of City Surveillance components with tentative minimum quantity for components are:											
1	Fixed Camera with lens, IP66 housing and accessories IR Illuminator	120	Bosch, Tamron	NBN-63023-B + UHO-HBGS-51 + LTC 9215/00,M13VG 850IR,IIR-50850-SR	1,02,650	1,23,18,057	0	0	0	5,26,782	6,32,138
2	PTZ Camera including mounting & accessories	20	Bosch	NDP-5502-Z30L	1,49,874	29,97,478	0	0	0	1,41,483	1,69,779
3	Automatic Number Plate Recognition (ANPR) System with Camera & accessories	60	Bosch, Tamron	NBN-50022-C + UHO-HBGS-51 + LTC 9215/00,M13VG 850IR,IIR-50850-SR	68,978	41,38,668	0	0	0	1,54,076	1,84,891
4	Red Light Violation Detection (RLVD) System with Camera & Accessories	40	Bosch, Tamron	NBN-50022-C + UHO-HBGS-51 + LTC 9215/00,M13VG 850IR,IIR-50850-SR	68,179	27,27,148	0	0	0	1,02,717	1,23,260
5	Dome Cameras for Subway/FOB	20	Bosch	UC-52051-F0E	81,622	16,32,435	0	0	0	77,052	92,462

DETAILED PROJECT REPORT – CITY LEVEL COMMAND & CONTROL CENTRE + CITY WIDE SURVEILLANCE + IT CONNECTIVITY

Sr. no.	Component -	Quantity	Make	Model	Price per unit	Capex exclusive of commissioning and installation)	Opex for 1st year	Opex for 2nd Year	Opex for 3rd Year	Opex for 4th Year	Opex for 5th Year
6	I/O Module	40	Moxa	ioLogik E1212	17,740	7,09,595	0	0	0	0	0
7	UPS + IP Enclosure - Main unit	10	Delta	Tra_Encl_power	1,14,611	11,46,109	0	1,00,466	1,00,466	1,00,466	1,00,466
8	UPS + IP Enclosure - Supplementary unit	50	Delta	Tra_Encl_comm	35,700	17,85,016	0	1,56,471	1,56,471	1,56,471	1,56,471
9	Local Processing Unit	40	Lanner	LPU_LEC-2281	1,75,388	70,15,534	0	0	4,30,478	4,30,478	4,30,478
10	Switch - 12 port / 8 port PoE for traffic	40	Allied Telesis	AT-IE300-12GP-80	94,731	37,89,240	0	0	0	0	0
11	Video Management Server with Redundant Server	1									
12	Video Analytics Server	2									
13	Recording Server with n+2 Redundancy	1									
14	ANPR Server	1									
15	RLVD Server	1									
16	Network Storage for 90 days, 15FPS @ 1080P	500 TB	Bosch	DIP-61F4-16HD	8,89,211	88,92,111	0	0	0	4,36,501	5,23,801

DETAILED PROJECT REPORT – CITY LEVEL COMMAND & CONTROL CENTRE + CITY WIDE SURVEILLANCE + IT CONNECTIVITY

Sr. no.	Component -	Quantity	Make	Model	Price per unit	Capex exclusive of commissioning and installation)	Opex for 1st year	Opex for 2nd Year	Opex for 3rd Year	Opex for 4th Year	Opex for 5th Year
	resolution for complete cameras										
17	42 U Rack	1 (8 Display)									
18	Workstations with dual display	10									
19	Videowall 4x2, 65" LED Display	1 (8 Display)									
20	Keyboard Joysticks to control PTZ cameras	2									
21	Server OS Licenses	As applicable									
22	Antivirus Licenses	As applicable									
23	Network switch for surveillance	40	Allied Telesis	AT-IE300-12GP-80	56,464	22,58,577	0	0	0	0	0
24	IP enclosure	40	Delta	Suv_encl	1,03,882	4155289	0	3,92,264	3,92,264	3,92,264	3,92,264
25	Video Management Software base license	1	Bosch	MBV-BPRO-75	1,66,215	1,66,215	0	0	0	8,159	9,791
26	Video Management Software Camera Licenses including failover & Edge storage	100	Bosch	MBV-XCHAN-75	6,375	6,37,459	0	0	0	31,292	37,550

DETAILED PROJECT REPORT – CITY LEVEL COMMAND & CONTROL CENTRE + CITY WIDE SURVEILLANCE + IT CONNECTIVITY

Sr. no.	Component -	Quantity	Make	Model	Price per unit	Capex exclusive of commissioning and installation)	Opex for 1st year	Opex for 2nd Year	Opex for 3rd Year	Opex for 4th Year	Opex for 5th Year
	license for traffic										
27	Video Management Software Camera Licenses including failover & Edge storage license for Surveillance	320	Bosch	MBV-XCHAN-75	6,375	20,39,869	0	0	0	1,00,134	1,20,161
28	Video Analytics Software Licenses	2	Bosch	IVA	50,000	1,00,000	0	0	0	8000	11000
29	ANPR Software Licenses	60	Carman	Freeflow	65,098	39,05,857	0	1,91,733	1,91,733	1,91,733	1,91,733
30	RLVD Software Licenses	40	Bosch	Tra_RLVD	1,13,756	45,50,234	0	6,70,093	6,70,093	6,70,093	6,70,093
31	Core Router	2									
32	Core Switch	2									
33	Internet Router	2									
34	Internet Firewall ,Intranet Firewall (if other firewall required for Intranet) and IPS/IPD	2									
35	Network Access Switch 24 Port, 2x10G SFP, PoE	2									

