

Request for Proposal for Selection of Master System Integrator for Integrated Command and Control Centre (ICCC) of Bareilly Smart City Limited (BSCL) (including 5 years O&M)

> Volume I: Instructions to Bidders Bareilly Smart City Limited (BSCL)

Smart City

BAREILLY SMART CITY LIMITED (BSCL) BAREILLY (UTTAR PRADESH, INDIA)

Ref No: -BSCL/2020-21/ 3 60

Date: 10/7/2020

Bareilly Smart City Limited, Bareilly invites e-tender for the following projects: -

S.No.	Name of the Work	Earnest Money Deposit (Rs.)	Tender fee with GST @ 18% (Rs.)	Work completion Period	Bid Start Date
01	Selection of master System Integrator for Integrated Command and control Centre for Bareilly Smart city Limited including 5 years O & M	360 Lakhs	29500	12 Months	10/7/2020
02	Construction /Development of Smart Street Vending Zone at Allen Club Mandi with 1-year Defect Liability Period	3.3 Lakhs	11800	6 Months	14/7/2020
03	Supply of Heavy Tippers for Waste Management at Bareilly	4 Lakhs	11800	3 Months	14/7/2020
04	Supply of Super Sucker Machine with Dump Tanks at Bareilly	5 Lakhs	11800	3 Months	14)7/2020
05	Design, Supply and Construction of Foot Over Bridge at District Hospital on EPC mode in Bareilly under Bareilly Smart City Limited	6 Lakhs	11800	6 Months	14/7/2020
06	Construction of Maulana Azad School Block with 1 year of Defect liability period	7 Lakhs	11800	6 Months	14/7/2020

1.	Detailed NIT and Bid Document shall be available on: - https://etender.up.nic.in and http://www.bareillysmartcity.in		
2.	Tender call notice in two Bid systems (Part- I: General & Technical Bid and Part-II: financial Bid/Price Bid/BOQ) from intending bidders		
	fulfilling the eligibility criteria mentioned in this Notice and other qualifying requirements mentioned in this RFP.		
3.	Amendment to NIT if any would be published on website only.		
4.	In case of any queries on this RFP, intending bidders may contact THE GENERAL MANAGER, BAREILLY SMART CITY LIMITED, Bareilly (Tel.		
	No: - 0581- 25510074, 7055519602) or send an email to: ceo.bscl01@gmail.com		

Chief Executive Officer, Bareilly Smart City Limited, Bareilly.

प्रकाशन हेतू नहीं

- 1. सम्पादक, Times of India (All Edition), Hindustan Times (Ay Edition), Danich Jagran (Local edition) इस अनुरोध के साथ कि अपने राष्ट्रीय संस्करण समाचार पत्र में उपरोक्त निविदा सूचना का प्रकाशन आगामी संस्करण में डी0ए0बी00पी0 दरो पर न्यूनतम स्थान में एक बार प्रकाशित करने का कष्ट करे तथा 04 प्रतियों के साथ बिल भुगतान हेतू प्रेषित करें ।
- 2. आयुक्त महोदय, बरेली मण्डल, बरेली की सूचानार्थ ं।
- नोटिस बोर्ड पर चस्पा हेतू । 3.
- कम्प्यूटर प्रभारी/ आई.टी० एक्सपर्ट नगर निगम बरेली को इस अनुरोध के साथ प्रेषित कि उक्त निविदा सूचना को नगर निगम, 4. बरेली की वेबसाइट पर प्रदर्शित करने का कष्ट करें ।

Chief Executive Officer, Bareilly Smart City Limited, Bareilly

Bidding Schedule: Important Dates

S. No.	Activity	Timeline
1.	Bid Start Date	10-07-2020 17:00 hrs
2.	Last date for submission of Online Bid	25-07-2020 till 15:00 hrs.
3.	Last date for submission of Offline (Hard Copies) Technical Bid (except financial bid)	30-07-2020 till 15:00 hrs.
4.	Opening of Bids	28-07-2020 till 15:00 hrs
5.	Date of opening of Commercial bids	To be decide

Instructions for Online Bid Submission

- Instructions to the Bidders to submit the bids online through the Central Public Procurement Portal for e Procurement at <u>https://etender.up.nic.in</u>
- 2. Possession of valid Digital Signature Certificate (DSC) and enrollment/registration of the contractors/ bidders on the e-Procurement/ e-Tender portal are prerequisite for e-Tendering.
- 3. Bidder should register for the enrollment in the e-Procurement site using the "Online Bidder Enrollment" option available on the home page. Portal enrollment is generally free of charge. During enrollment/registration, the bidders should provide only valid and true information including valid email id. All the correspondence shall be made directly with the contractors/bidders through email id as registered.
- 4. Bidder need to login to the site through their user ID/ password chosen during enrollment/registration.
- Then the Digital Signature Certificate (Class II or Class III Certificates with signing key usage) issued by SIFY/ TCS/ nCode/ eMudra or any other Certifying Authority recognized by Controller of Certifying Authorities (CCA) India on eToken/ Smart Card, should be registered.
- 6. The registered DSC only should be used by the bidder in the transactions and should ensure safety of the same.
- 7. Contractor/Bidder may go through the Tender published on the site and download the Tender documents/schedules for the Tenders.
- 8. After downloading / getting the Tender document/schedules, the Bidder should go through them carefully and then submit the documents as required, otherwise bid will be rejected.
- Any clarifications may be sought online through the Tender site, through the contact details or during pre-bid meeting if any. Bidder should take into account the corrigendum if any published before submitting the bids online.
- 10. Bidder may log in to the site through the secured login by the user id/ password chosen during enrolment/registration and then by submitting the password of the e-Token/Smartcard to access DSC.
- 11. Bidder may select the Tender in which he/she is interested in by using the search option and then move it to the 'my Tenders' folder.
- 12. From my Tender folder, he may select the Tender to view all the details uploaded there.
- 13. It shall be deemed that the bidder has read and understood all the terms and conditions before submitting the offer. Bidder should go through the Tender schedules carefully and upload the documents as asked; otherwise, the incomplete bid shall stand rejected.
- 14. Bidder, in advance, should get ready the bid documents to be submitted as indicated in the Tender document/schedule and ordinarily it shall be in PDF/ xls/ rar/ jpg/ dwf formats. If there is more

than one document, all may be clubbed together and provided in the requested format. Bidders Bid documents may be scanned with 100 dpi with black and white option. It is advisable that each document to be uploaded through online for the Tenders should be less than 2 MB. If any document is more than 2MB, it can be reduced through zip/ rar and the same if permitted may be uploaded. The file size being less than 1 MB the transaction uploading time will be very fast.

- 15. The Bidders can update well in advance, the documents such as certificates, annual report details etc., under "My Space option" and these can be selected as per Tender requirements and then send along with bid documents during bid submission. This will facilitate the bid submission process faster by reducing upload time of bids.
- 16. Bidder should submit the Tender Fee online through the e-tendering website only. EMD can be in the form of online payment /FDR or any other security certificate with the conditions that scanned copy of the instrument / proof of payment should be uploaded as part of the offer. FDR must be pledged in the favor of BSCL. The hard copy of EMD should be posted/ couriered/ given in person to the tender Inviting Authority, and it must reach Tender inviting authority latest by before opening of financial BID. The details of the FDR/any other accepted instrument, physically delivered, should tally with the details available in the scanned copy and the data entered during bid submission time, otherwise submitted bid shall not be acceptable or liable for rejection. Any discrepancies in the copy of the payment instrument submitted online and the physical copy would lead to disqualification.
- 17. While submitting the bids online, the bidder shall read the terms and conditions and may accept the same to proceed further to submit the bid packets.
- 18. The bidder has to digitally sign and upload the required bid documents one by one as indicated. Very act of using DSC for downloading the bids and uploading their offers shall be deemed to be a confirmation that they have read, understood and agreed with all clauses of the bid document including General conditions of contract without any exception.
- 19. The bidder has to upload the relevant files required as indicated in the cover content. In case of any irrelevant files, the bid may be rejected.
- 20. If the price bid format is provided in a spread sheet file like BoQ_XXXX.xls, the rates offered should be entered in the allotted space only and uploaded after filling the relevant columns. The Priced-bid/BOQ template shall not be modified / replaced by the bidder; else the bid submitted is liable to be rejected for the Tender.
- 21. The bidders are advised to submit the bids through online e-Tendering system to the Tender Inviting Authority (TIA) well before the bid submission due date and time (as per Server System Clock). The TIA shall not be held responsible for any delay or the difficulties faced during the submission of bids online by the bidders.

- 22. After the bid submission (i.e. after Clicking "Freeze Bid Submission" in the portal), the acknowledgement number indicated by the system should be printed by the bidder and kept as a record of evidence for online submission of bid for the particular Tender and also be used as entry pass to participate in the bid opening.
- 23. The time settings fixed in the server side and displayed at the top of the Tender site, shall remain valid for all actions of requesting, bid submission, bid opening etc., in the e-Tender system. The bidders should follow such time during bid submission.
- 24. All the data being entered by the bidders would be encrypted using Public Key Infrastructure (PKI) encryption techniques to ensure the secrecy of the data. The data entered is not retrievable by unauthorized persons during the bid submission and until the time of bid opening by any person.
- 25. Any bid document that is uploaded to the server is subjected to symmetric encryption using a system generated symmetric key. Further this key is subjected to asymmetric encryption using buyers/bid openers' public keys. Overall, the uploaded Tender documents become readable only after the Tender opening by the authorized bid openers.
- 26. The confidentiality of the bids is maintained with the use of Secured Socket Layer (SSL) 128-bit encryption technology. Data storage encryption of sensitive fields is done.
- 27. The bidder should logout of the Tendering system using the normal logout option available at the top right-hand corner and not by selecting the (X) exit option in the browser.
- 28. For any queries regarding e-Tendering process, the bidders may contact at address as provided in the Tender document. Parallelly, for any further queries, the bidders are advised to send a mail to ceo.bscl01@gmail.com

Chief Executive Officer, Bareilly Smart City Limited, Bareilly

Contents

1	Intro	roduction10		
	1.1	About the BSCL		10
	1.2	2 Introduction to Bareilly Smart city Project		10
	1.3	TEN	IDER Format	10
	1.3.	1	TENDER Volume 1: Instruction to Bidders	10
	1.3.	2	TENDER Volume 2: Scope of work including Functional & Technical Specifications	10
	1.3.	3	TENDER Volume 3: Master Service Agreement	10
	1.4	Fact	t sheet	11
	1.5	Def	initions/ Acronyms	12
2	Inst	ructi	on to Bidders	17
	2.1	Ger	neral	17
	2.2	Elig	ible Bidders	17
	2.2.	1	Sole Bidder	18
	2.2.	2	Consortium	18
	2.3	Con	npliant Bids/ Completeness of Response	18
	2.4	Bido	der to Inform	19
	2.5	Bid	Preparation costs	19
	2.6	Ten	der Fee	19
	2.7	Earı	nest Money Deposit (EMD)	19
	2.8	Bid	Validity Period	20
	2.9	Con	tent of Physical copy of Bid	21
	2.10	Bid	Formats	22
	2.10).1	Pre-Qualification Bid Format	22
	2.10).2	Technical Bid Format	22
	2.10).3	Commercial Bid Format	23
	2.10).4	Bank Details	23
	2.11	Lan	guage	24
	2.12	2.12 Authentication of Bids24		
	2.13	Am	endment of Request for Proposal	24

	2.14	Bid Price	. 24
	2.15	Deviations and Exclusions	. 25
	2.16	Total Responsibility	. 25
	2.17	Late Bids	. 25
	2.18	Right to Terminate the Process	. 25
	2.19	Non-Conforming bids	. 25
	2.20	Acceptance/Rejection of Bids	. 25
	2.21	Confidentiality	. 26
	2.22	Disqualification	. 26
	2.23	Key Personnel	. 27
	2.24	Initial Composition; Full Time Obligation; Continuity of Personnel	. 27
	2.25	Evaluations	. 27
	2.26	Replacement	. 27
	2.27	High Attrition	. 28
	2.28	Fraud and Corrupt Practices	. 28
	2.29	Conflict of Interest	. 30
	2.30	Sub-Contracting	. 30
	2.31	Eligible Goods and Services, and OEM Criteria:	. 30
	2.32	Right to vary quantity	. 32
	2.33	Withdrawal, Substitution, and Modification of Bids	. 32
	2.34	Site Visit	. 33
3	Sele	ction Process for Bidder	.34
	3.1	Opening of Bids	. 34
	3.2	Preliminary Examination of Bids	. 34
	3.3	Clarification on Bids	. 34
	3.4	Evaluation Process	. 35
	3.4.2	1 Stage 1: Pre-Qualification	.35
	3.4.2	2 Stage 2: Technical Evaluation	.35
	3.4.3	3 Stage 3: Commercial Evaluation	.37
		Page	7

	3.5	Prequalification Criteria	. 38
	3.6	Technical Evaluation Framework	.44
	3.6.	1 Technical Bid Criteria & Evaluation	.45
	3.6.	2 Structure of Proposed Solution during the POC	.59
	3.7	Project Delivery & Payment Schedule	. 60
	3.7.	1 Project Delivery	.60
	3.7.	2 Payment Schedule	.61
	3.8	Key Personnel Criteria	62
4	Awa	ard of Contract	.64
	4.1	Notification of Award	.64
	4.2	Signing of Contract	.64
	4.3	Performance Bank Guarantee (PBG)	.64
	4.4	Warranty & Maintenance	. 65
	4.5	Failure to agree with the Terms & Conditions of the TENDER	. 66
5	Ann	exure 2 – Formats for Submission of the Pre-Qualification Bid	.67
	5.1	Pre-qualification bid checklist	. 67
	5.2	Pre-Qualification Bid Covering Letter	. 68
	5.3	Company profile	. 70
	5.4	Declaration of Non-Blacklisting (To be provided on the Company letter head)	.71
	5.5	No Deviation Certificate	.73
	5.6	Total Responsibility Certificate	.74
	5.7	Self-certificate for Project execution experience (In Bidding Entity's Letter Head)	.75
6	Ann	exure 3 – Formats for Submission of the Technical Bid	.76
	6.1	Technical Bid Check-List	.76
	6.2	Technical Bid Covering Letter	. 77
	6.3	Credential Summary	. 79
	6.4	Bidder's Experience - Client Citations	. 80
	6.5	Overview of Proposed Solution	. 81
	6.5.	1 Structure of Proposed Solution	.81
	6.5.	2 Project Plan	.81
		Page	8

	6.	.5.3 Manpower Plan	82
	6.6	Details of Resources proposed	83
	6.7	Curriculum Vitae (CV) of Team Members	
	6.8	Relevant Work Undertaken that best illustrates the experience as required for	or the Role84
	6.9	Compliance to Requirement (Technical / Functional Specifications)	
	6.10	0 Manufacturers'/Producers' Authorization Form	
	6.11	1 Anti-Collusion Certificate	
7	Ar	nnexure 4 – Formats for Submission of the Commercial Bid	88
	7.1	Total Price Summary	
	7.2	Price component for CAPEX:	
	7.3	Price component for OPEX	
8	Ar	nnexure 5 (a) – Performance Bank Guarantee	90
9	Ar	nnexure 5 (b) – Bank Guarantee for Earnest Money Deposit	92
1(0	Annexure 6 – Non-Disclosure Agreement	94
1:	1	Annexure 7 - Consortium Agreement	97
1	2	Annexure 8 - Format for Power of Attorney to Authorize Signatory	
13	3	Annexure 9 - Format for Power of Attorney for Lead bidder of Consortium	

1 Introduction

1.1 About the BSCL

The Bareilly Smart City Limited (BSCL) in the Special Purpose Vehicle (SPV) constituted as per directives of MoUD, Govt. of India for is executing SMART CITY MISSION(SCM) in Bareilly. BSCL has been established under the Companies Act, 2013 of the Ministry of Corporate Affairs, Government of India. It is supported by PMC, PMU and the implementing agency for the implementation of the mission.

1.2 Introduction to Bareilly Smart city Project

The government of India has announced creation of 100 Smart cities to drive economic growth and improve the equality of life of people by enabling local development and harnessing technology as a means to create smart out comes for citizens.

Bareilly is one of the selected cities for the Smart City Mission (SCM) under Ministry of Urban Development, Government of India.

The Smart City planning was done with the strength-full and firm belief for the cultural and spiritual importance of the city along-with PAN city technological intervention to rejuvenate and re-live in a smarter way through various smart solutions for Bareilly.

The vision statement is "Facilitate Sustainable Living with Strengthened Traditional Trade and Smart Mobility through ICT based transformation." The vision is translated into various envisaged objectives for the city with various interventions to execute city operations in an integrated and a smarter way.

1.3 TENDER Format

The intent of this TENDER is to invite bids from the Bidders for implementation of an integrated solution for Bareilly Smart City.

The Request for Proposal (TENDER) consists of three volumes as follows:

1.3.1 TENDER Volume 1: Instruction to Bidders

Volume 1 details the instructions with respect to the bid process management, technical evaluation framework, and the technical & financial forms along-with the bid submission guidelines.

1.3.2 **TENDER Volume 2: Scope of work including Functional & Technical Specifications**

Volume2 of the TENDER provides information regarding the detailed Project scope, business requirements/applications to be covered and corresponding process related documentation, scope of work for the selected bidder and functional requirements.

1.3.3 TENDER Volume 3: Master Service Agreement

Volume 3 contains the contractual, legal terms & conditions applicable for the proposed engagement.

1.4 Fact sheet

S No.	Item	Description
		Each Technical Bid will be assigned a Technical score out of a
		maximum 100 marks. Only the Bidders who get an overall
		Technical score of 60% or more in the Technical Evaluation
		Framework as well as 60% or more in each of the criteria as given
1	Mathed of Calentian	in Section 3.6 will qualify for Financial Evaluation stage. Failing to
1.	Method of Selection	secure minimum marks shall lead to technical rejection of the
		Bid. QCBS scores will be calculated for only those vendors, who
		score 60% in their technical evaluation criteria. The commercial
		bid will be open for vendors, who qualify for minimum 60% into
		technical scoring.
2.	Availability of TENDER	Download from <u>https://eTender.up.nic.in</u>
	Documents	
	Tender document fee (Non- refundable and Not –exempted)	INR 29,500 (INR Twenty-Nine Thousand Five Hundred only)-
2		inclusive of taxes. The payment should be done only in online
3.		mode. The payment receipt of the same should be submitted
		along with technical bid.
		INR 3,60,00,000 (INR Three Crores Sixty Lacs only) through Bank
	Did. Convito /Environt	Guarantee (as per format attached in Annexure 5(b)/ FDR
4.	Bid Security/Earnest	/ Online transfer to BSCL account as mentioned in NIT
	Money Deposit (EMD)	conditions as mentioned in Instructions for Online Bid
		Submission, Point no 16 apply.
_		Bid must remain valid up to 180 (One Hundred & Eighty) days
5.	Βία ναπαιτγ	from the actual date of submission of the Bid.
c	Curronov	Currency in which the Bidders may quote the price and will
ο.	Currency	receive payment is INR only.
	Name and Address for	Chief Executive Officer, Bareilly Smart City Limited (BSCL), Nagar
7.	Correspondence/ Bid	Nigam Bareilly, Bareilly, U. P.
	Opening venue	

1.5 Definitions/ Acronyms

S No.	Term/Acronyms	Description
1.	ΑΑΑ	Authentication, authorization, and accounting
2.	ABD	Area Base Development
3.	ANPR	Automated Number Plate Recognition
4.	АР	Access Point
5.	AVLS	Automated Vehicle Locator System
6.	B2C	Business to Citizen
7.	внс	Benzene Hydro chloride
		Offer by the Bidder to fulfil the requirement of the Authority for
8.	Bid	an agreed price. It shall be a comprehensive technical and
		commercial response to the TENDER
9.	вом	Bill of Material
10.	ICCC	Integrated Command and Control Center
11.	CCTNS	Crime and Criminal Tracking Network & Systems
12.	ССТV	Closed Circuit Television
13.	COC	City Operation Centre
14	Consortium	A consortium consists of up to Three (3) members (Lead Bidder
14.		+ 2 Consortium members) entering into a Consortium.
		Agreement for a common objective of satisfying the BSCL
		requirements& represented by lead member of the consortium,
		designated as a "Lead Bidder".
		Also, the responsibility for successful execution of the entire
		project will be that of the defined Lead bidder. It is the duty of all
		the consortium members to execute the project successfully by
45		supporting the Lead Bidder.
15.		The consortium members should have relevant experience of
		executing similar roles and responsibilities in past as stated in the
		MoU in Annexure 7.
		Parent company existence of Bidder/ Lead bidder would be
		considered for only Wholly owned subsidiary/ division/ sub
		division/ branch business unit. Intellectual Property Rights
		Indemnity will not be applicable if any claim of infringement is
15.		The consortium members should have relevant experience of executing similar roles and responsibilities in past as stated in the MoU in Annexure 7. Parent company existence of Bidder/ Lead bidder would be considered for only Wholly owned subsidiary/ division/ sub division/ branch business unit. Intellectual Property Rights Indemnity will not be applicable if any claim of infringement is

		asserted by a parent, subsidiary, or affiliate of the MSI's
		organization.
16.	СОР	Common Operating Platform
17.	DBA	Database Administrator
18.	DC	Data Center
19.	DCP	Deputy Commissioner of Police
		Products, infrastructure and services agreed to be delivered by
		the Bidder in pursuance of the agreement as defined more
		elaborately in the TENDER, Implementation and the
20	Deliverables	Maintenance phases and includes all documents related to the
20.	Deliverables	user manual, technical manual, design, process and operating
		manuals, service mechanisms, policies and guidelines (such as
		security related, data migration related), inter alia payment
		and/or process related etc., source code and all its modifications.
21.	DIT	Directorate of Information Technology
22.	DNS	Domain Name Server
23.	DR	Disaster Recovery
24	Effective Date	The date on which the Contract Agreement for this TENDER
24.		comes into effect
25.	EMD	Earnest Money Deposit
26.	EMS	Enterprise Management System
27.	EMV	Engineering Materials Vehicles
28.	ΕΤΑ	Estimated Time of Arrival
29.	ETD	Estimated Time of Departure
30.	e- Procurement Portal	means the electronic Tendering system of the Authority
31.	ETM	Electronic Ticketing Machine
32.	FB Camera	Fixed Boxed Camera
33.	FPS	Frames Per Second
34.	FRS	Functional Requirement Specifications
35.	FTTX	Fiber to the x
36.	G2C	Government to Citizens
37.	GI Pipes	Galvanized iron Pipes
38.	GIS	Geographical Information System
39.	GoUP	Government of Uttar Pradesh

40.	GPRS	General Packet Radio Service
41.	GPS	Global Positioning System
42.	GSM	Global Systems for Mobile Communications
43.	GUI	Graphical User Interface
44.	HPSV	High Pressure Sodium Vapor lamps
45.	HDPE	High-Density Polyethylene
46.	НО	Head Office
47.	ІСТ	Information and Communication Technology
48.	IDS	Intrusion Detection System
49.	IOE	Internet of Everything
50.	IP	Internet Protocol
51.	IPS	Intrusion Prevention System
52.	ITIL	Information Technology Infrastructure Library
53.	JNNURM	Jawaharlal Nehru National Urban Renewal Mission (JNNURM)
54.	KeDB	Knowledge Database
55.	LAN	Local Area Network
56.	LED	Light Emitting Diode
57.	LOI/LOA	Letter of Intent/Letter of Award
58.	MAN	Metropolitan Area Network
59.	MoU	Memorandum of Understanding
60.	MSV	Mobile Surveillance Vehicle
61.	MTBF	Mean Time Between Failures
62.	MTTR	Mean Time to Repair
63.	Μυχ	Multiplexer
64.	NFC	Near Field Communication
65.	NIC	National Informatics Centre
		A Network Operations Center (NOC) is defined as the place from
		which the networks are supervised, monitored and maintained.
		It typically has a network operations center, a room containing
66.	NOC	visualizations of the network or networks that are being
		monitored, workstations at which the detailed status of the
		network can be seen, and the necessary software to manage the
		networks.
67.	Node	L3 aggregation points consisting of L3 switches

69	Non-Compliance	means failure/refusal to comply the terms and conditions of the
08.		Tender
		means failure to furnish complete information in a given format
		and manner required as per the Tender documents or non-
60	Non Posnonsivo	submission of Tender offer in given forms / pro forma or not
09.	Non-Responsive	following procedure mentioned in this Tender or any of required
		details or documents is missing or not clear or not submitted in
		the prescribed format or non- submission of Tender fee on EMD
70.	0&M	Operations & Maintenance
71.	OEM	Original Equipment Manufacturer
72.	OFC	Optical Fiber Cable
73.	OGC	Open Geospatial Consortium
74.	OS	Operating Systems
75.	ОТР	One Time Password
76.	PA System	Public Address System
77.	PDU's	Power Distribution Units
78.	PIS	Passenger Information System
79.	РоЕ	Power over Ethernet
80.	РоР	Points of Presence
81.	PTZ	Pan Tilt Zoom
82.	QR Code	Quick Response Code
		The consents, waivers, clearances and licenses to use Authority
		Intellectual Property Rights, rights and other authorizations as
83.	Required Consents	may be required to be obtained for the software and other items
		that DIT, GoM their nominated agencies are required to make
		available to Bidder pursuant to this Agreement;
84.	RF	Radio Frequency
85.	RFID	Radio Frequency Identification
86.	TENDER	Request for Proposal
87.	RLVD	Red Light Violation Detection
88.	RoW	Right of Way
89.	RPO	Recovery Point Objective
90.	RTO	Recovery Time Objective
91.	SDPO	Sub-Divisional Police Officer

92.	Service Level	The level of service and other performance criteria which will
		apply to the Services delivered by the Bidder;
93.	SI	System Integrator
94.	SLA	Service Level Agreement; Performance and Maintenance SLA
		executed as part of this Master Service Agreement;
95.	SNMP	Simple Network Management Protocol
96.	SMPS	Switched Mode Power Supply
97.	SOP	Standard Operating Procedure
98.	SOS	Save Our Souls
		SOS is the international Morse code distress signal
99.	SSID	Service Set Identifier
100.	Successful Bidder	The Bidder who is qualified & successful in the bidding process
		and is awarded the work
101.	TRAI	Telecom Regulatory Authority of India
102.	TRS	Technical Requirement Specifications
103.	UPS	Uninterruptible Power Supply
104.	URL	Uniform Resource Locator
105.	VA	Video Analytics
106.	VMS/VMD	Variable Message System/ Variable Messaging System
107.	VCA	Video Content Analytics
108.	VLAN	Virtual Local Area Network
109.	VMD	Variable Messaging Display
110.	VMS	Video Management Software/System
111.	WAN	Wide Area Network
112.	WSP	Wi-Fi Service Provider
113.	Server Room	Server room and data centre shall mean the same.

2 Instruction to Bidders

2.1 General

- i. While every effort has been made to provide comprehensive and accurate background information, requirements and envisaged solution(s) specifications, Bidders must form their own conclusions about the solution(s) needed to meet the BSCL's requirements. Bidders and recipients of this TENDER may wish to consult their own legal advisers in relation to this TENDER.
- ii. All information supplied by Bidders as part of their bids in response to this TENDER, may be treated as contractually binding on the Bidders, on successful award of the assignment by the BSCL on the basis of this TENDER.
- iii. No commitment of any kind, contractual or otherwise hall exists unless and until a formal written contract has been executed by or on behalf of BSCL. Any notification of preferred bidder status by BSCL shall not give rise to any enforceable rights by the Bidder. BSCL may cancel this public procurement at any time prior to a formal written contract being executed by or on behalf of BSCL.
- iv. All documents submitted in support of the Bid shall be submitted online only. Physical Copy of such documents submitted online shall also be provided in Sealed covers to the BSCL before the Bid evaluation. In the event of the specified date for the submission of Tender offers being declared a public holiday by the Government of Bareilly, the offers will be received upto the appointed time on the next working day. The BSCL may, at its discretion, extend this deadline for submission of offers by issuing corrigendum.
- v. Telex, cable or facsimile offers will be rejected.

2.2 Eligible Bidders

- i. Bids may be submitted by either of the following categories of bidders only:
 - a. The Bidder can be either a Single System Integrator(SI) or a Consortium of companies/ corporations/ Firm as described below.
 - b. A systems integrator is a company that specializes in bringing together component subsystems into a whole and ensuring that those subsystems function together.
- ii. An applicant or a member of consortium may either be sole proprietorship firm/partnership firm/limited liability partnership / company incorporated under company act 1956/2013 or body incorporate under applicable laws of India.

2.2.1 Sole Bidder

The Sole Bidder must be a System Integrator which has the capabilities to deliver the entire scope as mentioned in the TENDER. The Sole Bidder cannot bid as a part of any other consortium bid under this TENDER.

2.2.2 Consortium

Bids can be submitted by a consortium. A consortium should not consist of more than Three (3) members (including the Lead Bidder). Members of the consortium shall designate one of them as "Lead Bidder". The Lead Bidder would have the sole responsibility of ensuring the delivery of products and services mentioned in all volumes of this TENDER. The Lead Bidder would also be responsible for ensuring the successful execution of integrated solution including meeting the SLAs. The list of Consortium Members needs to be declared in the bid which cannot be changed by the bidder later on. Any change in the consortium partner will need to be approved by BSCL.

The Lead Bidder will be responsible for:

- a. The management of all Consortium Members who are part of the bid, and
- b. The supply, delivery and installation of all products and services submitted in their bid and as part of the contract

Bids submitted by a consortium should comply with the following requirements also:

- a. The Lead Bidder shall be authorized to incur liabilities and receive instructions for and on behalf of all consortium members. Entire execution of the Contract, including payment, shall be done exclusively by/with the Lead Bidder
- b. Any of the Lead Bidders and consortium member cannot be a Consortium Member with another bidder in a separate bid
- c. Internal arrangement between the Consortium Members is left to the bidders. It is the responsibility of the lead Bidder to ensure that all the other Consortium Members in the bid are compliant to all the clauses as mentioned in the bid, failing which bid can be disqualified

2.3 Compliant Bids/ Completeness of Response

- i. Bidders are advised to study all instructions, forms, terms, requirements and other information in the TENDER documents carefully. Submission of the bid shall be deemed to have been done after careful study and examination of the TENDER document with full understanding of its implications.
- ii. Failure to comply with the requirements of this paragraph may render the bid non- compliant and the Bid may be rejected. Bidders must:
 - a. Include all documentation specified in this TENDER, in the bid

- b. Follow the format of this TENDER while developing the bid and respond to each element in the order as set out in this TENDER
- c. Comply with all requirements as set out within this TENDER

2.4 Bidder to Inform

The Bidder shall be deemed to have carefully examined the Terms & Conditions, Scope, Service Levels, Specifications, and Schedules of this TENDER.

2.5 Bid Preparation costs

The Bidder shall bear all costs associated with the preparation and submission of its bid, for the purposes of clarification of the bid, if so desired by the BSCL.

2.6 Tender Fee

- i. TENDER can be downloaded from the e- procurement portal mentioned in the fact sheet.
- ii. Tender fee of Rs. 29,500 (Rupees Twenty-Nine Thousand Five Hundred Only) shall be paid at the time of submission of bid. The Tender fee shall be non-refundable.
- Without the payment of Bid Submission fee, the bids will be taken as incomplete and nonresponsive and shall not be considered. The Tender fee should be submitted in online mode.
 The payment receipt of the same should be submitted along with technical bid

2.7 Earnest Money Deposit (EMD)

EMD of Rs. 3,60,00,000 (Rupees Three Crores Sixty Lacs Only) can be in the form of online payment /FDR /BG or any other security certificate with the conditions that scanned copy of the instrument / proof of payment should be uploaded as part of the offer. FDR must be pledged in the favor of BSCL. The hard copy of EMD should be posted/ couriered/ given in person to the Tender Inviting Authority, and it must reach Tender inviting authority latest by before opening of financial BID. The details of the FDR/any other accepted instrument, physically delivered, should tally with the details available in the scanned copy and the data entered during bid submission time, otherwise submitted bid shall not be acceptable or liable for rejection. Any discrepancies in the copy of the payment instrument submitted online and the physical copy would lead to disqualification and blacklisting of the bidder WITHOUT FAIL

- i. **For Unsuccessful bidders:** The bid security of all unsuccessful bidder(s) would be refunded without interest by BSCL on finalization of the bid in all respects by the successful bidder.
- ii. **For Successful bidder:** The bid security, for the amount mentioned above, of successful bidder would be returned without interest upon submission of Performance Bank Guarantee by the successful bidder.

The above-mentioned return would be completed within 6 months from the date of selection of MSI. In case bid is submitted without the bid security then BSCL will reject the bid without providing opportunity for any further correspondence to the bidder concerned.

The EMD may be forfeited in any of the following circumstances:

The EMD shall be forfeited and appropriated by the Client as mutually agreed genuine pre-estimated compensation and damages payable to the Client for the time, cost and effort of the Client, without prejudice to any other right or remedy that may be available to the Client under the TENDER or in law under the following conditions:

- i. If a Bidder withdraws or modifies its Proposal during the Proposal validity period or any extension agreed by the Bidder thereof.
- ii. If a Bidder is disqualified in accordance with Clause 2;
- iii. If the Bidder tries to influence the evaluation process or engages in corrupt, fraudulent, coercive or undesirable practice or restrictive practice as set out in Section 4.