DETAILED PROJECT REPORT – CITY LEVEL COMMAND & CONTROL CENTRE + CITY WIDE SURVEILLANCE + IT CONNECTIVITY

Sr. no.	Component -	Quantity	Make	Model	Price per unit	Capex exclusive of commissioning and installation)	Opex for 1st year	Opex for 2nd Year	Opex for 3rd Year	Opex for 4th Year	Opex for 5th Year
36	Blade Chassis for Device Installation	1									
37	SAN Switch	2									
38	Server Load Balancer	As applicable									
39	Link Load Balancer	As applicable									
40	UPS (sizing as per proposed solution)	90 KVA with 2 hrs battery backup									
41	Air Conditiong	As applicable									
42	Multifunction Device	As applicable									
43	Site Preparation, Furniture, Chairs for operator	As applicable									
44	Fire Alarm System										
45	Biometric Access Control System	1									
46	Dome Cameras for Internal Surveillance	6									
47	Rodent Repellent System	for a room size of 2000 SQ Feet									

DETAILED PROJECT REPORT – CITY LEVEL COMMAND & CONTROL CENTRE + CITY WIDE SURVEILLANCE + IT CONNECTIVITY

Sr. no.	Component -	Quantity	Make	Model	Price per unit	Capex exclusive of commissioning and installation)	Opex for 1st year	Opex for 2nd Year	Opex for 3rd Year	Opex for 4th Year	Opex for 5th Year
48	Diesel Generator	1									
Total Capex						6,49,64,891	-	15,11,027	19,41,505	35,27,700	38,46,339
Total Opex						1,08,26,571					
Total						7,57,91,462					

Annexure I. Budgetary estimates from Kaizen proposal



COMMERCIAL OFFER

Pricing

The following table details the pricing for delivery of the services outlined in this proposal. This pricing is valid for 90 days from the date of this proposal:

1. Services Cost – Development & Implementation	Est. Price (INR)
Phase 1 of Works (Basic Modules)	85,00,000.00
Phase 2 of Works (Customized Modules)	1,75,00,000.00
Training	4,50,000.00
Total Services Costs – Development & Implementation	2,64,50,000.00
2. Services Cost – Support & Maintenance	
Remote Technical Support with helpdesk provided during normal Working hours and corrective maintenance – Annual Cost	39,75,000.00
Hosting and License Fees – Annual Cost	4,25,000.00
App monitoring, app upgrades and enhancements, Content updates - engaging 10 skilled resources on site. – Annual Cost	79,00,000.00
Total Services Costs – Annual Maintenance	1,25,00,000.00
3. Total for Items 1 + 2 (for 1 year maintenance)	3,89,50,000.00

Disclaimer: The prices listed in the preceding table are an estimate for the services discussed. This summary is not a warranty of final price. Estimates are subject to change if project specifications are changed or costs for outsourced services change before a contract is executed.

Annexure J. Responsibility Matrix [MSI (Centralised CCC SI) / LSI (City SI) / KMDS (DC Service Provider)]

Sr. no.	Activity	KMDS	Centralised CCC MSI	City SI
1.	Physical space for setting up Data Center	√		
2.	Design, Supply, Installation & Commissioning of Data Center Infrastructure (IT and Non-IT)		√	
3.	Provisioning DR as per RFP		√	
4.	Implementation of ICOP platform		√	
5.	Integration of ICOP platform with smart city applications		√	√
6.	KSWAN MPLS connectivity between Smart City & DC and DR	√		
7	Providing KSWAN Internet at DC (KMDS)	√		
8.	Network connectivity between DC and DR		√	
9.	Infrastructure procurement, deployment and commissioning at KMDS & DR on Cloud		√	
10.	Procurement of the OS, Application software and DB & licensing at DC (KMDS) & DR			√
11.	Stating the requirement as regards to storage and compute as required for smart cities at DC (KMDS) & the DR for city level applications			√
12.	Development & Hosting the city specific applications at the servers in KMDS (Production) & DR			√
13.	Provisioning of required compute and storage at DC (KMDS) & DR for the requirement of the city and Co-location space for Mangaluru city.		√	
14.	Complete back-up of the Application & Database hosted at KMDS DC and DR as per the back-up policy provided by City SI		√	
15.	DR Set up for ICOP		√	
16.	DR set up for city specific applications		√	
17	DC & DR set up for video feeds			√
18.	Infrastructure procurement, deployment and commissioning towards DR for video feed			√
19	Back-up of video feeds into secondary storage device, where Required			√
20	Integration (development, testing and staging) between field devices and the IoT platform at KMDS		√	√
21.	Integration (development, testing and staging) between city specific applications and the ICOP platform at KMDS		√	√
22.	Integration (development, testing and staging) between external applications and ICOP platform at KMDS.		√	√
23.	Integration (development, testing and staging) for data transfer from field devices DR in case of DC failure		√	√
24.	Integration (development, testing and staging) between city specific		√	√

Sr. no.	Activity	KMDS	Centralised CCC MSI	City SI
	applications and the ICOP platform at DR in case of DC failure			
25.	Integration (development, testing and staging) for data transfer from external applications to DR in case of DC failure		√	√
26.	Ensuring the availability of DC & DR Infrastructure		√	
27.	Ensuring the availability of field devices			√
28.	Ensuring the availability of ICOP Platform		√	
29.	Ensuring the availability of City specific Applications			√
30.	Updating the data layers at GIS			√
31.	Integration of new applications as per the scope defined in the scope of the RFP		√	√
32.	Data flow from cameras/ field devices to the Video Storage			√
33.	Network connectivity from Field devices to KMDS			√
34.	Network connectivity to the DR for video storage			√
35.	Functional specifications for the data coming from the field devices to the IoT platform			√
36.	Implementation of Business Intelligence based on the data collected from Smart City applications at the IoT platform for the data coming from field devices		√	
37.	Defining workflow based on the SOP for Critical Health Incidence and Emergency Response			√
38.	Conducting UAT for DC and DR		√	√
39.	Extending EMS for monitoring		√	
40.	DNS Registration			√
41.	Development of workflows for Emergency Response and Critical Health Response for cities & integrate onto the ICOP platform based on the work flow inputs provided by the Authority/ Smart City SPV/ CSI of KUIDFC		√	
42.	Provide Training to Personnel of the Authority		√	
43.	Providing comprehensive maintenance of Data Center IT and Non-IT Infrastructure for 5 years		√	
44.	Operations & Maintenance of DC & DR Services for 2 years		√	
45.	Maintenance of ICOP for 5 years with operations support for 2 years		√	

Annexure K. Stakeholder Departments' Buy-In Letters

MANGALURU SMART CITY LIMITED

ಮಂಗಳೂರು ಸ್ಮಾರ್ಟ್ ಸಿಟಿ ಲಿಮಿಟೆಡ್

Address: M.G. ROAD, LALBAGH, MANGALURU-575003, DAKSHINA KANNIADA, KARNATAKA.