If a Bidder is declared the first ranking Bidder and it:

- Withdraws its Proposal during negotiations. However, failure to arrive at a consensus between the Client and the first ranked Bidder shall not be construed as withdrawal of proposal by the first ranked Bidder;
- fails to furnish the Performance Security
- fails to sign and return, as acknowledgement, the duplicate copy of the letter of award;
- fails to fulfil any other condition precedent to the execution of the Contract, as specified in the letter of award; or
- iv. fails to execute the Contract.

2.8 Bid Validity Period

- i. Bid shall remain valid for the time period mentioned in the Fact Sheet.
- ii. The bidder shall be required to extend the bid validity period, if requested by client to do so.Accordingly, the bid security shall also be extended by the bidder for such period.
- iii. The request and the responses to the request shall be made in writing. A Bidder may refuse the request without risking forfeiting the EMD, but in this case the bid will be out of the competition for the award. Bidder agreeing to the request will not be required or permitted to modify its bid, but will be required to ensure that the bid remains secured for a correspondingly longer period

2.9 Content of Physical copy of Bid

The three sets of documents (each enveloped separately and packed in a master envelope) are required to be submitted for evaluation. The sets will comprise of:

Document Set per envelope- packed in one master envelope	Name of Document	Content
One	TENDER Document fee	a. TENDER Document Fee receipt
	& Bid Security/ Earnest	b. Bid Security/ Earnest Money Deposit
	Money Deposit (EMD)	(EMD) receipt
		a. Pre-Qualification bid as per Section 6
	Pre-Qualification Bid	annexure 2 and along with the required
Two		supporting documents
TWO		b. No Deviation Certificate as per Section 6.5
		c. Total Responsibility declaration as per
		Section 6.6
Three	Technical Bid	a. Technical bid as per section 7 annexure 3
		along with the required supporting
		documents
		b. Response to FRS & TRS

i. Please note that Prices should NOT be indicated in the Technical Bid but should only be indicated in the Commercial Bid.

- ii. All the pages of the bid must be sequentially numbered. The bid documents must contain in the beginning of the document, a list of contents with page numbers. Any deficiency in the documentation may result in the rejection of the Bid.
- iii. The original bid shall be prepared in indelible ink. It shall contain no interlineations or overwriting, except as necessary to correct errors made by the Bidder itself. Any such corrections must be initialed by the person (or persons) who sign(s) the bids.
- iv. All pages of the bid shall be initialed and stamped by the person (or persons) who sign the bid.
- v. The physical submission of the bid has to be accompanied by soft copy non- writable CD/ DVD per section. Except the price bid, whole the documents would be submitted in both modes Online through e-procurement portal as well Hard copy (2 Sets). It is to be noted that there should not be any discrepancy in the uploaded technical bid document on the portal and submitted physical documents (Hard copy). If such deficiency found in both of the files (Online and Hard copy) then it may result in the rejection of the Bid.
- vi. BSCL will not accept delivery of bid by fax or e-mail only. Hard Copy submission is mandatory. Page | 21

2.10 Bid Formats

2.10.1 Pre-Qualification Bid Format

Section #	Section Heading	Details
1.	Pre-qualification checklist	As per format provided in section 6.1
2.	Pre-Qualification Bid	As per format provided in section 6.2
	Covering Letter	
3.	Consortium Agreement	As per format provided in Annexure 7 of this Volume
4.	About Bidder	As per format provided in section 6.3 of this document
		Copy of Certification of Incorporation/ Registration
5	Legal	Certificate
5.		PAN Card
		GST Registration
6.	Annual Turnover	Details of annual turnover with documentary evidence.
7.	Net worth	Details of net worth with documentary evidence.
8.	Certification	Relevant ISO certification
q	Self-certificate for non-	As per format provided in section 6.4
5.	blacklisting clause	
10	Power of Attorney	Documentary evidence as per format provided in
10.	1 ower of Actorney	Annexure 8 and 9
11.	Project Experience	Citation details of projects as per format in Section 7.4
		and 6.7, as applicable.
12.	No Deviation Certificate	As per format provided in section 6.5
13.	Total responsibility	As per format in 6.6
10.	certificate	

2.10.2 Technical Bid Format

Section	Section Heading	Details
1.	Technical Bid Checklist	As per format provided in section 7.1
2.	Technical Bid Covering	As per format provided in Section 7.2
	Letter	
3.	About Bidder	• Details about bidder (whether sole bidder or
		consortium)
		Bidder's General Information as required in Technical
		Criteria 3.6.1

Section	Section Heading	Details
4.	Understanding	Details as required in Technical Criteria 3.6.1.
5.	Solution proposed	Details as required in Technical Criteria 3.6.1. Please refer
		to section 7.5.1.
6.	Project/credential	As per format provided in Section 7.3
	summary	
7.	Bidder's Experience	Project citation as per format provided in section 7.4 and
		supporting documentary evidences and Self-
		certifications as per format in section 6.7 as applicable
8.	Project Plan and Resources	• Project plan as per format provided in Section 7.5.2
		• Manpower Plan as per format provided in section
		7.5.3 &
		• Summary of resources as per format provided in
		Section 7.6.1
		CV of resources as per format provided CV of
		resources as per format provided
9.	Manufacturers'/Producers'	As per format provided in section 7.11
	Authorization Form	
10.	Anti-Collusion Certificate	As per format provided in section 7.12
11.	Non-disclosure agreement	As per format provided in section 11 (Annexure 6)

2.10.3 Commercial Bid Format

The Bidder must submit the Commercial Bid is the formats specified in Section 8.

S No.	Section Heading	Details
1.	Total Price Summary	As per format provided in Section 8.1
2.	Price component for CAPEX	Price component for CAPEX 8.2
3.	Price component for OPEX	As per format provided in Section 8.3

2.10.4 Bank Details

Name of Bank	Punjab National Bank
A/C No	0294001100000836
Branch	Pilibhit By-Pass Road, Bareilly
IPSC Code	PUNB0613400

2.11 Language

The bid should be prepared and submitted by the bidders in English language only. If any submitted supporting documents are in any language other than English, translation of the same in English language is to be provided (duly attested) by the Bidders. For purposes of interpretation of the documents, the English translation shall govern.

2.12 Authentication of Bids

An authorized representative (or representatives) of the Bidder shall initial all pages of the Pre-Qualification, Technical and Commercial Bids.

Bid should be accompanied by an authorization in the name of the signatory (or signatories) of the Bid. The authorization shall be in the form of a written power of attorney accompanying the Bid or in any other form demonstrating that the representative has been duly authorized to sign.

2.13 Amendment of Request for Proposal

At any time prior to the due date for submission of bid, BSCL may, for any reason, whether at its own initiative or in response to a clarification requested by prospective bidder(s), modify the Tender document by amendments. Such amendments shall be uploaded on the e-procurement portal, through corrigendum and shall form an integral part of Tender document. The relevant clauses of the TENDER document shall be treated as amended accordingly.

It shall be the responsibility of the prospective bidder(s) to check the e procurement portal given in advertisement from time to time for any amendment in the TENDER document. In case of failure to get the amendments, if any, BSCL shall not be responsible.

In order to allow prospective bidders a reasonable time to take the amendment into account in preparing their bids, BSCL, at its discretion, may extend the deadline for submission of bids. Such extensions shall be uploaded on website of the BSCL.

2.14 Bid Price

Commercial Bid shall be as per the format provided in Section 8. Bidders shall give the required details of all applicable taxes, duties, other levies and charges etc. in respect of direct transaction between BSCL and the Bidder.

Bidders shall quote for the entire scope of contract on a "overall responsibility" basis such that the total bid price covers Bidder's all obligations mentioned in or to be reasonably inferred from the bidding documents in respect of providing the product/services.

Prices quoted by the Bidder shall remain firm during the entire contract period and not subject to variation on any account. A bid submitted with an adjustable price quotation shall be treated as non-responsive and rejected. However, it should be noted that the price quotes should be inclusive of tax components. The quoted price must have a break up of applicable tax rates.

Note: Online Bid price shall be include of all excise, GST, levy cess, taxes etc (Central and State). A separate breakup sheet shall be provided.

2.15 Deviations and Exclusions

Bids shall be submitted strictly in accordance with the requirements and terms & conditions of the TENDER. The Bidder shall submit a No Deviation Certificate as per the format mentioned in Section 6.5. The bids with deviation(s) to the clauses/ outlined scope mentioned in the TENDER are liable for rejection.

2.16 Total Responsibility

Bidder should issue a statement undertaking total responsibility for the defect free operation with effective SLAs of the proposed solution as per the format mentioned in Section 6.6.

2.17 Late Bids

- i. Late submission will not be entertained.
- ii. The bids submitted by telex/telegram/fax/e-mail etc. shall not be considered. No correspondence will be entertained on this matter.
- iii. BSCL shall not be responsible for any non-receipt/non-delivery of the documents due to technical snag whatsoever at Bidder's end. No further correspondence on the subject will be entertained.
- iv. BSCL reserves the right to modify and amend any of the above-stipulated condition/criterion.

2.18 Right to Terminate the Process

BSCL may terminate the TENDER process at any time and without assigning any reason. BSCL makes no commitments, express or implied, that this process will result in a business transaction with anyone. This TENDER does not constitute an offer by BSCL.

2.19 Non-Conforming bids

- i. A bid may be construed as a non-conforming bids and ineligible for consideration:
- ii. If it does not comply with the requirements of this TENDER.
- iii. If a bid does not follow the format requested in this TENDER or does not appear to address the particular requirements of the solution.

2.20 Acceptance/Rejection of Bids

- BSCL reserves the right to reject in full or part, any or all bids without assigning any reason thereof. BSCL reserves the right to assess the Bidder's capabilities and capacity. The decision of BSCL shall be final and binding.
- ii. Bid should be free of over writing. All erasures, correction or addition must be clearly written both in words and figures and attested.

- iii. In the event of any assumptions, presumptions, key points of discussion, recommendation or any points of similar nature submitted along with the Bid, BSCL reserves the right to reject the Bid and forfeit the EMD.
- iv. If there is any discrepancy in the commercial bid, it will be dealt as per the following:
 - a. If, in the price structure quoted for the required goods/services/works, there is discrepancy between the unit price and total price (which is obtained by multiplying the unit price by the quantity), the unit price shall prevail and the total price corrected accordingly.
 - b. If there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail, and the total shall be corrected.
 - c. If there is a discrepancy between words and figures, the amount in words shall prevail.
 - d. If there is such discrepancy in an offer, the same shall be conveyed to the bidder with target date up to which the bidder has to send his explanations. On the above lines BSCL reserves the right to take appropriate decision which needs to be agreed by the bidder. If the bidder does not agree to the decision of BSCL, the bid is liable to be disqualified.

2.21 Confidentiality

All the material/information shared with the Bidder during the course of this procurement process as well as the subsequent resulting engagement following this process with the successful bidder, shall be treated as confidential and should not be disclosed in any manner to any unauthorized person under any circumstances. The employees of the successful Lead bidder and Consortium members who are proposed to be deployed on the project need to furnish a Non- Disclosure Agreement (NDA) as per TENDER Volume III.

2.22 Disqualification

The bid is liable to be disqualified/ a proper explanation can be called in the following cases or in case bidder fails to meet the bidding requirements as indicated in this TENDER:

- a. During validity of the bid, or its extended period, if any, the bidder increases its quoted prices
- b. The bidder's bid is conditional and has deviations from the terms and conditions of TENDER
- c. Bid is received in incomplete form
- d. Bid is not accompanied by all the requisite documents
- e. Information submitted in technical bid is found to be misrepresented, incorrect or false, accidentally, unwittingly or otherwise, at any time during the processing of the contract (no matter at what stage) or during the tenure of the contract including the extension period if any.

- f. Financial bid is enclosed with the same document as technical bid.
- g. Bidder tries to influence the bid evaluation process by unlawful/corrupt/fraudulent means at any point of time during the bid process
- In case any one party submits multiple bids or if common interests are found in two or more bidders, the bidders are likely to be disqualified, unless additional bids/bidders are withdrawn upon notice immediately
- i. If any of the Lead Bidder is also partner in any other bid, then all the affected bids shall be disqualified

2.23 Key Personnel

BSCL has identified certain key positions and minimum qualifications for each of the positions that should be part of project team of the bidder (hereby referred to as "key personnel"). Details of these key positions are provided in Section 3.8

2.24 Initial Composition; Full Time Obligation; Continuity of Personnel

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

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

2.25 Evaluations

Bidder shall carry out an evaluation of the performance of each member of the Key Personnel in connection with the Services at least once in each Contract Year. Bidder shall provide reasonable written notice to BSCL of the date of each evaluation of each member of the Key Personnel. BSCL shall be entitled to provide inputs to the bidder for each such evaluation. Bidder shall promptly provide the results of each evaluation to BSCL, subject to Applicable Law.

2.26 Replacement

In case any proposed resource resigns, then the Bidder has to inform BSCL within one week of such resignation.

Bidder shall promptly initiate a search for a replacement to ensure that the role of any member of the Key Personnel is not vacant at any point in time during the contract period, subject to reasonable extensions requested by Bidder to BSCL.

Before assigning any replacement member of the Key Personnel to the provision of the Services, Bidder shall provide BSCL with:

- a. A resume, curriculum vitae and any other information about the candidate that is reasonably requested by BSCL; and
- b. An opportunity to interview the candidate.

The bidder has to provide replacement resource of equal or better qualification and experience as per the requirements of this TENDER.

If BSCL objects to the appointment, Bidder shall not assign the individual to that position and shall seek an alternative candidate in accordance with the resource requirements of this TENDER.

The bidder needs to ensure at least 4 weeks of overlap period in such replacements. BSCL will not be responsible for any knowledge transition to the replacement resource and any impact/escalation of cost incurred by the bidder due to resource replacement.

2.27 High Attrition

SI shall ensure that none of the Key Personnel (refer Section 3.6.1 of the RFP Volume I proposed) and manpower exit from the project during first 6 months of the beginning of the project. In such cases of exit MSI need to provide replacement within 7 days (Qualification Mentioned in RFP section 3.6.1 / Corrigendum), except for medical reason/death a penalty of INR 2 lakhs per such replacement shall be imposed on SI.

Bidder shall:

- a. Provide BSCL with a reasonably detailed explanation as to the reasons for such change, including, where applicable and permitted, notes from any exit interviews conducted by Bidder with any departing member of the Key Personnel; and
- b. If such change to Key Personnel has or is likely to have any material adverse impact on the provision of the Services or any substantial part thereof, undertake, at its own costs, such remediation acts as are reasonably necessary in order to improve the retention of the Key Personnel including making reasonable changes to the human resources policies and procedures applicable to the Key Personnel (including those related to compensation, benefits and other conditions so that they are competitive with the market) as may be necessary to ensure that such policies and procedures comply with Good Industry Practice.

2.28 Fraud and Corrupt Practices

The Bidders and their respective officers, employees, agents and advisers shall observe the highest standard of ethics during the Selection Process. Notwithstanding anything to the contrary contained in this TENDER, BSCL shall reject a Bid without being liable in any manner whatsoever to the Bidder, if it determines that the Bidder has, directly or indirectly or through an agent, engaged in corrupt

practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice (collectively the "Prohibited Practices") in the Selection Process. In such an event, BSCL shall, without prejudice to its any other rights or remedies, forfeit and appropriate the EMD or PBG, as the case may be, as mutually agreed genuine pre-estimated compensation and damages payable to BSCL for, inter alia, time, cost and effort of BSCL, in regard to the TENDER, including consideration and evaluation of such Bidder's Bid.

Without prejudice to the rights of BSCL under Clause above and the rights and remedies which BSCL may have under the LOI or the Agreement, if a Bidder is found by BSCL to have directly or indirectly or through an agent, engaged or indulged in any corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice during the Selection Process, or after the issue of the LOI or the Agreement, such Bidder shall not be eligible to participate in any Tender or TENDER issued by BSCL during a period of 3 years from the date such Bidder is found by BSCL to have directly or through an agent, engaged or indulged in any Prohibited Practices.

For the purposes of this Section, the following terms shall have the meaning hereinafter respectively assigned to them:

- a. "corrupt practice" means (i) the offering, giving, receiving, or soliciting, directly or indirectly, of anything of value to influence the action of any person connected with the Selection Process (for avoidance of doubt, offering of employment to or employing or engaging in any manner whatsoever, directly or indirectly, any official of BSCL who is or has been associated in any manner, directly or indirectly with the Selection Process or the LOI or has dealt with matters concerning the Agreement or arising there from, before or after the execution thereof, at any time prior to the expiry of one year from the date such official resigns or retires from or otherwise ceases to be in the service of BSCL, shall be deemed to constitute influencing the actions of a person connected with the Selection Process); or (ii) save as provided herein, engaging in any manner whatsoever, whether during the Selection Process or after the issue of the LOA or after the execution of the Agreement, as the case may be, any person in respect of any matter relating to the Project or the Award or the Agreement, who at any time has been or is a legal, financial or technical consultant/adviser of BSCL in relation to any matter concerning the Project;
- b. "fraudulent practice" means a misrepresentation or omission of facts or disclosure of incomplete facts, in order to influence the Selection Process;
- c. "coercive practice" means impairing or harming or threatening to impair or harm, directly or indirectly, any persons or property to influence any person's participation or action in the Selection Process;

- d. "undesirable practice" means (i) establishing contact with any person connected with or employed or engaged by BSCL with the objective of canvassing, lobbying or in any manner influencing or attempting to influence the Selection Process; or (ii) having a Conflict of Interest; and
- e. "restrictive practice" means forming a cartel or arriving at any understanding or arrangement among Bidders with the objective of restricting or manipulating a full and fair competition in the Selection Process.

2.29 Conflict of Interest

A bidder shall not have a conflict of interest that may affect the Selection Process or the Solution delivery (the "Conflict of Interest"). Any Bidder found to have a Conflict of Interest shall be disqualified. In the event of disqualification, BSCL shall forfeit and appropriate the EMD, if available, as mutually agreed genuine pre-estimated compensation and damages payable to BSCL for, inter alia, the time, cost and effort of BSCL including consideration of such Bidder's Bid, without prejudice to any other right or remedy that may be available to BSCL hereunder or otherwise.

BSCL requires that the bidder provides solutions which at all times hold BSCL's interest's paramount, avoid conflicts with other assignments or its own interests, and act without any consideration for future work. The bidder shall not accept or engage in any assignment that would be in conflict with its prior or current obligations to other clients, or that may place it in a position of not being able to carry out the assignment in the best interests of BSCL.

2.30 Sub-Contracting

The bidder would not be allowed to sub-contract work, except for the following:

- a. Facility Management Staff at Ground maintenance, Civil Works, Cleaning, Field Works, Survey works, Catering, Integration Works, OEM associated works, Vending Space management, Utilities management etc. and associated manpower.
- b. Sub-contractor will be approved by BSCL basis on relevant credentials (of the sub-contractor for their scope of work) submitted. However, even if the work is sub-contracted, the sole responsibility of the work shall lie with the lead bidder. The lead bidder shall be held responsible for any delay/error/non-compliance etc. of its sub-contracted vendor.

2.31 Eligible Goods and Services, and OEM Criteria:

 For purposes of this Clause, the term "goods" includes commodities, raw material, machinery, equipment, and industrial plants; and "related services" include services such as insurance, transportation, supply, installation, integration, testing, commissioning, training, and initial maintenance.

- ii. The Bidder shall quote only one specific make and model from only one specific OEM, for each of the goods. Providing more than one option shall not be allowed. All goods quoted by the Bidder must be associated with item code and names and with printed literature describing configuration and functionality. Any deviation from the printed specifications should be clearly mentioned in the offer document by the Bidder.
- iii. The OEM for each products or technology quoted should be in the business of that product or solution or technology for at least 3 years as on the date of Submission of the TENDER. Each quoted products or technology should have been implemented for at least 2 years as on the date of Submission of the TENDER..
- iv. The OEM for each product should not be banned/ blacklisted in India because of security concerns.
- v. All the OEMs (Hardware, Software, OS etc) should have presence in India (Registered office) or through channel partners before the date of submission of bid. However, OEM of camera should be direct presence or through channel partners in India more than 3 years as on bid submission date. The mac address of the all IP based equipment's must be registered in the name of quoted OEM Brand.
- vi. The OEM for all active components should give a declaration that products or technology quoted are neither end of- sale nor end-of-life till 30 months from the date of bidding and are not end-of-support till 5 years from the due date of bidding.
- vii. Bidder must quote products in accordance with above clause "Eligible goods and related services.
- viii. The OEM of each product or technology should have quality certifications like ISO 9001:2015/ ISO 27001 and/ or ISO 14001 or equivalent where ever applicable.
- ix. OEM for ICCC Software should have deployed in at least 4 Smart Cities either in India or Globally. In addition, ICCC Software should have at least one deployed /ongoing deployment in India. (*Smart Cities means any city wide deployment of ICCC Software.)
- The bidder's proposed OEM should not have been blacklisted by any State / Central Government Department or Central /State PSUs.
- xi. Though the prime responsibility of providing 24x7x365 support for overall project is of MSI. However, in order to ensure the seamless support each of the proposed OEMs should either have existing capability and infrastructure to provide 24x7x365 technical support in India, or should provide an undertaking that they would establish the requisite infrastructure and capability to provide 24x7x365 technical support in India within 60 days from the date of signing of the contract of their successful MSI and proof of establishment should be provided after establishing the same.

- xii. The Goods and Services to be supplied, installed and/or performed by the Bidder conform to the TENDER requirements.
- xiii. Adequate supporting documents pertaining to the above points, along with a summary compliance table, should be submitted in the technical proposal by the Bidder.
- xiv. ICCC Software licenses MUST not be based on count of edge devices such as cameras, sensors, zones etc. It MUST support unlimited number of edge devices if they are integrated. This is to prove that the CCC is scalable for future expansion without being dependent on additional cost / license per edge device.
- xv. ICCC Operator Terminal Application must a 'thick Client' based on Client Server architecture.
- xvi. ICCC OEM should be absolutely agnostic to any third party system and is not biased towards its own company products.
- xvii. ICCC application must have inbuilt Video Drivers to play live and recorded video feeds from multiple video management systems.

2.32 Right to vary quantity

- i. At the time of award of contract or within one year, the quantity of goods, works or services originally specified in the bidding documents may be 25% increased or decreased. It shall be without any change in the unit prices or other terms and conditions of the Bid and the bidding documents.
- ii. If the BSCL does not procure any subject matter of procurement or procures less than the quantity specified in the bidding documents due to change in circumstances, the bidder shall not be entitled for any claim or compensation except otherwise provided in the bidding document.
- iii. Repeat orders for extra items or additional quantities may be placed, if it is provided in the bidding document, on the rates and conditions given in the contract if the original order was given after inviting open competitive bids. Delivery or completion period may also be proportionally increased.

2.33 Withdrawal, Substitution, and Modification of Bids

- i. No bid may be withdrawn, substituted, or modified in the interval between the bid submission deadline and the expiration of the bid validity period specified by the Bidder in the Bid Submission Form, or any extension thereof agreed to by the Bidder. Withdrawal of a bid during this interval may result in the forfeiture of the EMD/Bid Security.
- Any alteration/ modification in the Application or additional information supplied subsequent to the Application Due Date, unless the same has been expressly sought for by the Authority, shall be disregarded.

iii. Bids withdrawn shall not be opened and processed further.

2.34 Site Visit

- i. The Bidder may wish to visit and examine the site or sites and obtain for itself, at its own responsibility and risk, all information that may be necessary for preparing the bid and entering into the Contract. The costs of visiting the site or sites shall be at the Bidder's own expense.
- ii. It is strongly recommended that bidders may conduct their site surveys as per the requirement of TENDER wherever necessary, prior to the proposal submission.
- iii. No site visits shall be arranged or scheduled after the deadline for the submission of the Bids and prior to the award of Contract.

3 Selection Process for Bidder

3.1 Opening of Bids

The Bids shall be opened by BSCL in presence of those Bidders or their representatives who may be present at the time of opening.

The representatives of the bidders should be advised to carry the identity card or a letter of BSCL from the bidder firms to identify that they are bona fide representatives of the bidder firm, for attending the opening of bid.

There will be three bid-opening events as follows:

- a. Set 1 (TENDER Document fee& Bid Security/EMD)
- b. Set 2 (Pre-Qualification bid)
- c. Set 3 (Technical bid)
- i. The venue, date and time for opening the Bids bid are mentioned in the Fact sheet.
- ii. The date and time for opening of Technical bid is specified in the bidding schedule and that of the Commercial bid would be communicated at respective stages to eligible bidders.
- iii. The Technical Bids of only those bidders will be opened who clears the Pre- qualification stage.
- iv. The Commercial Bids of only those bidders will be opened who score equal to or more than qualifying marks in Technical Bid.

3.2 Preliminary Examination of Bids

BSCL shall examine the bids to determine whether they are complete, whether the documents have been properly signed and whether the bids are generally in order. Any bids found to be nonresponsive for any reason or not meeting any criteria specified in the TENDER, shall be rejected by BSCL and shall not be included for further consideration.

Initial Bid scrutiny shall be held and bids will be treated as non-responsive, if bids are:

- a. Not submitted in format as specified in the TENDER document
- b. Received without the Letter of Authorization
- c. Found with suppression of details
- d. With incomplete information, subjective, conditional offers and partial offers submitted
- e. Submitted without the documents requested
- f. Non-compliant to any of the clauses mentioned in the TENDER
- g. With lesser validity period

3.3 Clarification on Bids

During the bid evaluation, BSCL may, at its discretion, ask the Bidder for any clarification(s) of its bid. The request for clarification and the response shall be in writing, and no change in the price or substance of the bid shall be sought, offered, or permitted. Evaluation Process

3.4 Evaluation Process

- i. BSCL shall constitute a Tender Evaluation Committee to evaluate the responses. The Tender Evaluation Committee shall evaluate the responses to the TENDER and all supporting documents/documentary evidence. Inability to submit requisite supporting documents/documentary evidence by bidders may lead to rejection of their bids.
- The decision of the Tender Evaluation Committee in the evaluation of bids shall be final. No correspondence will be entertained outside the process of evaluation with the Committee.
 The Tender Evaluation Committee may ask for meetings or presentation with the Bidders to seek clarifications or conformations on their bids.
- iii. The Tender Evaluation Committee reserves the right to reject any or all bids. Each of the responses shall be evaluated as per the criteria and requirements specified in this TENDER.

The steps for evaluation are as follows:

3.4.1 Stage 1: Pre-Qualification

- BSCL shall validate the Set 1 "TENDER Document fee& Bid Security/Earnest Money Deposit (EMD)".
- ii. If the contents of the Set 1 are as per requirements, BSCL shall open the "Pre-Qualification Bid". Each of the Pre-Qualification condition mentioned in Section 3.5 is MANDATORY. In case, the Bidder does not meet any one of the conditions, the bidder shall be disqualified.
- iii. Bidders would be informed of their qualification/disqualification based on the Pre-Qualification criteria through Email and Phone and subsequently, the Bid Security amount shall be returned to the respective disqualified Bidders after the submission of Performance Bank Guarantee by the successful Bidder.
- iv. Technical and Financial bids for those bidders who don't pre-qualify will not be opened.
 Financial bid will not be opened for those bidders, who don't qualify the technical evaluation.
 Bid Security shall be returned to the unsuccessful bidders.

3.4.2 Stage 2: Technical Evaluation

- i. Set 3 "Technical bid" will be evaluated only for the bidders who succeed in Stage 1.
- ii. BSCL will review the technical bids of the short-listed bidders to determine whether the technical bids are substantially responsive. Bids that are not substantially responsive are liable to be disqualified at BSCL's discretion.
- iii. The bidders' technical solutions proposed in the bid document shall be evaluated as per the requirements specified in the TENDER and technical evaluation framework as mentioned in Section 3.6.
- iv. Bidders may be asked to give demonstration of the envisaged solution to BSCL as per the demo scripts that shall be shared with the Bidders who qualify the Pre-Qualification Stage.
- v. Bidders submit in detailed "Approach & Methodology & Solutions proposed "
- vi. Each Technical Bid will be assigned a technical score out of a maximum of 100 marks. Only the bidders who get an Overall Technical score of 60% or more in the Technical Evaluation Framework as given in Section 3.6 will qualify for commercial evaluation stage. Failing to secure minimum marks shall lead to technical rejection of the Bid.

3.4.2a Table for commercial evaluation (Quality Cost Basis System -QCBS_)

	The method of selection is QCBS. The weightage given to the
	Technical and Financial scores will be 70% and 30%
	respectively. The Contract will be awarded to the bidder
	scoring maximum marks in technical and financial evaluations
	as per the qualifying criteria. QCBS scores will be calculated for
	only those vendors, who score 60% in their technical
	evaluation criteria. The commercial bid will be open for
	vendors, who qualify for minimum 60% into technical scoring.
	QCBS evaluation formula:
	For Quality and Cost based Evaluation (QCBS), the following
Method of Selection	formula will be used for the evaluation of the bids.
	The scores will be calculated as:
	Bn = 0.7*Tn + 30*(Cmin/Cb)
	Where
	i. Bn = overall score of bidder under consideration.
	ii. Calculated up to two decimal points
	iii. Tn = Technical score for the bidder under
	consideration.
	iv. Cb = Actual price quoted by the bidder.
	v. Cmin = Lowest price among the financial proposals
	under consideration.
	Method of Selection

3.4.3 Stage 3: Commercial Evaluation

- i. All the technically qualified bidders will be notified to participate in Commercial Bid opening process.
- ii. The commercial bids for the technically qualified bidders shall then be opened on the notified date and time and reviewed to determine whether the commercial bids are substantially responsive. Bids that are not substantially responsive are liable to be disqualified at BSCL's discretion.
- iii. Commercial Bids that are not as per the format provided in Section 8 (Annexure 4) shall be liable for rejection.
- iv. The bid price shall inclusive of all taxes and levies and shall be in Indian Rupees with clear breakup of base price along with taxes.
- v. Mentioning prices for each line item of BOM is mandatory.
- vi. Commercials will be calculated based on "3.4.2a Table for commercial evaluation (Quality Cost Basis System -QCBS_)"
- vii. Bidder would not leave blank in any of the line item of BoM.
- viii. The Bid Security amount shall be returned to those who don't qualify the financial evaluation stage and after PBG shall be submitted by the Successful Bidder.

S No.	Туре	Pre-Qualification Criteria	Required Documentary Evidence		
		1. The Sole Bidder/ Bidders (each of	1.	Copy of certificate of Incorporation/	
		consortium members in case of		Registration under Companies Act	
		consortium) shall be in		1956/ Companies Act 2013 (for	
		operations for a period of at least		Indian companies) /proof of	
		Three (3) years prior to the date		registration under applicable laws.	
		of bid submission.	2.	Global companies to provide	
		2. The Sole Bidder/ Bidders (each of		equivalent proof of incorporation/	
		consortium members in case of		registration.	
		consortium) should be registered	3.	A written undertaking from each of	
		in India.		the consortium members, in case of	
	ofile	3. Relevant Global experience of		a consortium, duly signed by the	
1	y Pro	Parent company (of which the		authorized signatory, holding a	
1.	pan	bidder is wholly owned		written power of attorney for this	
	Com	subsidiary) could be considered		bid on a stamp paper, authorizing	
		including the Technical		the lead bidder to incur liabilities	
		experience & financial capability		and receive instructions for and on	
		(Turnover) however, the average		behalf of any and all consortium	
		annual turnover for last 3 years of		members, and the entire execution	
		India entity of the Lead bidder/		of the Contract, including but not	
		Sole Bidder should be equal to		limited to the payments.	
		50% of the project value as	4.	MoA among the Consortium	
		defined in the NIT.		Partners shall be submitted Clearly	
				defining the roles & responsibilities	
				of each consortium members	
		The Sole Bidder/ Bidders (All	1.	Audited financial statements for last	
	ofile	consortium members put together in		three Financial Years.	
	al Pr	case of consortium) shall have an	2.	Statutory auditor's/ CA certificate	
2.	ancia	average annual turnover of INR 400		clearly specifying the annual	
	y Fin	Crores over the last three (3) Financial		turnover for the specified years.	
	pan	Years i.e. for FY 2016-17, 2017-18 &	3.	Statutory auditor's/ CA certificate	
	Com	2018-19. In case of Consortium, out		clearly specifying the experience	
		of the total value of turnover; at least		from specific business areas	

S No.	Туре	Pre-Qualification Criteria	Required Documentary Evidence
		50% of the turnover criteria shall be	(Business Area means: ICT
		met by the Lead Bidder and each	Experience relevant to this TENDER)
		Consortium partners other than lead	4. PAN card
		bidder shall have minimum average	5. GST registration
		annual turnover of INR 50 Crores in	
		last three FY as indicative above.	
		In case of sole bidder 100% turnover	
		to be from sole bidder.	
		The Sole Bidder/ Bidders (each of	Certificate from the Statutory
		consortium members in case of	Auditor/CA on net worth for last 3 years.
		consortium) shall have positive net	
		worth the last three (3) Financial	
	rth	Years i.e. for FY 2016-17, 2017-18 &	
	it wo	2018-19. While the Sole/ lead bidder	
3.	Financials- Ne	shall have minimum net worth of	
		Rupees 45 crores as per the last	
		audited Financial Year i.e. for FY	
		2018-19. In case of Global entity, the	
		same should have the expected net	
		worth and India Entity should have	
		positive net worth.	
		The Sole Bidder/ Lead Bidder (in case	List and address of office in U.P or,
	esence	of a Consortium) should have office in	undertaking from authorized signatory
1		the State of U.P or should furnish an	to open office in U.P within 60 days from
4.	al Pr	undertaking that the same would be	the date of signing of the Contract.
	Loc	established within 60 days from the	Failure to meet this commitment would
		date of contract signing.	incur in forfeiting the EMD.
		The Sole Bidder/ Lead Bidder/ any	Copies of the valid certificates in the
	ions	member of consortium shall have	name of the Bidder. At least six months
5	ficati	Minimum 2 or more of following	validity is required from the date of
J.	ƙey Certifi	Certifications valid at the time of	submission of bids. The MSI is to ensure
		submission of bid:	the quality certificates remain valid
	—		throughout the period of the contract.