ವಿಳಾಸ: ಎಮ್.ಜಿ. ರಸ್ತೆ, ಲಾಲ್ ಬಾಗ್, ಮಂಗಳೂರು - 575003, ದಕ್ಷಿಣ ಕನ್ನಡ, ಕರ್ನಾಟಕ.

CIN:U74999KA2017PLC102010

Phone:0824-2220310

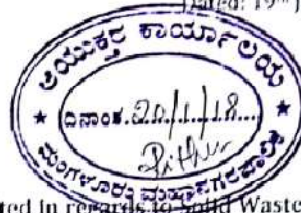
Email id:commissioner,mcc@gmail.com,smartcitymangaluru@gmail.com Website: www.mangaluresmartcity.myspace.in

Ref: MSCL/MD/ICT Manager/008/2017-18

Dated: 19th January, 2018

To,

Commissioner,
Mangaluru City Corporation,
Lalbagh, Mangaluru,
Karnataka - 575003.



- Subject: 1) Your acknowledgement and concurrence solicited in regards to Solid Waste Management, Emergency Response and Disaster Management under Mangaluru Smart City Projects.
- 2) Direction through you for Paperless Office, Utility bill payment and Service Identification and Integration with One Touch Mangaluru App/Portal.

Dear Sir,

Under your capable leadership and directions, Mangaluru Smart City Project seeks to implement Solid Waste Management, Emergency Response and Disaster Management for the city. Your office plays critical role in leading the rescue and resolution operations by engaging relevant Departments subject to the nature of Emergency/Disaster and their predefined role in it. Mangaluru Smart City will be establishing Command and Control Centre to assist by engaging Smart Components and establishing a direct line of communication between mobilized resources from each responsible Department. We request your acknowledgement and concurrence in establishing Standard Operating Procedures in accordance with the guidelines issued by National Disaster Response Force and Karnataka State Natural Disaster Monitoring Centre, in addition to any guidelines deemed fit by your office:

- 1) Implementing of Smart Components such as GPS, RFID etc for real time tracking and monitoring of Emergency Response vehicle and Integration with Automated Dispatch System so that systems in CCC can directly schedule dispatch of Department Resources such as Response Team, Vehicles etc.
- 2) Management and monitoring of progress on real time basis by enabling clear lines of communications between your office, CCC and Response Team active on field.
- 3) Emergency response vehicles identified so far
 - a) Police Patrolling Vehicles
 - b) Towing Vehicle
 - c) Ambulance
 - d) Fire Brigade
 - e) Municipality Emergency Response vehicles

In regards to Solid Waste Management, KUIDFC guidelines dictate that SWM vehicles to be equipped with GPS for tracking vehicular movement across the city. There is requirement for establishing weighbridge at dumping site if not already present along with CCTV for surveillance purposes. In addition, we recommend that one environmental sensor be positioned in proximity to dumping site for air quality monitoring in the area.

The third element of Smart City where we request your direction and assistance is for identification and integration of Department services with One Touch Mangaluru App/Portal. Under Smart City project, One Touch Mangaluru aims to serve as Single Window for Citizens in seeking any City specific service provided by State Departments. Active Participation of these Departments will help design eGovernance blueprint for citizen interfacing depending upon the service maturity and Integration readiness. In addition, to encourage

MANGALURU SMART CITY LIMITED
ಮಂಗಳೂರು ಸ್ಮಾರ್ಟ್ ಸಿಟಿ ಲಿಮಿಟೆಡ್

Address: M.G. ROAD, LALBAGH, MANGALURU-575003, DAKSHINA KANNADA, KARNATAKA.

ವಿಳಾಸ : ಎಮ್.ಜಿ. ರಸ್ತೆ, ಲಾಲ್ ಬಾಗ್, ಮಂಗಳೂರು - 575003, ದಕ್ಷಿಣ ಕನ್ನಡ, ಕರ್ನಾಟಕ.

CIN:U74999KA2017PLC102010


Phone:0824-2220310

Email id:commissioner.mcc@gmail.com, smartcitymangaluru@gmail.com Website: www.mangaluresmartcity.mca.gov.in

utilization of One Touch Mangaluru, it would be beneficial if Paperless Office being undertaken by MCC be enabled through One Touch Mangaluru along with utility bill payments, grievance redressal and helpdesk.

I request you to kindly provide with your concurrence on this matter as early as possible.

Yours Sincerely,


Managing Director
Mangaluru Smart City Limited

MANGALURU SMART CITY LIMITED
ಮಂಗಳೂರು ಸ್ಮಾರ್ಟ್ ಸಿಟಿ ಲಿಮಿಟೆಡ್

Address: M.G. ROAD, LALBAGH, MANGALURU-575003, DAKSHINA KANNADA, KARNATAKA.

ವಿಳಾಸ : ಎಮ್.ಜಿ. ರಸ್ತೆ, ಲಾಲ್ ಬಾಗ್, ಮಂಗಳೂರು - 575003, ದಕ್ಷಿಣ ಕನ್ನಡ, ಕರ್ನಾಟಕ.