S No.	Туре	Pre-Qualification Criteria	Required Documentary Evidence	
		a. ISO 9001:2015 or equivalent		
		for Quality Management		
		System.		
		b. ISO 20000:2011 for IT Service		
		Management or equivalent		
		certification		
		c. ISO 27001:2013 for		
		Information Security		
		Management System or		
		equivalent certification.		
		d. CMMI Level 3 or above for		
		Capability Maturity Model		
		Integration.		
		As on date of submission of the	1. The Sole Bidder or the Partner In	
	Company Standings	proposal, The Sole Bidder/ Bidders	charge and all other Members of	
		(each of consortium members in case	Consortium: Legal Attorney	
		of consortium as applicable) shall not	certified letter of undertaking to	
6		be blacklisted by any State / Central	this effect on the letter head, co-	
0.		Government Department or Central	signed by bidders' authorized	
		/State PSUs.	signatory.	
			2. In case of consortium, this needs to	
			be provided by each of the	
			consortium member.	
		The Sole/ Lead Bidder/ (any member	The sole Bidder/any Member of	
		in case of consortium) shall have	Consortium/ Sub-Contractor(s):	
		successfully executed both category	1. Work order/ Contract clearly	
	ents	(A&B) projects in last Seven (07) years	highlighting the scope of work, Bill	
7	omponer	(excluding civil work) as per following:	of Material and Total value of the	
/.			contract/order with relevant values.	
	נל	Category A:	2. Completion Certificate issued &	
		1. Data Center / Disaster Recovery	signed by the authorized signatory	
		Centre Infrastructure	of the client entity on the entity's	
		establishment	Letterhead.	

S No.	Туре	Pre-Qualification Criteria	Required Documentary Evidence
		AND	In case of large orders/orders with
		2. Command and control center/	operations & maintenance phase,
		City Control Room/	the completion may specify
		Communication Center	successful execution of mentioned
			components and in-operation
		The combined values of the above-	status of a part of the order meeting
		mentioned solution (excluding civil	the requirement through a Self-
		work) should not be less than as per	declaration. The format of the self-
		following:	certificate is provided in Section 6.7
			of TENDER volume I.
		• 1 nos. of Combination: INR 54 Cr.	3. In case of NDA, Company Secretary/
		(Where Value of Item 1 of Cat-A shall	CA Signed Certificate providing
		not be less than INR 30 Cr. and value	details of Scope of work and Value
		of item 2 of Cat-A shall not be less	and stage of project.
		than INR 10 Cr.)	
		Or	"BSCL reserves the rights to contact &
		• 2 nos. of Combination: INR 40 Cr.	verify with the competent authority for
		Each.	the specified Work Orders.
		(Where Value of Item 1 of Cat-A shall	For on-going projects, a duly signed
		not be less than INR 23 Cr. and value	certificate from CA/ CS has to be
		of item 2 of Cat-A shall not be less	submitted mentioning and value of the
		than INR 7 Cr.)	component.
		Or	In such a case the completed project
		• 3 nos. of Combination: INR 27 Cr.	value must not be less than the
		Each.	minimum qualifying value of the
		(Where Value of Item 1 of Cat-A shall	stipulated project as has been asked in
		not be less than INR 15 Cr. and value	the TENDER.
		of item 2 of Cat-A shall not be less	
		than INR 5 Cr.)	
		Note: Combination means one nos. of	
		item 1 and one nos. of item 2.	

S No.	Туре	Pre-Qualification Criteria	Required Documentary Evidence
		Relevant experience upto seven (07)	
		years will be considered provided	
		system has been/had been under	
		active O&M by the Bidder for 3 years	
		in last 7 years.	
		Category B:	
		1. Intelligent traffic management	
		with minimum 10 junctions of	
		RLVD + ANPR and 5 junctions of	
		ATCS System.	
		AND	
		2. Surveillance projects with at least	
		250 outdoor Cameras	
		The combined values of the above-	
		mentioned solution (excluding civil	
		work) should not be less than as per	
		following:	
		• 1 nos. of Combination: INR 20 Cr.	
		Or	
		• 2 nos. of Combination: INR 15 Cr.	
		Each.	
		Ur .	
		• 3 nos. of Combination: INR 10 Cr.	
		Each.	
		Note: Combination means one nos. of	
		item 1 and one nos. of item 2.	
		Polovant ovnerience unte cover (07)	
		Relevant experience upto seven (07)	
		years will be considered provided	

S No.	Туре	Pre-Qualification Criteria	Required Documentary Evidence
		system has been/had been under	
		active O&M by the Bidder for 3 years	
		in last 7 years	
		The Sole/ Lead Bidder/ (any member	The sole Bidder/ any Member of
		in case of consortium) shall have	Consortium/ Sub-Contractor(s):
		successfully executed E-Governance	1. Work order/ Contract clearly
		Solution projects in last Seven (07)	highlighting the scope of work, Bill
		years (excluding civil work) as per	of Material and Total value of the
		following:	contract/order with relevant values.
			2. Completion Certificate issued &
		1 Project value: INR 5 Cr.	signed by the authorized signatory
		Or	of the client entity on the entity's
		2 Projects value: INR 3 Cr.	Letterhead.
		Or	In case of large orders/orders with
		3 Projects value: INR 2 Cr.	operations & maintenance phase,
			the completion may specify
	rnance	Relevant experience upto seven (07)	successful execution of mentioned
Q		years will be considered provided	components and in-operation
0.	ovei	system has been/had been under	status of a part of the order meeting
	E-0	active O&M by the Bidder for 3 years	the requirement through a Self-
		in last 7 years	declaration. The format of the self-
			certificate is provided in Section 6.7
			of TENDER volume I.
			3. In case of NDA, Company Secretary/
			CA Signed Certificate providing
			details of Scope of work and Value
			and stage of project.
			BSCL reserves the rights to contact &
			verify with the competent authority for
			the specified Work Orders.
			For on-going projects, a duly signed
			certificate from CA/ CS has to be

S No.	Туре	Pre-Qualification Criteria	Required Documentary Evidence		
			submitted mentioning and value of the		
			component.		
			In such a case the completed project		
			value must not be less than the		
			minimum qualifying value of the		
			stipulated project as has been asked in		
			the TENDER.		

Note: On-going projects shall be accepted considering mentioned clause in RFP.

3.6 Technical Evaluation Framework

The Bidder's technical solution proposed in the Technical Evaluation bid shall be evaluated as per the evaluation criteria in the following table.

S No.	Evaluation Criteria	Total Marks	Minimum Technical qualification Marks
1.	Company Financial Standing	15	
2.	Experience: ICT Components	29	
3.	Experience: Smart Element	8	51
4.	Experience: E-Governance	3	
5.	Proposed Solution, Approach, Methodology	15	
6.	Proof of concept	15	
7.	Relevant Manpower Deployment	15	9
	Total	100	60

Qualification Minimum absolute technical score to qualify for commercial evaluation is 60 marks out of total 100 marks and also the bidder should get minimum of 60% of marks in each of abovementioned evaluation criteria.

BSCL (or a nominated committee/ party) reserves the right to check/validate the authenticity of the information provided in the Pre-qualification and Technical Evaluation criteria and the additional requisite support must be provided by the Bidder.

C No.	Criteria/	Evoluction Critoric Dotoile	Max.	Required Supporting
5 NO.	Category	Evaluation Criteria Details	Marks	Documents
1.	Annual Turnover	Average annual turnover as mentioned below for the Sole Bidder/ Bidders (All consortium members put together in case of consortium) over the last three (3) Financial Years i.e. for FY 2016-17, 2017-18 & 2018-19. In case of Consortium, out of the total value of turnover; at least 50% of the turnover criteria shall be met by the Lead Bidder and each Consortium partners other than lead bidder shall have minimum average annual turnover of INR 50 Crores in last three FY as indicative above. In case of sole bidder 100% turnover to be from sole bidder. Marks shall be allotted as given below: 1. >INR 500 Cr.= 15 marks 2. >INR 450cr. to 500 Cr.= 12 marks 3. =INR 400 to 450 Cr.= 9 marks	15	Sole Bidder or Lead Bidder of the consortium and its consortium partners: Certificate from the Statutory Auditor/ CA on turnover details from the "specific business areas" over the last three (3) financial years (Business Area means: ICT Experience relevant to this TENDER)
2.	ICT Components	The Sole/ Lead Bidder/ (any member in case of consortium) shall have successfully executed both category (A&B) projects in last seven (07) years (excluding civil work) as per following: <u>Category A:</u>	29	 Sole Bidder/ any Member of Consortium: 1. Work order/ Contract clearly highlighting the scope of work, Bill of Material and value of the contract/order. 2. Completion Certificate issued & signed by the

3.6.1 Technical Bid Criteria & Evaluation

Criteria/	Evoluction Critoric Details	Max.	Required Supporting
Category	Evaluation Criteria Details	Marks	Documents
	1. Data Center / Disaster Recovery		authorized signatory of
	Centre Infrastructure		the client entity on the
	establishment		entity's letterhead.
	AND		3. In case of NDA,
	2. City Command and control		Company Secretary/ CA
	center/ City Control Room/ City		Signed Certificate
	Communication Center		providing details of
			Scope of work and
	The combined values of the above-		Value and stage of
	mentioned solution (excluding civil		project.
	work) should not been less than as		
	per following:		The BSCL reserves the right
			to contact & verify with the
	A. Slab 1: 12 Marks		afore mentioned
	1 nos. of Combination: INR 54 Cr.		competent authority.
	Or		In case of large orders/
	2 nos. of Combination: INR 40 Cr.		orders with operations &
	Or		maintenance phase, the
	3 nos. of Combination: INR 27 Cr.		completion/self-certificate
			from authorized signatory
	OR		may specify successful
			execution and in operation
	Slab 2: 15 Marks		status of a part of the order
	2 nos. of Combination: INR 54 Cr.		meeting the requirement.
	Or		The format of the self-
	3 nos. of Combination: INR 40 Cr.		certificate is provided in
			TENDER volume I.
	OR		
			For on-going projects, a duly
	Slab 3: 18 Marks		signed certificate from CA/
	3 nos. of Combination: INR 54 Cr.		CS has to be submitted
	Criteria/ Category	Criteria/ CategoryEvaluation Criteria Details1. Data Center / Disaster Recovery Centre establishmentInfrastructure 	Criteria/ CategoryEvaluation Criteria DetailsMax. Marks1. Data Center / Disaster Recovery Centre establishment1.AND2.2. City Command and control center/ City Control Room/ City Communication CenterThe combined values of the above- mentioned solution (excluding civil work) should not been less than as per following:A. Slab 1: 12 Marks 1 nos. of Combination: INR 54 Cr. Or 2 nos. of Combination: INR 40 Cr. Or 3 nos. of Combination: INR 27 Cr.ORSlab 2: 15 Marks 2 nos. of Combination: INR 54 Cr. Or 3 nos. of Combination: INR 40 Cr. Or 3 nos. of Combination: INR 40 Cr.ORSlab 3: 18 Marks 3 nos. of Combination: INR 54 Cr.

Criteria/	Criteria/	Evoluation Critoria Dataila	Max.	Required Supporting
5 NO.	Category	Evaluation Criteria Details	Marks	Documents
		B. If both components will be from		mentioning and value of the
		single project, then additional		component.
		marking will be given as per below		
		mentioned.		In such a case the
				completed project value
		1 Project (having both item 1 and		must not be less than the
		2 in same project) each of		minimum qualifying value
		minimum value: INR 54 Cr. = 1		of the stipulated project as
		Mark		has been asked in the
		OR		TENDER.
		2 Project (having both item 1 and		
		2 in same project) each of		
		minimum value: INR 54 Cr = 2		
		Mark		
		OR		
		3 Project (having both item 1 and		
		2 in same project) each of		
		minimum value: INR 54 Cr = 3		
		Mark		
		*Minimum value of each component		
		shall be as per PQ criteria.		
		Code and Di		
		Category B:		
		1. Intelligent traffic management		
		with minimum 10 junctions of		
		KLVD + ANPK and 5 junctions of		
		AILS System.		
		2. Surveillance projects with at least		
		250 outdoor Cameras		

S No	Criteria/	Evaluation Critoria Dotails	Max.	Required Supporting
- 5 NO.	Category		Marks	Documents
		The combined values of the above-		
		mentioned solution (excluding civil		
		work) should not been less than as		
		per following:		
		A. Slab 1: 3 Marks		
		1 nos. of Combination: INR 20 Cr.		
		Or		
		2 nos. of Combination: INR 15 Cr.		
		Or		
		3 nos. of Combination: INR 10 Cr.		
		OR		
		Slab 2: 4 Marks		
		2 nos. of Combination: INR 20 Cr.		
		Or		
		3 nos. of Combination: INR 15 Cr.		
		OR		
		Slab 3: 5 Marks		
		3 nos. of Combination: INR 20 Cr.		
		B. If both components will be from		
		single project, then additional		
		marking will be given as per below		
		mentioned.		
		1 Projects (having both item 1 and		
		2 in same project) each of		
		minimum value: INR 20 Cr. = 1		
		Mark		

S No	Criteria/	Evaluation Critoria Dotails	Max.	Required Supporting
3 110.	Category		Marks	Documents
		Or		
		2 Projects (having both item 1 and		
		2 in same project) each of		
		minimum value: INR 20 Cr. = 2		
		Mark		
		Or		
		3 Projects (having both item 1 and		
		2 in same project) each of		
		minimum value: INR 20 Cr. = 3		
		Mark		
		*Minimum value of each component		
		shall be as per PQ criteria.		
		Relevant experience upto seven (07)		
		years will be considered provided		
		system shas been/had been under		
		active O&M by the Bidder for 3 years		
		in last 7 years		
		The Sole/ Lead Bidder/ (any member		Sole Bidder/any Member of
		in case of consortium) shall have		Consortium:
		successfully executed both category		1. Work order/ Contract
		(C&D) projects in last seven (07) years		clearly highlighting the
	s	(excluding civil work) as per following:		scope of work, Bill of
	ution			Material and value of
3.	Solu	Category C:	8	the contract/ order.
	mart			2. Completion Certificate
	S	Solid waste management System		issued & signed by the
				authorized signatory of
		Slab 1: 1 Marks		the client entity on the
		1 Project value: INR 5 Cr.		entity's letterhead OR
		Or		The BSCL reserves the

S No	Criteria/	Evaluation Critoria Dotails	Max.	Required Supporting
5 110.	Category		Marks	Documents
		2 Project value: INR 3 Cr.		right to contact the
		Or		afore mentioned
		3 Project value: INR 2 Cr.		competent authority.
				In case of large orders/
		OR		orders with operations
				& maintenance phase,
		Slab 2: 2 Marks		the completion/ self-
		2 Project Value: INR 5 Cr.		certificate by
		Or		authorized signatory
		3 Project Value: INR 3 Cr.		may specify successful
				execution and in-
		OR		operation status of a
				part of the order
		Slab 3: 3 Marks		meeting the
		3 Project Value: INR 5 Cr.		requirement. The
				format of the self-
				certificate is provided in
		Category D:		TENDER volume I.
		1. 10 Environmental Sensor - 0.5		In case of NDA, Company
		Mark		Secretary/ CA Signed
		2. Variable Messaging Display at min		Certificate providing details
		10 Location – 2 Mark		of Scope of work and Value
		3. Public Address System/		and stage of project.
		Emergency Call Box at Min 15		
		Location – 1 Mark		For on-going projects, a duly
		4. Parking Management Solution at		signed certificate from CA/
		10 Locations – 1.5 Marks		CS has to be submitted
				mentioning and value of the
		Relevant experience upto 7 years will		component.
		be considered provided system has		