CIN: U74999KA2017PLC102010

Phone 0824-2220310

Email id: commissioner.mcc@gmail.com, smartcitymangaluru@gmail.com, Web Site: www.mangalorcity.mnrc.gov.in

Ref: MSCL/MD/ICT Manager/001/2017-18

Dated: 19th January, 2018

To,

Regional Transport Officer
Regional Transport Office,
Opposite Nehru Maidan, Maidan Road,
Attavar, Mangaluru,
Karnataka - 575001.



Subject: Your acknowledgement and concurrence solicited in regards to Vehicle Tracking and Passenger Information System for public transport utility.

Dear Sir,

As you are aware that Mangaluru Smart City Project seeks to implement Passenger Information System at Smart Bus Shelters and on the portal/app, One Touch Mangaluru. Your office plays critical role in ensuring safe and comfortable Public Transportation system in the city. In order to have an accurate Passenger Information System, it would be required for Buses be equipped with GPS devices along with GSM/GPRS module. KUIDFC is in dialogue with BMTS, KSRTC for implementing a centralized Vehicle Tracking system for all cities in Karnataka State. It is envisaged that the GPS devices applied in Public Transportation will integrate with the centralized VTS as and when it is rolled out by the state. VTS shall be integrated with the City CCC for surveillance as well as with One Touch Mangaluru for select officials' access.

Since Public Transportation in the Mangaluru City employs Private Bus Operators, we request your office to coordinate and issue necessary directives to Bus Operators/Owners for procuring GPS devices with GSM/GPRS module for their buses. System Integrator selected for the Smart city components will undertake configuring their GPS devices for syncing with the Centralized VTS. We are attaching specifications of the GPS device with this letter for your consideration.

We are proposing following additional use cases for enhancing public transportation in the city:

1. Locate closest bus shelter on Mobile through One Touch Mangaluru app/portal
2. Get route map between desired source and destination, and buses operating between the two
3. Fare information in terms of distance, between source-destination.
4. Information on Cultural events, places for citizens, tourists based on their location
5. Grievance, help desk through One Touch Mangaluru
6. SOS for Bus operators, citizens in event of breakdown or any incident.

I request your kind perusal and provide us with your concurrence as early as possible.

Yours Sincerely,


Managing Director
Mangaluru Smart City Limited

Enclosed: Specifications of GPS Device.



MANGALURU SMART CITY LIMITED ಮಂಗಳೂರು ಸ್ಮಾರ್ಟ್ ಸಿಟಿ ಲಿಮಿಟೆಡ್

Address: M. G. ROAD, LALBAGH, MANGALURU-575003, DAKSHINA KANNADA, KARNATAKA.

ವಿಳಾಸ : ಎಮ್.ಜಿ. ರಸ್ತೆ, ಲಾಲ್ ಬಾಗ್, ಮಂಗಳೂರು - 575003, ದಕ್ಷಿಣ ಕನ್ನಡ, ಕರ್ನಾಟಕ.

CIN:U74999KA2017PLC102010

Phone:0824-2220310

Email id:commissioner.mcc@gmail.com,smartcitymangaluru@gmail.com Website: www.mangalorecity.mrc.gov.in

GPS Specifications

Sr. No.	Parameter	Minimum Specifications Required
1	General Requirements	<ul style="list-style-type: none"> GPS (Location, speed, heading, timestamp, fuel monitoring,) data polling and sending frequency capability of less than or equal to 05 sec. Location on demand on GPRS/SMS Memory to store sufficient positional log. (Used when connectivity is not available. It will synchronize with server as soon as connectivity establishes) Configurable Backup SMS facility in case of GPRS failure. Remotely controlled (to change any configuration) Device should have status LED's to indicate Power, GPS, and GPRS status. GPS Device should be battery based and Battery Backup of device should be at least for 5 days. Device must be sealed with security screws. Parallel GPS Receiver: minimum 20-Channel or more Acquisition sensitivity: better than (-)148dBm Tracking Sensitivity better than (-)155dBm Less than 5m Positional Accuracy,(2dRMS confidence level higher than 95%) or 3m CEP Hot Start < 10s Warm Start :< 40s Cold Start <60s Outputs as per NMEA 0183 WGS-84 compliant Internal memory backup up-to 10 days. GPRS Communication In- Built Triband GPRS module/Modem Multi Slot GPRS Class 10 GSM/GPRS module Should support all - SMS, Voice, Data, GPRS, TCP/IP Power Input voltage range 8-30 Volts Active mode Peak < 1.0 A Active mode Avg< 200mA Sleep Mode < 25 mA
2	Operating Environment	Temperature range: 0° C to 90° C Humidity Level: 4% to 95% non-condensing Dust, temperature, airtight, vibration and Water Splash resistant IP 55 rated or better.
3	Antenna	All the antennas must be internal but should have provision for supporting external antenna
4	Ports	<ul style="list-style-type: none"> 8 or more digital Inputs 4 or more digital outputs (For Relays, sirens etc.) 1 or more analog inputs (For analog inputs like Fuel, temperature etc) Ignition sensing 2 no.s RS232 ports RS232 /GPS out for LED display board thru integrated controller, inside vehicle. (GPRMC string out in Degree, minutes format with 1/10,000 of minutes, ddmmyy format every 1 sec feed) (Optional).

MANGALURU SMART CITY LIMITED
ಮಂಗಳೂರು ಸ್ಮಾರ್ಟ್ ಸಿಟಿ ಲಿಮಿಟೆಡ್

Address: M.G. ROAD, LALBAGH, MANGALURU-575003, DAKSHINA KANNADA, KARNATAKA.

ವಿಳಾಸ: ಎಮ್.ಜಿ. ರಸ್ತೆ, ಲಾಲ್ ಬಾಗ್, ಮಂಗಳೂರು - 575003, ದಕ್ಷಿಣ ಕನ್ನಡ, ಕರ್ನಾಟಕ.

CIN U74999KA2017PLC102010

Phone: 0824-2220310

Email: id.commissioner.mcc@gmail.com, smartcitymangaluru@gmail.com Website: www.mangalpsmartcity.mys.gov.in

Ref: MSCL/MD/ICT Manager/002/2017-18

Dated: 19th January, 2018

To,

Commissioner of Police
Mangalore Police Commissionerate Office
Maidan Road, Pandeshwar,
Mangaluru,
Karnataka - 575001.

Subject: Your acknowledgement and concurrence solicited in regards to CCTV Surveillance aspects under Mangaluru Smart City Projects.

Dear Sir,

As you are aware that Mangaluru Smart City Project seeks to enhance CCTV Surveillance across city. In this context, our Project Management Consultants have already completed around 8 rounds of dialogue with your officials in various capacities. A list of locations with required number of CCTV was deliberated and arrived upon between the two teams. You may also be aware that KUIDFC is serving as Nodal Agency responsible for reviewing the DPR for all Smart City components for every selected city under Karnataka State. They have issued IT/ICT guidelines requiring to limit the number of junctions to not more than 15 and number of CCTV cameras not more than 60. We are attaching a tentative list of junctions that has been received from your office from time to time along with the number of CCTV installations (existing + proposed) in the said junctions for your concurrence and prioritization of the same. Further, in strict compliance with the IT/ICT guidelines of KUIDFC, the following scope has been worked out:

1. Command and Control Centre will be established in the MCC office, Lalbagh.
2. It is recommended that few officers from Police Department become part of City Surveillance team in the CCC office. As informed by current system implementer (Maurya Infotech) of CCTV installations in Mangaluru City, the feed from additional cameras that will be deployed under Smart City Project to be integrated with the existing police control room is infeasible in current set-up.
3. Video Analytics scope will be limited to Face Detection, Crowd Detection, People counting, Incident/Accident detection etc under purview of Law & Order for a select few cameras at busy junctions with higher footfall.
4. Red Light Violation Detection, Over Speed Detection, Automatic Number Plate Recognition under purview of Traffic Surveillance will be implemented under later stages.
5. Feed sharing between the CCC office and Police Control Room be automated and on demand basis to optimize on duplication of video storage and operations between the two offices.
6. Integration with Automated Dispatch system for engaging Police Patrolling Vehicles and/or Towing Vehicles by City Operations Team in response to Incident/Accident reported by Civilians and/or detected by the system.
7. eChallan integration with your existing eChallan system in place.
8. Preparation of MIS reports for weekly, fortnightly and monthly basis indicating number of incidents captures vs reported, action taken reports, eChallan Collections and number of resolutions carried out against civilian feedback and/or grievances.

(Signature)
Commissioner of Police
Mangaluru City

MANGALURU SMART CITY LIMITED ಮಂಗಳೂರು ಸ್ಮಾರ್ಟ್ ಸಿಟಿ ಲಿಮಿಟೆಡ್

Address: M.G. ROAD, LALBAGH, MANGALURU-575003, DAKSHINA KANNADA, KARNATAKA.
ವಿಳಾಸ : ಎಮ್.ಜಿ. ರಸ್ತೆ, ಲಾಲ್‌ಬಾಗ್, ಮಂಗಳೂರು - 575003, ದಕ್ಷಿಣ ಕನ್ನಡ, ಕರ್ನಾಟಕ.

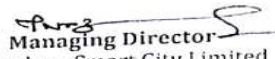
CIN:U74999KA2017PLC102010 Phone:0824-2220310

Email id:commissioner.mcc@gmail.com,smartcitymangaluru@gmail.com Website: www.mangalorecity.mrc.gov.in

In addition to seeking your concurrence on the revised scope listed above, I also request you to nominate official who will participate in preparing Standard Operating Procedures for City Surveillance.

I request you to kindly provide with your concurrence on this matter as early as possible.

Yours Sincerely,


Managing Director
Mangaluru Smart City Limited

Enclosed: List of 25 Junction Improvements' List to Identify 15 Junctions for the CCTV Locations

MANGALURU SMART CITY LIMITED ಮಂಗಳೂರು ಸ್ಮಾರ್ಟ್ ಸಿಟಿ ಲಿಮಿಟೆಡ್

Address: M.G. ROAD, LALBAGH, MANGALURU-575003, DAKSHINA KANNADA, KARNATAKA.
ವಿಳಾಸ : ಎಮ್.ಜಿ. ರಸ್ತೆ, ಲಾಲ್‌ಬಾಗ್, ಮಂಗಳೂರು - 575003, ದಕ್ಷಿಣ ಕನ್ನಡ, ಕರ್ನಾಟಕ.

CIN:U74999KA2017PLC102010 Phone:0824-2220310

Email id:commissioner.mcc@gmail.com,smartcitymangaluru@gmail.com Website: www.mangalorecity.mrc.gov.in