S No.	Criteria/	Evoluation Critoria Dotaila	Max.	Required Supporting
5 110.	Category	Evaluation Criteria Details	Marks	Documents
		been/had been under active O&M by		In such a case the
		the Bidder for 3 years in last 7 years		completed project value
				must not be less than the
				minimum qualifying value
				of the stipulated project as
				has been asked in the
				TENDER.
				The BSCL reserves the right
				to contact & verify with the
				a fore mentioned
				competent authority.
		The Sole/ Lead Bidder/ (any member		Sole Bidder/any Member of
		in case of consortium) shall have		Consortium:
		successfully executed E-Governance		1. Work order/ Contract
		Solution projects in last seven (07)		clearly highlighting the
		years (excluding civil work) as per		scope of work, Bill of
		following:		Material and value of
				the contract/ order.
		Slab 1: 2 Marks		2. Completion Certificate
	е			issued & signed by the
4	rnan	1 Project value: INR 5 Cr.	3	authorized signatory of
	ove	Or	5	the client entity on the
	БЧ	2 Projects each of minimum value:		entity's letterhead OR
		INR 3 Cr.		The BSCL reserves the
		Or		right to contact the
		3 Projects each of minimum value:		afore mentioned
		INR 2 Cr.		competent authority.
				In case of large orders/
		OR		orders with operations &
				maintenance phase, the
		Slab 2: 2.5 Marks		completion/self-certificate

S No	Criteria/	Evaluation Critoria Dataila	Max.	Required Supporting
5 100.	Category	Evaluation Criteria Details	Marks	Documents
		2 Project each of minimum value: INR		by authorized signatory may
		5 Cr.		specify successful execution
		Or		and in- operation status of a
		3 Projects each of minimum value:		part of the order meeting
		INR 3 Cr.		the requirement. The
				format of the self-
		OR		certificate is provided in
				TENDER volume I.
		Slab 3: 3 Marks		
		3 Project value: INR 5 Cr.		In case of NDA, Company
				Secretary/ CA Signed
		Relevant experience upto 7 years will		Certificate providing details
		be considered provided system has		of Scope of work and Value
		been/had been under active O&M by		and stage of project.
		the Bidder for 3 years in last 7 years		
				For on-going projects, a duly
				signed certificate from CA/
				CS has to be submitted
				mentioning and value of the
				component.
				In such a case the
				completed project value
				must not be less than the
				minimum qualifying value
				of the stipulated project as
				has been asked in the
				TENDER.
				The BSCL reserves the right
				to contact & verify with the

S No	Criteria/	Evaluation Critoria Dotails	Max.	Required Supporting
5 100.	Category		Marks	Documents
				afore mentioned
				competent authority.
	×	Understanding: Demonstrated level		Assessment to be based on
	۸/ bility	of understanding of the scope of work		a dedicated sectional note
	/ A&M Scalab	and all aspects of the project Overall		covering all requirements
5.	ling/ LA/ 9	project implementation approach,	15	(in the Technical Proposal
	tand ht/ S	methodology, Deployment plan/ Risk		submitted by the bidder)
	ders /mer	Mitigation Plan/ Strategy/ SLA		
	Un Ploy	Adequacy, robustness and scalability		
	ă	of proposed solution		
6.	C	Proof of Concept as defined in section	15	
	РС	3.6.2		
		A. Technical Leader cum Program		The detailed CVs of the
		Manager: 4 marks		proposed Manpower
		i. Min Educational		Resources duly signed
		Qualification: BE / B. Tech or		either self-attested or
		equivalent		signed by the competent
	t	ii. Min Work experience in the		authority of the bidder.
	men	capacity of Project		
	ploy	Manager/Program Manager		
	ir De	in ICT implementation		
7.	9MO	Projects: 10 years (with min 5	15	
	Manp	years of exp. as a project lead)		
	ant l			
	elev	a. Certification: PMP/ Prince 2		
	R	Certification- 0.5 mark		
		b. Work experience in the capacity		
		of Project/ Program Manager in		
		ICT implementation Projects		
		i. > Min 5 years of experience as		
		a project lead): 1 mark		

S No	Criteria/	Evaluation Critoria Dotails	Max.	Required Supporting
5 100.	Category		Marks	Documents
		ii. > Min 7 years of experience as		
		a project lead): 1.5 mark		
		iii. > 10 years of experience as a		
		project lead): 2 mark		
		c. Project/ Program Management		
		Experience in ICT implementation		
		Project of value > 100 crores: 1		
		mark		
		d. Project/ Program Management		
		Experience of min 6 months in		
		Smart City ICT implementation		
		Project: 0.5 mark		
		B. Solution Architect: 2 marks		
		i. Min Educational		
		Qualification: Bachelor's		
		Degree in Engineering/MCA		
		or equivalent		
		ii. ii. Min Work experience in the		
		capacity of Solution Architect		
		in ICT implementation		
		Projects: 7 years		
		a. Certification: Relevant		
		certification in Solution		
		Architecture/ framework e.g		
		CCNA/CCNP or equivalent - 0.5		
		mark		
		b. Work experience as IT/ICT		
		solution architect		
		i. > 7 years of relevant		
		experience): 1 mark		

S No.	Criteria/	Evoluction Critorio Dotoile	Max.	Required Supporting
5 110.	Category	Evaluation Criteria Details	Marks	Documents
		ii. > 10 years of relevant		
		experience): 1.5 mark		
		C. IOI Expert: I mark		
		I. Min Educational		
		Qualification: Bachelor's		
		Degree in Engineering/MCA		
		or equivalent		
		ii. Min 2 years of Work		
		experience as IOT expert		
		a Mark oversienes as IOT overset		
		a. Work experience as for expert		
		i. >2 years of relevant		
		experience: 0.5 Mark		
		ii. >4 Years of relevant		
		experience: 1 Mark		
		D. System Admin: 1 mark		
		i. Min Educational		
		Qualification: Bachelor's		
		Degree in Engineering/ MCA		
		or equivalent		
		ii. Min 5 year of Work		
		experience in the capacity of		
		System admin in ICT		
		implementation Projects		
		a. Certification: Any professional		
		certification that relates to MCSE/		
		Linux/ RHCE or equivalent- 0.5		
		mark		

S No	Criteria/	Evoluation Critoria Dataila	Max.	Required Supporting
- 5 NO.	Category	Evaluation Criteria Details	Marks	Documents
		b. Work experience in the capacity		
		of System admin in ICT		
		implementation Projects		
		> 5 years of relevant		
		experience- 0.5 mark		
		E. Network Expert: 1 mark		
		i. Min Educational		
		Qualification: Bachelor's		
		Degree in Engineering/ MCA		
		or equivalent		
		ii. Min 5 years of work		
		experience as network expert		
		for IT/ ICT Project		
		a. Certification: Relevant		
		certification preferably CCNA /		
		CCNP/ or equivalent 0.5 marks		
		b. Work experience as network		
		expert for IT/ICT Projects		
		I. > 5 years of relevant		
		experience - 0.5 mark		
		F Database Expert: 1 mark		
		i Min Educational		
		Qualification: Bachelor's		
		Degree in Engineering/ MCA		
		or equivalent		
		ii. Min 5 years of Work		
		experience as Data base		
		administrator/ Manager		
		a. Certification: Relevant		
		certification in Database		

S No	Criteria/	Evaluation Criteria Details	Max.	Required Supporting
- 5 NO.	Category		Marks	Documents
		architecture and management,		
		preferably i.e. MCSE (Database		
		platform)/ MySQL / MTA DB/ any		
		RDBMS or equivalent- 0.5 mark		
		b. Work experience as Data base		
		administrator/ Manager		
		i. > 5 years of relevant		
		experience - 0.5 mark		
		G. Command Control &		
		Communication Center Expert: 2		
		marks		
		i. Min Educational		
		Qualification: · Bachelor's		
		Degree in Engineering/ MCA		
		or equivalent		
		ii. Min 5 years of Work		
		experience in designing/		
		operating of Command		
		Center / Network Operating		
		Centre Projects		
		a. Work experience in designing/		
		operating of Command Center /		
		Network/ VMS / ICCC Operating		
		Centre Projects		
		i. > 5 years of Work experience:		
		1 Marks		
		ii. > 7 Years of work experience:		
		2 Mark		
		H. Security Expert: 1 mark		

S No	Criteria/	Evaluation Critoria Dotails	Max.	Required Supporting
- 3 NO.	Category	Evaluation Citteria Details	Marks	Documents
		i. Min Educational		
		Qualification: Bachelor's		
		Degree in Engineering/ MCA		
		or equivalent		
		ii. Min 5 years of Work		
		experience as IT Security		
		expert		
		a. Certification: Relevant		
		certification in IT security/ CISM/		
		CISSP/ CCIE or equivalent- 0.5		
		mark		
		b. Work experience as IT Security		
		expert		
		i. > 5 years of relevant		
		experience - 0.5 mark		
		I. Technical Support staff: 1 mark		
		i. Min Educational		
		Qualification: BE / B. Tech /		
		MCA or equivalent		
		ii. Min 3 years of Work		
		experience as technical		
		support expert		
		a. Work experience as technical		
		support expert		
		i. >3 years of relevant		
		experience - 0.5 Mark		
		ii. > 5 Years of relevant		
		experience: 1 Mark		
		J. Helpdesk staff: 1 mark		

S No.	Criteria/	Evaluation Critoria Dataila	Max.	Required Supporting
3 NU.	Category	Evaluation Criteria Details	Marks	Documents
		i. Min Educational		
		Qualification: Diploma in IT /		
		B. Tech / B.E/ MCA or		
		equivalent		
		ii. Min 2 years of work		
		experience in same domain		
		a. Work experience in same domain		
		i. > 2 years: 0.5 Mark		
		ii. > 3 years: 1 Mark		
		Total	100	
			marks	

Note : On-going projects shall be accepted considering mentioned clause in RFP.

3.6.2 Structure of Proposed Solution during the POC

Bidders should include list of similar projects executed along with relevant details about the integration scope of the ICCC. The evaluation committee to be shown the end to end ICCC integration and Incident Management capabilities along with dashboards showing operational insights/ Trends/ KPIs related to city. The evaluation committee may also visit one or more of the sites for onsite evaluation. Bidder need to demonstrate all the key components mentioned in volume 2 scope of work. Either Onsite (Bareilly) or Any existing implementation (PoC to be done by the bidder its own expenses). Lab Setup will not be accepted. In case of Onsite PoC (Bareilly), approval and permission will be given by BSCL.

Bidder may demonstrate local setup or existing deployments over network/ cloud.

A.	System Demonstration	Integrated Operations Platform Software
В.	Demo material & Setup	Demo Material –
		Department scope:
		• Power Source
		 Space for installing server and workstation
		Demo Material – OEM/SI Scope
		Demo Setup (OEM/SI scope) at Site

C.	Performance Evaluation	Smart City use cases
		Live demo and integration services

3.7 Project Delivery & Payment Schedule

Payments to MSI shall be made by the Competent Authority, after the successful completion of the target milestones (including specified project deliverables) where T is the date of sign of contract:

3.7.1 Project Delivery

S. No.	Deliverables	Timelines (in Months)	
1.	Phase1: Project Mobilization & Design	T + 2 month	
	Resource Mobilization	1 Month	
	Detailed Project Plan		
	 Survey and Detailed Design of all the solutions 		
	components	1 Month	
	Design Approvals		
	Required Civil Infrastructure Plan & Approval		
	Weekly and Monthly Progress Reports		
2.	Phase 2: Supply of equipment's	T + 6 months	
3.	Phase 3: Project Implementation Phase	T + 10 months	
	Hardware & Software Installation Stage		
	Pilot Deployment		
	Prototype Acceptance and Factory Acceptance Testing		
	Software Development	4 Months	
	Final Deployment and Documentation		
	System Integration		
	• Testing-Performance, Scalability, Systems Integration,		
	Stress Testing, Security Testing, Systems Acceptance		
	Test, etc.		
	Develop Training Materials		
4.	Phase 4: Operational Acceptance & Training (T1)	T1=T + 12months	
	Training & Change Management	2 Month	
	User Training		

	Mobilization of required staff	
	Operational System Acceptance	
	ICCC, DC, DR certifications	
	Go-Live	
5.	Phase 5: Operations and Maintenance phase	T1+ 60 Months
	MSI has to follow the SLA's defined during the maintenance phase. MSI will be solely responsible for the deliverables.	60 months from the date of Go-Live
	SLA Compliance Reports, Audits	

Note

- T = Project Start Date
- T1= Go-Live Date

3.7.2 Payment Schedule

S. No.	Scope of Work	Timelines	Payment	
1.	Phase 1 Project Mobilization & Design	T + 2 Months	10 % of contract Value	
2.	Phase 2 Delivery of equipment's	T + 6 Months	25 % of contract Value (*)	
3.	Phase 3 Project Implementation Phase	T + 10 Months	15 % of Contract Value (**)	
4.	Phase 4 Operational Acceptance& Training (T1)	T1 = T + 12 months	20 % of Contract value	
5.	Phase 5 Operations Maintenance phase	T1 + 60 Months	30 % of the contract value (20) equal quarterly installments spread across 5 years Post Final Go-Live	

* Successful Delivery of each 25% the Site equipment (camera, Ruggedized switch, Traffic Signal, PA System, Wi-Fi Hotspot, LED Display screens etc.)

** MSI shall claim 50% of value against mentioned milestone after successful completion of 75% of Project implementation. However, in case 100% implementation will not completed due to site unavailability BSCL may consider the milestone payment against work completed after completion of 90% work.

3.8 Key Personnel Criteria

- i. SI shall provide adequate number of personnel, each responsible for a specific role within the project. SI shall provide clear definition of the role and responsibility of each individual personnel.
- ii. SI shall have a defined hierarchy and reporting structure for various teams that shall be part of the project. SI has to provide the list of proposed Manpower for the Project. Any changes in Manpower deployment post submission of the proposal will have to be approved by the BSCL.
- iii. The indicative minimum qualification required for Key Positions identified for this project can be referred at point no. 8 of Technical Evaluation Criteria table. However, beside these mandatory deployments, SI shall independently estimate the teams size required to meet the requirements of Service Levels as specified as part of this Tender.
- iv. All other proposed positions shall be Onsite throughout the entire project implementation phase.
- v. Manpower plan for Implementation Phase to be provided as per format provided in 7.5.3 (I)
- vi. Apart from the above –mentioned resources, the Bidder shall also propose manpower to be deployed during the Operation & Maintenance phase of the Project.
- vii. Below mentioned minimum manpower shall be deployed for entire contract duration. However, apart from this minimum manpower quantity MSI shall propose the manpower to fulfil RFP conditions.

#	Designation	Desire	d Qualification	<u>Qty</u>
1.	Technical Leader	١.	BE / B. Tech or equivalent.	<u>1</u>
	cum Program	II.	Min Work experience in the capacity of Project/Program	
	Manager		Manager in ICT implementation Projects: 10 years (with	
			min 5 years of exp. as a project lead)	
		III.	PMP/ Prince 2 Certification	
2.	Solution Architect	I.	BE/ B. Tech /MCA or equivalent	<u>1</u>
		II.	Min Work experience in the capacity of Solution Architect	
			in ICT implementation Projects: 7 years	
3.	IOT Expert	I.	BE/ B. Tech /MCA or equivalent	<u>1</u>
		II.	Min 2 years of Work experience as IOT expert	
4.	System Admin	I.	BE/ B. Tech /MCA or equivalent	<u>2</u>
		II.	Min 5 year of Work experience in the capacity of System	
			admin in ICT implementation Projects	
		III.	MCSE/Linux/ RHCE Certification or equivalent	
5.	Network Expert	I.	BE/ B. Tech /MCA or equivalent	<u>2</u>
		١١.	Min 5 years of work experience as network expert for IT/ICT	
			Project	
		III.	CCNA / CCNP/ or equivalent	
6.	Database Expert	I.	BE/ B. Tech /MCA or equivalent	<u>1</u>
		II.	Min 5 years of Work experience as Database administrator/	
			Manager	
7.	Command Control	I.	BE/ B. Tech / MCA or equivalent	<u>2</u>
	& Communication	١١.	Min 5 years of Work experience in designing/ operating of	
	Center Expert		Command Center / Network Operating Centre Projects	
8.	Security Expert	I.	BE/ B. Tech /MCA or equivalent	<u>1</u>
		II.	Min 5 years of Work experience as IT Security expert	
		III.	IT security/ CISM/ CISSP/ CCIE or equivalent Certification	
9.	Technical Support	I.	BE / B. Tech / MCA or equivalent	<u>2</u>
	staff	II.	Min 3 years of Work experience as technical support expert	
10	Helpdesk staff	I.	Diploma in IT / B. Tech / B.E/ MCA or equivalent	<u>2</u>
		11.	Min 2 years of work experience in same domain	

4 Award of Contract

4.1 Notification of Award

BSCL will notify the successful Bidder in writing by e-mail followed by Physical document to be confirmed by the Bidder in writing by email followed by Physical document.

4.2 Signing of Contract

After the notification of award, BSCL will issue Purchase Order (PO)/Letter of Intent (LOI). Accordingly, a contract shall be signed between successful bidder and BSCL or the agency designated by BSCL. As an acceptance of the PO/LOI, the Bidder shall sign and return back a duplicate copy of the Purchase Order to BSCL or the agency designated by the BSCL. The bidder shall return the duplicate copy along with a Performance Bank Guarantee within 15 working days from the date of issuance of PO/LOI.