Sr. no.	Junction	Traffic Signal (Y/N)	Existing Cameras	PTZ Proposed by PMC (Y/N)	Earlier Camera Requisition Given by Police	Prioritized by Traffic Police under 15 Junctions for Cameras (Y/N)	Final Camera Requisition by Police
1.	Pumpwell Circle	N	0	Y	6	Y (?)	
2.	KPT Circle	Y	4	N	2	?	
3.	Nanthoor Circle	Y	5	Y	2	Y	- 1 PTZ
4.	Bendoorwell	Y	1	Y	2	Y	- 1 PTZ
5.	Karavali (Overview)	Y	3	Y	1	Y	- 1 PTZ
6.	Kankanady	N	2	N	2		
7.	Marmankatta	N	1	N	2		
8.	Morgan's Gate	N	1	N	2		
9.	Mangaladevi	N	2	N	3		
10.	AB Shetty Junction	N	5	N	2		
11.	Hampankatta	Y	4	Y	2		- 1 PTZ
12.	Ambedkar (Jyothi) Circle	Y	3	Y	2	Y	- 1 PTZ
13.	KSRTC	Y	0	Y	4	Y	- 1 PTZ
14.	Kottara Chowki Junction	N	0	N	3		
15.	Lady Hill Circle	N	4	N	2		- 1 PTZ
16.	Lalbagh	Y	4	Y	2	Y	- 1 PTZ
17.	PVS Circle	Y	3	Y	3	Y	- 1 PTZ
18.	Kuntikana junction	N	2	N	4		
19.	Balmatta Junction	Y	2	N	0	?	
20.	Clock Tower Circle	N	3	N	0		
21.	Hamilton Junction	N	3	N	0		
22.	Malikane Junction	N	3	N	0		
23.	Rao and Rao Circle	N	0	N	2		
24.	Jeppinamogaru Junction	N	0	N	2		
25.	Eemmekere Cross Street Junction	N	0	N	0		
26.	Horticulture Junction	Y	0	Y	2	Y	+ 1 PTZ
Total		11	55	11	52	15 (max)	60 (max)

MANGALURU SMART CITY LIMITED
ಮಂಗಳೂರು ಸ್ಮಾರ್ಟ್ ಸಿಟಿ ಲಿಮಿಟೆಡ್

Address: M.G. ROAD, LABAGH, MANGALURU-575003, DAKSHINA KANNADA, KARNATAKA.

ವಿಳಾಸ : ಎಮ್.ಜಿ. ರಸ್ತೆ, ಲಾಬಾಗ್, ಮಂಗಳೂರು - 575003, ದಕ್ಷಿಣ ಕನ್ನಡ, ಕರ್ನಾಟಕ.

CIN:U74999KA2017PLC102010

Phone:0824-2220310

Email id:commissioner.mcc@gmail.com,smartcitymangaluru@gmail.com Website: www.mangalorecity.mrc.gov.in

Ref: MSCL/MD/ICT Manager/004/2017-18

Dated: 19th January, 2018

To,

District Health Officer,
Health and Family Welfare Office
Opposite Nehru Maidan, Mangaluru,
Karnataka - 575001.

**Subject: Your concurrence solicited in regards to Integration with One Touch Mangaluru, and
Emergency Response and Disaster Management under Mangaluru Smart City Projects.**

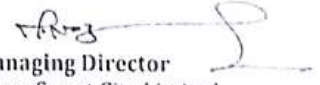
Dear Sir,

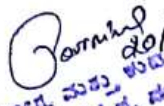
As you are aware that Mangaluru Smart City Project seeks to implement One Touch Mangaluru, Command and Control Centre, Emergency Response and Disaster Management for the city. Your Institution plays pivotal role in providing health and critical care services across the clock. We request you to nominate Official from your Institution for following scope of work in addition to establishing SOP:

1. Implementing of Smart Components such as GPS, RFID etc on designated Resource for real time tracking and monitoring of your Ambulances and/or mobile clinics.
2. Enable and Integrate Automated Dispatch System so that systems in CCC can directly schedule dispatch of Ambulances and/or mobile clinics.
3. Integration of your Department services with One Touch Mangaluru App/Portal for advisories, notifications and citizen active participation.
4. Establishment of Standard Operating Procedure for coordination and communications with your office/officials for Emergency Response and Disaster Management.

Under Smart City project, One Touch Mangaluru aims to serve as Single Window for Citizens in seeking any City specific service provided by State Departments. I request you to kindly provide with your concurrence on this matter as early as possible.

Yours Sincerely,


Managing Director
Mangaluru Smart City Limited


20/1/18
ಮಂಗಳೂರು ಮಹಾನಗರ ಪಾಲಿಕೆ
ಆರೋಗ್ಯ ಮತ್ತು ಕುಟುಂಬ ಕಲ್ಯಾಣ ಇಲಾಖೆ
ಜಿಲ್ಲಾ ಆರೋಗ್ಯ ಮತ್ತು ಕುಟುಂಬ ಕಲ್ಯಾಣ ಅಧಿಕಾರಿ

MANGALURU SMART CITY LIMITED
ಮಂಗಳೂರು ಸ್ಮಾರ್ಟ್ ಸಿಟಿ ಲಿಮಿಟೆಡ್

Address: M.G. ROAD, LALBAGH, MANGALURU-575003, DAKSHINA KANNADA, KARNATAKA.

ವಿಳಾಸ : ಎಮ್.ಜಿ. ರಸ್ತೆ, ಲಾಲ್‌ಬಾಗ್, ಮಂಗಳೂರು - 575003, ದಕ್ಷಿಣ ಕನ್ನಡ, ಕರ್ನಾಟಕ.

CIN:U74999KA2017PLC102010

Phone:0824-2220310

Email:commissioner.mcc@gmail.com,smartcitymangaluru@gmail.com Website: www.mangaluresmartcity.mrc.gov.in

Ref: MSCL/MD/ICT Manager/003/2017-18

Dated: 19th January, 2018

To,

Chief Fire Officer,
Fire and Emergency Services Office
Attavar, Mangaluru,
Karnataka - 575001.

**Subject: Your concurrence solicited in regards to Integration with One Touch Mangaluru, and
Emergency Response and Disaster Management under Mangaluru Smart City Projects.**

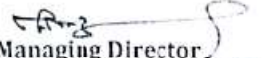
Dear Sir,

As you are aware that Mangaluru Smart City Project seeks to implement Emergency Response and Disaster Management for the city. Your office plays critical role in rescue and resolution operations subject to the nature of Emergency/Disaster. Mangaluru Smart City will be establishing Command and Control Centre to assist by engaging Smart Components and establishing a direct line of communication between CCC and your Department. We request your acknowledgement and concurrence in establishing Standard Operating Procedures between CCC and your department. We request you to nominate Official from your Department for following scope of work in addition to establishing SOP:

1. Implementing of Smart Components such as GPS, RFID etc. on designated Resource for real time tracking and monitoring of your Fire Fighting vehicles.
2. Enable and Integrate Automated Dispatch System so that systems in CCC can directly schedule dispatch of Fire Brigade.
3. Management and monitoring of progress on real time basis by enabling clear lines of communications between your office and Response Team active on field.
4. Integration of your Department services with One Touch Mangaluru App/Portal.

Under Smart City project, One Touch Mangaluru aims to serve as Single Window for Citizens in seeking any City specific service provided by State Departments. I request you to kindly provide with your concurrence on this matter as early as possible.

Yours Sincerely,


Managing Director
Mangaluru Smart City Limited



MANGALURU SMART CITY LIMITED
ಮಂಗಳೂರು ಸ್ಮಾರ್ಟ್ ಸಿಟಿ ಲಿಮಿಟೆಡ್

Address: M.G. ROAD, LALBAGH, MANGALURU-575003, DAKSHINA KANNADA, KARNATAKA.

ವಿಳಾಸ : ಎಮ್.ಜಿ. ರಸ್ತೆ, ಲಾಲ್‌ಬಾಗ್, ಮಂಗಳೂರು - 575003, ದಕ್ಷಿಣ ಕನ್ನಡ, ಕರ್ನಾಟಕ.

CIN:U74999KA2017PLC102010

Phone:0824-2220310

Email id commissioner.mcc@gmail.com,smartcitymangaluru@gmail.com Website: www.mangalorecity.mrc.gov.in

Ref: MSCL/MD/ICT Manager/007/2017-18

Dated: 19th January, 2018

To,

Deputy Commissioner,
Dakshina Kannada District,
Mangaluru, Karnataka - 575001.

- Subject:** 1) Your acknowledgement and concurrence solicited in regards to Emergency Response and Disaster Management under Mangaluru Smart City Projects.
2) Direction through you to State Departments serving Mangaluru City for service identification and integration with One Touch Mangaluru App/Portal.

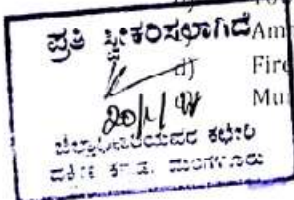
Dear Sir,

As you are aware that Mangaluru Smart City Project seeks to implement Emergency Response and Disaster Management for the city. Your office plays critical role in leading the rescue and resolution operations by engaging various City and State departments subject to the nature of Emergency/Disaster and their predefined role in it. Mangaluru Smart City will be establishing Command and Control Centre to assist by engaging Smart Components and establishing a direct line of communication between mobilized resources from each responsible Department. We request your acknowledgement and concurrence in establishing Standard Operating Procedures in accordance with the guidelines issued by National Disaster Response Force and Karnataka State Natural Disaster Monitoring Centre, in addition to any guidelines deemed fit by your office. PMC has proposed engagement of following departments as part of City Operations Team under CCC:

1. Police Department
2. Fire Department.
3. Emergency Response team of MCC.
4. Health Department

Your office may also nominate Additional Departments deemed necessary in Emergency Response & Disaster Management. We request that at least one officer from each Department be identified to help finalize the SOP cross cutting across all the Departments. Post implementation of CCC, we request all involved Departments for following scope of work:

- 1) Implementing of Smart Components such as GPS, RFID etc on designated Resource for real time tracking and monitoring.
- 2) Enable and Integrate Automated Dispatch System so that systems in CCC can directly schedule dispatch of Department Resources such as Response Team, Vehicles etc.
- 3) Management and monitoring of progress on real time basis by enabling clear lines of communications between your office, CCC and Response Team active on field.
- 4) Designated resources identified so far
 - a) Police Patrolling Vehicles
 - b) Towing Vehicle
 - c) Ambulance
 - d) Fire Brigade
 - e) Municipality Emergency Response vehicles



MANGALURU SMART CITY LIMITED
ಮಂಗಳೂರು ಸ್ಮಾರ್ಟ್ ಸಿಟಿ ಲಿಮಿಟೆಡ್

Address: M.G. ROAD, LALBAGH, MANGALURU-575003, DAKSHINA KANNADA, KARNATAKA.

ವಿಳಾಸ : ಎಮ್.ಜಿ. ರಸ್ತೆ, ಲಾಲ್‌ಬಾಗ್, ಮಂಗಳೂರು - 575003, ದಕ್ಷಿಣ ಕನ್ನಡ, ಕರ್ನಾಟಕ.

CIN: U74999KA2017PLC102010

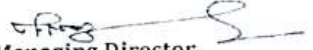
Phone: 0824-2220310

Email id: commissioner.mcc@gmail.com, smartcitymangaluru@gmail.com Website: www.mangalorecity.mrc.gov.in

The Second element of Smart City where we request your direction and assistance is for identification and integration of Department services with One Touch Mangaluru App/Portal. Under Smart City project, One Touch Mangaluru aims to serve as Single Window for Citizens in seeking any City specific service provided by State Departments. Active Participation of these Departments will help design eGovernance blueprint for citizen interfacing depending upon the service maturity and Integration readiness.

I request you to kindly provide with your concurrence on this matter as early as possible.

Yours Sincerely,


Managing Director

Mangaluru Smart City Limited

MANGALURU SMART CITY LIMITED
ಮಂಗಳೂರು ಸ್ಮಾರ್ಟ್ ಸಿಟಿ ಲಿಮಿಟೆಡ್

Address: M.G. ROAD, LALBAGH, MANGALURU-575003, DAKSHINA KANNADA, KARNATAKA.