On receipt of the Performance Bank Guarantee, BSCL or the agency designated by BSCL shall enter into a contract with the successful bidder. The Master Service Agreement is provided in TENDER Volume III.

4.3 Performance Bank Guarantee (PBG)

- Within fifteen (15) working days from the date of issuance of LOI, the successful Bidder shall at his own expense submit unconditional and irrevocable Performance Bank Guarantee (PBG) to the BSCL. The PBG shall be from a Nationalized Bank or a Scheduled Commercial Bank in the format prescribed in Section 9 Annexure 5 (a), payable on demand, for the due performance and fulfillment of the contract by the bidder.
- ii. This Performance Bank Guarantee shall be for an amount equivalent to 10% of total contract value. PBG shall be invoked by BSCL, in the event the Bidder:
 - a. fails to meet the overall penalty condition as mentioned in TENDER Volume II or any changes agreed between the parties,
 - b. fails to perform the responsibilities and obligations as set out in the TENDER to the complete satisfaction of BSCL,
 - c. Misrepresents facts/information submitted to BSCL
- iii. The performance bank guarantee shall be valid till satisfactory completion of Post Implementation Support. The performance bank guarantee may be discharged/returned by BSCL upon being satisfied that there has been due performance of the obligations of the bidder under the contract. However, no interest shall be payable on the performance bank guarantee.
- iv. In the event of the Bidder being unable to service the contract for whatever reason(s), BSCL shall have the right to invoke the PBG. Notwithstanding and without prejudice to any rights whatsoever of BSCL under the contract in the matter, the proceeds of the PBG shall be payable

Page | 64

to BSCL as compensation for any loss resulting from the bidder's failure to perform/comply its obligations under the contract.

- v. BSCL shall notify the bidder in writing of the exercise of its right to receive such compensation within 40 days, indicating the contractual obligation(s) for which the bidder is in default. BSCL shall also be entitled to make recoveries from the bidder's bills, performance bank guarantee, or from any other amount due to him, an equivalent value of any payment made to him due to inadvertence, error, collusion, misconstruction or misstatement.
- vi. In case the project is delayed beyond the project schedule as mentioned in TENDER Vol 2, the performance bank guarantee shall be accordingly extended by the Bidder till completion of scope of work as mentioned in TENDER Volume II.
- vii. This Performance Bank Guarantee shall be valid only up to the completion of the period of 'Go- Live' + 60 months for the Solution.
- viii. On satisfactory performance and completion of the order in all respects and duly certified to this effect by the Project Coordinator, Contract Completion Certificate shall be issued and the PBG would be returned to the Bidder.

4.4 Warranty & Maintenance

- Bidder shall also provide complete maintenance support for all the proposed integrated solution as outlined in this TENDER for a period of Sixty months from the date of go-live i.e.
 "Go-Live" + 60 months. "Go-live" is the date on which the proposed solution is completely operational as per the requirements provided in this TENDER and all the acceptance tests are successfully concluded to the satisfaction of BSCL.
- ii. During the warranty period, the bidder shall warrant that the goods supplied under the contract are new, unused, of the most recent version/models and incorporate all recent improvements in design and materials unless provided otherwise in the contract. The bidder further warrants that the goods supplied under this contract shall have no defects arising from design, materials or workmanship.
- iii. BSCL or designated representatives of the bidder shall promptly notify successful bidder in writing of any claims arising under this warranty. Upon receipt of such notice, the bidder shall, within the warranty period and with all reasonable speed, repair or replace the defective systems, without costs to BSCL and within time specified and acceptable to BSCL.
- iv. If the successful bidder, having been notified, fails to remedy the defect(s) within the period specified in the contract, BSCL may proceed to take such reasonable remedial action as may be necessary, at the successful bidder's risk and expense and without prejudice to any other rights, which BSCL may have against the bidder under the contract.

v. During the comprehensive warranty period, the successful bidder shall provide all product(s) and documentation updates, patches/fixes, and version upgrades within 15 days of their availability and should carry out installation and make operational the same at no additional cost to BSCL.

The successful bidder hereby warrants BSCL that:

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

4.5 Failure to agree with the Terms & Conditions of the TENDER

Failure of the successful bidder to agree with the Terms & Conditions of the TENDER shall constitute sufficient grounds for the annulment of the award, in which event BSCL may award the contract to the next best value bidder or call for new bids.

In such a case, BSCL shall invoke the PBG and/or forfeit the EMD.

5 Annexure 2 – Formats for Submission of the Pre-Qualification Bid

5.1 Pre-qualification bid checklist

SI	Checklist Items	Compliance	Page No. and
		(Yes or No)	Section No. in bid
1.	TENDER Document fees		
2.	Earnest Money Deposit		
3.	Pre-Qualification Covering letter		
4.	Consortium Agreement, if applicable as per Annexure 7		
5.	Copy of Certification of Incorporation/Registration		
	Certificate		
	PAN card		
	GST registration		
6.	Audited financial statements for the last three financial		
	years		
	AND		
	Certificate from the Statutory Auditor/ CA		
7.	Declaration of non-blacklisting		
8.	Power of attorney for Lead Bidder of Consortium		
9.	Project Citations and Self-certifications, as Applicable		
10.	No Deviation Certificate		
11.	Total Responsibility Certificate		
12.	Valid ISO certification		

5.2 Pre-Qualification Bid Covering Letter

Date: dd / mm / yyyy

Τo,

CEO,

BSCL,

Bareilly,

U.P, India

Subject: Request for Proposal for Selection of System Integrator for Implementation of Bareilly Integrated Smart Solution

Ref: TENDER No. <<.....>> dated <<>>

Dear Sir,

With reference to your "Request for Proposal for Selection of System Integrator for Implementation of Bareilly Smart City Solution for BSCL", we hereby submit our Prequalification bid, Technical Bid and Commercial Bid for the same.

We hereby declare that:

- a. We hereby acknowledge and unconditionally accept that the BSCL can at its absolute discretion apply whatever criteria it deems appropriate, not just limiting to those criteria set out in the TENDER and related documents, in short listing of Agency for providing services.
- b. We have submitted EMD of INR [] Crores and Tender fee of INR [] in the <<Account details>>.
- c. We hereby declare that all information and details furnished by us in the Bid are true and correct, and all documents accompanying such application are true copies of their respective originals.
- d. We agree to abide by our offer for a period of 180 days from the date of Submission of bid prescribed by BSCL and that we shall remain bound by a communication of acceptance within that time.
- e. We have carefully read and understood the terms and conditions of the TENDER and the conditions of the contract applicable to the TENDER. We do hereby undertake to provision as per these terms and conditions.
- f. In the event of acceptance of our bid, we do hereby undertake:
 - i. To supply the products and commence services as stipulated in the TENDER document
 - ii. To undertake the project services for entire contract period from the date of signing of the contract as mentioned in the TENDER document.

- We affirm that the prices quoted are inclusive of design, development, delivery, installation, commissioning, training, providing facility management and handholding support and discounts etc.
- g. We do hereby undertake, that, until a formal contract is prepared and executed, this bid, together with your written acceptance thereof and notification of award of contract, shall constitute a binding contract between us.
- h. We understand that the BSCL may cancel the bidding process at any time and that BSCL is not bound to accept any bid that it may receive without incurring any liability towards the bidder.
- i. We fully understand and agree to comply that on verification, if any of the information provided in our bid is found to be misleading the selection process, we are liable to be dismissed from the selection process or termination of the contract during the project, if selected to do so

In case of any clarifications please contact, email, contact no.

Thanking you,

Yours sincerely,

(Signature of the Lead bidder) (Printed Name)

Designation

Seal Date:

Place:

Business Address:

5.3 Company profile

A. Brief company profile (required for both bidder and consortium member)

SNo.	Particulars	Description
1.	Name of Bidder	
2.	Legal status of Bidder (company, Pvt. Ltd., LLP etc.)	
3.	Main business of the Bidder	
4.	Registered office address	
5.	Incorporation date and number	
6.	Service Tax number	
7.	GST number	
8.	PAN details	
9	Primary Contact Person (Name, Designation, address, mobile	
5.	number, fax, email)	
10	Secondary Contact Person (Name, Designation, address, mobile	
10.	number, fax, email)	
11.	EMD details	
12.	Role in Consortium (if applicable)	Brief scope of work in
		the consortium

B. Valid Certificate of Incorporation (required for both bidder and consortium member)

C. Financial Turnover of last 3 years

The financial turnover of the company has to be provided as per the following table:

Annual Turnover details (certified)					
S No.	FY- 2016- 2017	FY 2017-18	FY 2018-19		

 Copy of audited financial statements or declaration from the appointed statutory auditor/ CA to be provided as proof of the financial turnover.

ii. Positive net worth of the last Three (3) financial years as on 31.03.2019. Copy of self-certified statutory auditor certificate to be submitted along with the bid.

5.4 Declaration of Non-Blacklisting (To be provided on the Company letter head)

Declaration for Lead Bidder:

Date: dd / mm / yyyy To,

CEO,

BSCL,

Bareilly,

U.P, India

Subject: Self Declaration of not been blacklisted in response to the Request for Proposal for selection of System Integrator for Implementation of Bareilly Smart City Solutions

Ref: TENDER No. <<.....>> dated <<>>

Dear Sir,

We confirm that our company or firm, ,is currently not blacklisted in any manner whatsoever by any of the State or UT and or Central Government in India on any ground including but not limited to indulgence in corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice.

(Signature of the Lead Bidder) Printed Name Designation Seal Date: Place: Business Address:
Declaration for Consortium Member

(To be provided on the Company letter head)

Date: dd / mm / yyyy

Τo,

CEO, BSCL,

Bareilly,

U.P, India

Subject: Self Declaration of not been blacklisted in response to the Request for Proposal for selection of System Integrator for Implementation of Bareilly Smart City Solutions for Ref: TENDER No. <<.....>> dated <<>>

Dear Sir,

We confirm that our company or firm, , is currently not blacklisted in any manner whatsoever by any of the State or UT and or Central Government in India on any ground including but not limited to indulgence in corrupt practice, fraudulent practice, coercive practice, undesirable practice or restrictive practice.

(Signature of the Consortium Member)
Printed Name Designation
Seal
Date:
Place:
Business Address:

5.5 No Deviation Certificate

This is to certify that our offer is exactly in line with your Tender enquiry/TENDER (including amendments) no. dated. This is to expressly certify that our offer contains no deviation either Technical (including but not limited to Scope of Work, Business Requirements Specification, Functional Requirements Specification, Hardware Specification and Technical Requirements Specification) or Commercial in either direct or indirect form.

(Authorized Signatory)

Signature: Name: Designation: Address: Seal: Date:

5.6 Total Responsibility Certificate

This is to certify that we undertake the total responsibility for the defect free operation of the proposed solutions as per the requirement of the TENDER for the duration mentioned in all the volumes of the TENDER.

(Authorized Signatory)

Signature:

Name:

Designation:

Address:

Seal:

Date:

5.7 Self-certificate for Project execution experience (In Bidding Entity's Letter Head)

This is to certify that < Name of the Bidding entity > has been awarded with < Name of the Project > as detailed under:

Name of the Project	
Client's Name, Contact no. and Complete Address	
Contract Value for the bidder (in INR)	
Current status of the project (Completed/Ongoing)	
Activities completed by bidding entity as on bid submission	
date	
(N.B Only relevant activities as sought in the Criteria to be	
included)	
Value of Work completed for which payment has been	
received from the client.	
Date of Start	
Date of Completion	

(Authorized Signatory)

Signature:

Name:

Designation:

Bidding entity's name

Address:

Seal and Date:

6 Annexure 3 – Formats for Submission of the Technical Bid

6.1 Technical Bid Check-List

S No	Chacklist Itom	Compliance	Page No. and Section
5 NO.	Checkist item	(Yes/No)	No. in the Bid
1.	Technical Bid Letter		
2.	Credential summary		
3.	Project Citations and Self-certifications, as applicable		
4.	Detailed proposed solution		
5.	Project plan and manpower plan		
6.	Proposed CVs		
7.	Compliance to Requirement (Technical / Functional Specifications)		
8.	Proposed Bill of Material		
9.	Manufacturers'/Producers' Authorization Form Anti-Collusion certificate		
10.	Non-disclosure agreement		

6.2 Technical Bid Covering Letter

Date: dd / mm / yyyy

Τo,

CEO, BSCL, Bareilly,

U.P, India

Subject: Request for Proposal for selection of System Integrator for Implementation of Bareilly Smart City Solutions

Ref: TENDER No. <<.....>> dated <<>>

Dear Sir,

I (in case of single bidder) or We, <<name of the undersigned Bidder and consortium members>>, having read and examined in detail all the bidding documents in respect of "Request for Proposal for Selection of System Integrator for Implementation of Bareilly Smart City Solution" do hereby propose to provide our services as specified in the bid submitted by us.

It is hereby confirmed that I / We are entitled to act on behalf of our company / corporation / firm / organization and empowered to sign this document as well as such other documents, which may be required in this connection.

We declare that all the services shall be performed strictly in accordance with the TENDER documents. We confirm that the information contained in this response or any part thereof, including its exhibits, and other documents and instruments delivered or to be delivered to BSCL, Government of U.P is true, accurate, verifiable and complete. This response includes all information necessary to ensure that the statements therein do not in whole or in part mislead the department in its evaluation process. We also confirm that we shall not attract conflict of interest in principle.

We hereby declare that in case the contract is awarded to us, we shall submit the contract Performance bank guarantee in the form prescribed at Annexure 5 (a) of Section 9 of the TENDER Volume I.

We hereby declare that our bid is made in good faith, without collusion or fraud and the information contained in the bid is true and correct to the best of our knowledge and belief.

We understand that our bid is binding on us and that you are not bound to accept a Bid you receive. This bid is valid for 180 days after opening of technical bid. We shall extend the validity of the bid if required by BSCL.

Thanking you,

Yours sincerely,

(Signature of the Lead Bidder) Printed Name

Designation

Seal Date:

Place:

Business Address:

S No.	Project Name	Client Name	Client Type	Project Value (in INR)	Project Components	Documentary evidence provided (Yes or No)	Project Status (Completed or Ongoing or Withheld)
1							
2							
3							
4							
5							
6							
7							

6.3 Credential Summary

- Client type Indicate whether the client is Government or PSU or Private
- Project Components Indicate the major project components like setting up of NOC, Wide Area Network, city/ public Wi-Fi, application development for security surveillance, command and control center, Maintenance, Hardware procurement and deployment, DC setup and maintenance, Facility management services, provisioning manpower, IT support and maintenance
- Documentary evidence provided Indicate the documentary evidence provided with the detailed project credential like work order or purchase order or completion certificate or letter of appointment
- Project Status Completed (date of project completion) or Ongoing (project start date)

6.4 Bidder's Experience - Client Citations

Prime Bidder or Consortium member is requested to furnish the credentials in the following format for both Pre-qualification and Technical criterion. All credentials should be followed by relevant documentary proof.

Name of the Project & Location	
Client's Name and Complete Address	
Narrative description of project	
Contract value for the bidder (in INR)	
Date of Start	
Date of Completion	
Activities undertaken by prime bidder or consortium member	

N.B - If the project is ongoing, bidder must clearly specify which of the stages/phases/milestones are completed and which are ongoing and at what stage of completion and produce a self-certificate as per the format provided in Section 6.7.

6.5 Overview of Proposed Solution

6.5.1 Structure of Proposed Solution

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

S No.	Item							
1.	Understanding of requirement and Implementation approach							
	Understanding of requirements							
	Work Plan & its adequacy							
2.	Robustness and quality							
	End to end integrated solution proposed							
	Hardware deployment and integration approach encompassing all solutions							
	Timelines and modalities for implementation in a time bound manner							
	Project implementation approach or strategy and operations and maintenance							
	plan including comprehensiveness of fallback strategy and planning during rollout							
	• Any other area relevant to the scope of work and other requirements of the							
	project							
3.	Assessment of Manpower deployment, Training and Handholding plan							
	Deployment strategy of Manpower							
	Contingency management							
	Mobilization of existing resources and additional resources as required							
	Training and handholding strategy							

6.5.2 Project Plan

Within 15 calendar days of Effective Date of the Signing of the contract, MSI shall submit to the designated authority for its approval a detailed Project Plan with details of the project showing the sequence, procedure and method in which it proposes to carry out the works. The Plan so submitted by MSI shall conform to the requirements and timelines specified in the Contract. The designated authority and MSI shall discuss and agree upon the work procedures to be followed for effective execution of the works, which MSI intends to deploy and shall be clearly specified. The Project Plan shall include but not limited to project organization, communication structure, proposed staffing, roles and responsibilities, processes and tool sets to be used for quality assurance, security and confidentiality practices in accordance with industry best practices, project plan and delivery schedule in accordance with the Contract. Approval by the designated authority's Representative of the Project Plan shall not relieve MSI of any of his duties or responsibilities under the Contract.