ವಿಳಾಸ : ಎಮ್.ಜಿ. ರಸ್ತೆ, ಲಾಲ್‌ಬಾಗ್, ಮಂಗಳೂರು - 575003, ದಕ್ಷಿಣ ಕನ್ನಡ, ಕರ್ನಾಟಕ.

CIN:U74999KA2017PLC102010

Phone:0824-2220310

Email id:commissioner.mcc@gmail.com,smartcitymangaluru@gmail.com,Website: www.mangalorecity.mrc.gov.in

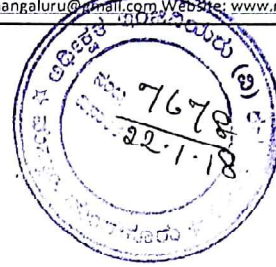
Ref: MSCL/MD/ICT Manager/005/2017-18

Dated: 19th January, 2018

To,

**The Superintending Engineer,
MESCOM**

Attavar, Mangaluru,
Karnataka - 575001.



Subject: Your acknowledgement and concurrence are solicited in regards to Smart Energy / Electricity requirements under Mangaluru Smart City Projects.

Dear Sir,

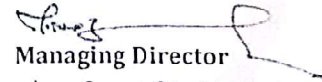
As you are aware that Mangaluru Smart City Project seeks to improve Citizen Participation in regards to Utilities consumption, wastage and theft prevention. In this context, our Project Management Consultants have already met around 5 times with your officials in various capacities to gather list of meters, SCADA etc. You may also be aware that KUIDFC is serving as Nodal Agency responsible for reviewing the DPR for all Smart City components for every selected city under Karnataka State. They have issued IT/ICT guidelines requiring to limit the scope of smart energy meter to integration alone. In strict compliance with the IT/ICT guidelines of KUIDFC, the following scope has been worked out:

1. Smart meters integration with the Centralized CCC platform hosted at KMDS Data Centre. Subject to level of integration, it may enable citizen to track the utilization and be alerted in event of excess consumption.
2. SCADA integration for the purpose of notifying citizens in event of planned/unplanned maintenance, load shedding etc.
3. Integration with Utility bill payment system with One Touch Mangaluru
4. Integration of Help desk/grievance cell with One Touch Mangaluru

In addition to seeking your concurrence on the revised scope listed above, I also request you to nominate official who will participate in preparing Standard Operating Procedures for designing process flow between City Operations Team and MESCOM officials.

I request you to kindly provide with your concurrence on this matter as early as possible.

Yours Sincerely,


Managing Director

Mangaluru Smart City Limited

MANGALURU SMART CITY LIMITED

ಮಂಗಳೂರು ಸ್ಮಾರ್ಟ್ ಸಿಟಿ ಲಿಮಿಟೆಡ್

Address: M.G. ROAD, LALBAGH, MANGALURU-575003, DAKSHINA KANNIADA, KARNATAKA.

ವಿಳಾಸ : ಎಮ್.ಜಿ. ರಸ್ತೆ, ಲಾಲ್‌ಬಾಗ್, ಮಂಗಳೂರು - 575003, ದಕ್ಷಿಣ ಕನ್ನಡ, ಕರ್ನಾಟಕ.

CIN:U74999KA2017PLC101010

Phone:0824-2220310

Email:ld.commissioner.mcc@gmail.com,smartcitymangaluru@gmail.com Website: www.mangalorecity.mrc.gov.in

Ref: MSCL/MD/ICT Manager/006/2017-18

Dated: 19th January, 2018

To,

**Environmental Officer,
Karnataka State Pollution Control Board
10B, Near Gausiya Masjid,
Baikampady Industrial Area,
Mangaluru, Karnataka - 560011.**

Subject: Your acknowledgement and concurrence solicited in regards to scope of Air Quality monitoring and Environmental Sensor locations.

Dear Sir,

As you are aware that Mangaluru Smart City Project seeks to implement Air Quality Monitoring at few select locations in accordance with KUIDFC guidelines. In this regard, Project Management Consultants (PMC) have met your officials on three occasions to gather requirements and work out tentative locations for installation of Environmental Sensors. We are attaching specifications of the sensors indicating the scope air quality monitoring and the list of selected tentative locations from the list provided by your office in accordance with KUIDFC guidelines.

Category.	Features	Range	Resolution / Remarks
Gas Sensors	Particulate Matter PM 2.5	0 - 500 µg/ m ³	± 5 µg/ m ³
	Particulate Matter PM 10	0 - 1000 µg/ m ³	± 5 µg/ m ³
	Carbon Monoxide (CO)*	0 - 31000 ppb	100 ppb
	Nitrogen Dioxide (NO ₂)*	0 - 300 ppb	10 ppb
	Ozone (O ₃)*	0 - 400 ppb	10 ppb
	Sulphur Dioxide (SO ₂)*	0 - 700 ppb	10 ppb
	Nitric Oxide (NO)* (Optional)	0 - 300 ppb	10 ppb
External Mount Sensors (Optional)	CO2	0-5000 ppm	
	UV	0-30 UVI	
	Humidity	20% - 30% RH	
	Temperature	-40°C - +85°C	
	Sound	40 dBA - 75 dBA	
Environmental Sensors	Light	1 - 188000 Lux	

Sl. No.	Locations	Coordinates
1.	Jyothi Circle Hampankatta	12.87261, 74.84853
2.	Clock Tower, Balmatta	12.05555, 74.84017
3.	Nreshwalya Road, Bunder	12.85879, 74.83403
4.	Crescent English Medium School, Bunder	12.85897, 74.83236
5.	B E O Office South, Bolar	12.84724, 74.84465

I request your kind perusal and provide us with your concurrence as early as possible.

Yours Sincerely,

Recd
19/01/18
OFFICE
Karnataka State Pollution Control Board
10B, Near Gausiya Masjid,
Baikampady Industrial Area,
MANGALORE - 575 011

19/01/18
Managing Director