If MSI's work plans necessitate a disruption/ shutdown in designated authority's operation, the plan shall be mutually discussed and developed so as to keep such disruption/shutdown to the barest unavoidable minimum. Any time and cost arising due to failure of MSI to develop/adhere such a work plan shall be to his account.

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

Activity-wise Timelines											
Sl. No.	Item of Activity	Month wise Program									
		1	2	3	4	5	6	7	8	9	10
1	Project Plan										
1.1	Activity 1										
1.2	Sub-Activity 1										

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

6.5.3 Manpower Plan

1. Till Go-Live (Implementation)

Manpower distribution								
S. No.	Name	Role	Month wise time to be spent by each					
			personnel (in days) Total					
			Mont	Mont	Mont			Month
			h 1	h 2	h 3			12

2. After Go-Live (Operation & Maintenance)

Year wise Manpower distribution								
S. No.	Manpower/ Role	Years						
		Year 1	Year 2	Year 3	Year 4	Year 5		

6.6 Details of Resources proposed

Summary of Resources proposed

S No.	Name of the Resource	Proposed Role	Highest degree	Basic Qualification (E.g. B.Sc. or B.E. or MCA or Diploma)	Certifications (ex. PMI or ITIL or TOGAF or CCNP etc.)	Total Experience (in years)
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						

6.7 Curriculum Vitae (CV) of Team Members

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

	[Starting with present position and last 2 firms, list in reve					
	order, giving for each employment: dates of employment,					
	name of en	nploying organization, pos	itions held.]			

6.8 Relevant Work Undertaken that best illustrates the experience as required for

the Role

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

6.9 Compliance to Requirement (Technical / Functional Specifications)

The bidder should provide compliance to the requirement specifications (both technical and functional) specified in the Volume II of this TENDER. The same should be reproduced here, and compliance against each requirement line item should be marked.

6.10 Manufacturers'/Producers' Authorization Form

(This form has to be provided by the OEMs of the hardware and software solutions proposed. This letter of BSCL should be on the letterhead of the manufacturer and should be signed by a person competent and having the power of attorney to bind the manufacturer.)

Date: dd / mm / yyyy

Τo,

CEO,

BSCL,

Bareilly,

U.P, India

Subject: Manufacturer's Authorization Form Ref: TENDER No. <<....>> dated <<>> Dear Sir,

We (Name of the OEM) who are established and reputable manufacturers of (List of Goods) having factories or product development centers at the locations or as per list attached, do hereby authorize. (Name and address of the Bidder) to bid, negotiate and conclude the contract with you against TENDER No. Dated for the above goods manufactured or developed by us.

We hereby extend, our warranty for the hardware goods supplied by the bidder and or maintenance or support services for software products against this invitation for bid by (Name of the Bidder) as per requirements and for the duration of contract as specified in this TENDER.

We also confirm that our offered product will not be end of life for minimum of 30 months from the date of bidding and the support for such offered product/s will be available for minimum of 5 years from the due date of bidding.

Thanking you,

Yours faithfully,

(Signature)

For and on behalf of:

(Name of the OEM)

Authorized Signatory Name:

Designation:

Place:

Date:

6.11 Anti-Collusion Certificate

[Certificate should be provided by Lead Bidder and on letter head]

We hereby certify and confirm that in the preparation and submission of our Bid for Request for Proposal for Selection of System Integrator for Implementation of Bareilly Smart City Solutions in Bareilly, Bareilly against the TENDER issued by BSCL, we have not acted in concert or in collusion with any other Bidder or other person(s) and also not done any act, deed or thing, which is or could be regarded as anti-competitive. We further confirm that we have not offered nor will offer any illegal gratification in cash or kind to any person or organization in connection with the instant bid.

(Signature of the Lead Bidder)
Printed Name
Designation
Seal
Date:
Place:
Business Address:

7 Annexure 4 – Formats for Submission of the Commercial Bid

7.1 Total Price Summary

S No.	Head	Amount(i n Rs.)	Amount(i n Words)
1.	Total CAPEX price (Inclusive of all taxes, levies, duties, etc. as applicable)		
2.	Total OPEX price (Inclusive of all taxes, levies, duties, etc. as applicable)		
3.	Total price (1+2) (Inclusive of all taxes, levies, duties, etc. as applicable)		

7.2 Price component for CAPEX:

The Bidder shall consider the components and quantity to fulfill the TENDER and project requirements in totality as per the following template:

	For Supply, Installation and Commissioning									
S No.	Line Item 6 No. (Component wise)		quantity proposed	Unit base price (in Rs.)	All taxes, levies, duties, etc. as Applicable (in Rs.) (per unit)	Total Price Including All taxes, levies, duties, etc. as applicable (in Rs.)				
1	2	3	4	5	6	7=(5+6)*4				
1	Items should be picked primarily as specified in BoM, or, MSI proposed solution.									

Total CAPEX Price (in words) -

N.B – Bidder must ensure that all the line items are covered as specified in BOM and all required fields in the Commercial bid format are duly filled and calculated appropriately. All amounts to be quoted in INR.

7.3 Price component for OPEX

The Bidder may add any additional line item (with adequate details and pricing information) in table below towards the end that may be required to fulfill the TENDER and project requirements in totality.

S No.	Components	Year 1	Year 2	Year 3	Year 4	Year 5
	Components	(in INR)				
	Items should be picked primarily as					
1	specified in BoM, or, MSI proposed					
	solution.					

Total OPEX Price (in words) -

8 Annexure 5 (a) – Performance Bank Guarantee

Ref: Date

Bank Guarantee No.

Bareilly Smart City Ltd. (BSCL)Chief Executive Officer,

BSCL address- CEO, BSCL, Bareilly Corporation Bareilly, U.P

Contact no.

Email: ceo.bscl01@gmail.com

Whereas, <<name of the supplier and address>> (hereinafter called "the System Integrator") has undertaken, in pursuance of contract no. <Insert Contract No.> dated. <Date> to provide Implementation services for<<name of the assignment>> to BSCL (hereinafter called "the BSCL") And whereas it has been stipulated by in the said contract that the bidder shall furnish you with a bank guarantee by a recognized bank for the sum specified therein as security for compliance with its obligations in accordance with the contract;

And whereas we, <Name of Bank> a banking company incorporated and having its head/registered office at<Address of Registered Office> and having one of its office at <Address of Local Office> have agreed to give the supplier such a bank guarantee.

Now, therefore, we hereby affirm that we are guarantors and responsible to you, on behalf of the supplier, up to a total of Rs.<Insert Value> (Rupees <Insert Value in Words> only) and we undertake to pay you, upon your first written demand declaring the supplier to be in default under the contract and without cavil or argument, any sum or sums within the limits of Rs. <Insert Value> (Rupees <Insert Value in Words> only) as aforesaid, without your needing to prove or to show grounds or reasons for your demand or the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the bidder before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the contract to be performed there under or of any of the contract documents which may be made between you and the System Integrator shall in any way release us from any liability under this guarantee and we hereby waive notice of any such change, addition or modification.

This Guarantee shall be valid until <<Insert Date>>)

Notwithstanding anything contained herein:

- i. Our liability under this bank guarantee shall not exceed Rs. <Insert Value> (Rupees <Insert Value in Words> only).
- ii. This bank guarantee shall be valid up to <Insert Expiry Date>)

iii. It is condition of our liability for payment of the guaranteed amount or any part thereof arising under this bank guarantee that we receive a valid written claim or demand for payment under this bank guarantee on or before <Insert Expiry Date>) failing which our liability under the guarantee will automatically cease.

Date

Place

Signature

Witness

Printed name

(Bank's common seal)

9 Annexure 5 (b) – Bank Guarantee for Earnest Money Deposit

Τo,

Bareilly Smart City Ltd. (BSCL)

Chief Executive Officer,

BSCL address- CEO, BSCL, Bareilly Corporation Bareilly, U.P

Contact no.

Email: ceo.bscl01@gmail.com

Whereas <<Name of the bidder>> (hereinafter called 'the System Integrator') has submitted the bid for Submission of TENDER<<TENDER Number>> dated <<Date>> for <<Name of the assignment>> (hereinafter called "the Bid") to <<BSCL>> .

Know all Men by these presents that we <<... >> having our office at <<Address>> (hereinafter called "the Bank") are bound unto the <<BSCL>> (hereinafter called "the BSCL") in the sum of Rs. <<Amount in figures>> (Rupees <<Amount in words>> only) for which payment well and truly to be made to the said BSCL, the Bank binds itself, its successors and assigns by these presents. Sealed with the Common Seal of the said Bank this <<Date>>.

The conditions of this obligation are:

- i. If the Bidder having its bid withdrawn during the period of bid validity specified by the Bidder on the Bid Form; or
- ii. If the Bidder, having been notified of the acceptance of its bid by the BSCL during the period of validity of bid
 - a. Withdraws his participation from the bid during the period of validity of bid document; or

b. Fails or refuses to participate in the subsequent Tender process after having been short listed; We undertake to pay to the BSCL up to the above amount upon receipt of its first written demand, without the BSCL having to substantiate its demand, provided that in its demand the BSCL will note that the amount claimed by it is due to it owing to the occurrence of one or both of the two conditions, specifying the occurred condition or conditions.

This guarantee will remain in force up to <<insert date>> and including <<extra time over and above mandated in the TENDER>> from the last date of submission and any demand in respect thereof should reach the Bank not later than the above date.

NOTHWITHSTANDING ANYTHING CONTAINED HEREIN:

- Our liability under this Bank Guarantee shall not exceed Rs. <<Amount in figures>> (Rupees<<Amount in words>> only)
- ii. This Bank Guarantee shall be valid up to <<insert date>>)

iii. It is condition of our liability for payment of the guaranteed amount or any part thereof arising under this Bank Guarantee that we receive a valid written claim or demand for payment under this Bank Guarantee on or before <<insert date>>) failing which our liability under the guarantee will automatically cease.

(Authorized Signatory of the Bank) Seal: Date:

10 Annexure 6 – Non-Disclosure Agreement

WHEREAS, we the undersigned Bidder,, having our principal place of business or registered office at....., are desirous of bidding for TENDER No. <<>> dated <<DD-MM-2020>> "Request for Proposal for Selection of System Integrator for Implementation of Bareilly Smart City Solutions" (hereinafter called the said 'TENDER') to the "BSCL", hereinafter referred to as 'BSCL' and,

WHEREAS, the Bidder is aware and confirms that the BSCL's business or operations, information, application or software, hardware, business data, architecture schematics, designs, storage media and other information or documents made available by the BSCL in the TENDER documents during the bidding process and thereafter, or otherwise (confidential information for short) is privileged and strictly confidential and or proprietary to the BSCL,

NOW THEREFORE, in consideration of disclosure of confidential information, and in order to ensure the BSCL's grant to the Bidder of specific access to BSCL's confidential information, property, information systems, network, databases and other data, the Bidder agrees to all of the following conditions.

It is hereby agreed as under:

- 1. The confidential information to be disclosed by the BSCL under this Agreement ("Confidential Information") shall include without limitation, any and all information in written, representational, electronic, verbal or other form relating directly or indirectly to processes, methodologies, algorithms, risk matrices, thresholds, parameters, reports, deliverables, work products, specifications, architecture, project information, security or zoning strategies & policies, related computer programs, systems, trend analysis, risk plans, strategies and information communicated or obtained through meetings, documents, correspondence or inspection of tangible items, facilities or inspection at any site to which access is permitted by the BSCL.
- 2. Confidential Information does not include information which:
 - i. the Bidder knew or had in its possession, prior to disclosure, without limitation on its confidentiality;
 - ii. information in the public domain as a matter of law;
 - iii. is obtained by the Bidder from a third party without any obligation of confidentiality;
 - iv. the Bidder is required to disclose by order of a competent court or regulatory BSCL;
 - v. is released from confidentiality with the written consent of the BSCL.

The Bidder shall have the burden of proving hereinabove are applicable to the information in the possession of the Bidder.

- 3. The Bidder agrees to hold in trust any Confidential Information received by the Bidder, as part of the Tendering process or otherwise, and the Bidder shall maintain strict confidentiality in respect of such Confidential Information, and in no event a degree of confidentiality less than the Bidder uses to protect its own confidential and proprietary information. The Bidder also agrees:
 - i. to maintain and use the Confidential Information only for the purposes of bidding for this TENDER and thereafter only as expressly permitted herein;
 - ii. to only make copies as specifically authorized by the prior written consent of the BSCL and with the same confidential or proprietary notices as may be printed or displayed on the original;
 - iii. to restrict access and disclosure of Confidential Information to their employees, agents, consortium members and representatives strictly on a "need to know" basis, to maintain confidentiality of the Confidential Information disclosed to them in accordance with this clause; and
 - iv. to treat Confidential Information as confidential unless and until BSCL expressly notifiesthe Bidder of release of its obligations in relation to the said Confidential Information.
- 4. Notwithstanding the foregoing, the Bidder acknowledges that the nature of activities to be performed as part of the Tendering process or thereafter may require the Bidder's personnel to be present on premises of the BSCL or may require the Bidder's personnel to have access to software, hardware, computer networks, databases, documents and storage media of the BSCL while on or off premises of the BSCL. It is understood that it would be impractical for the BSCL to monitor all information made available to the Bidder's personnel under such circumstances and to provide notice to the Bidder of the confidentiality of all such information.

Therefore, the Bidder shall disclose or allow access to the Confidential Information only to those personnel of the Bidder who need to know it for the proper performance of their duties in relation to this project, and then only to the extent reasonably necessary. The Bidder will take appropriate steps to ensure that all personnel to whom access to the Confidential Information is given are aware of the Bidder's confidentiality obligation. Further, the Bidder shall procure that all personnel of the Bidder are bound by confidentiality obligation in relation to all proprietary and Confidential Information received by them which is no less onerous than the confidentiality obligation under this agreement.

5. The Bidder shall establish and maintain appropriate security measures to provide for the safe custody of the Confidential Information and to prevent unauthorized access to it.

- 6. The Bidder agrees that upon termination or expiry of this Agreement or at any time during its currency, at the request of the BSCL, the Bidder shall promptly deliver to the BSCL the Confidential Information and copies thereof in its possession or under its direct or indirect control, and shall destroy all memoranda, notes and other writings prepared by the Bidder or its Affiliates or directors, officers, employees or advisors based on the Confidential Information and promptly certify such destruction.
- 7. Confidential Information shall at all times remain the sole and exclusive property of the BSCL. Upon completion of the Tendering process and or termination of the contract or at any time during its currency, at the request of the BSCL, the Bidder shall promptly deliver to the BSCL the Confidential Information and copies thereof in its possession or under its direct or indirect control, and shall destroy all memoranda, notes and other writings prepared by the Bidder or its Affiliates or directors, officers, employees or advisors based on the Confidential Information within a period of sixty days from the date of receipt of notice, or destroyed, if incapable of return. The destruction shall be witnessed and so recorded, in writing, by an authorized representative of the BSCL. Without prejudice to the above the Bidder shall promptly certify to the BSCL, due and complete destruction and return. Nothing contained herein shall in any manner impair rights of the BSCL in respect of the Confidential Information.
- 8. In the event that the Bidder hereto becomes legally compelled to disclose any Confidential Information, the Bidder shall give sufficient notice and render best effort assistance to the BSCL to enable the BSCL to prevent or minimize to the extent possible, such disclosure. Bidder shall not disclose to a third party any Confidential Information or the contents of this TENDER without the prior written consent of the BSCL. The obligations of this Clause shall be satisfied by handling Confidential Information with the same degree of care, which the Bidder applies to its own similar Confidential Information but in no event less than reasonable care.

For and on behalf of:

(BIDDER) Authorized Signatory Office Seal: Name: Place: Designation: Date:

11 Annexure 7 - Consortium Agreement

DRAFT MEMORANDUM OF UNDERSTANDING EXECUTED BY MEMBERS OF THE CONSORTIUM [On Non-judicial stamp paper of INR 100 duly attested by notary public]

This Memorandum of Understanding (MoU) entered into this day of [Date] [Month] 2020 at [Place] among () (hereinafter referred to as " _") and having office at [Address], India, as Party of the First Part and......(hereinafter referred as " ") and having office at[Address], as Party of the Second Part.....and (hereinafter referred as " __") and having office at[Address], as Party of the Third Part. The parties are individually referred to as Party and collectively as Parties. WHEREAS BSCL, Bareilly, U.P has issued a Request for Proposal dated [Date] (TENDER) from the Applicants interested in Request for Proposal for Selection of System Integrator for Implementation of Bareilly Smart City Solutions for BSCL:

AND WHEREAS the Parties have had discussions for formation of a Consortium for bidding for the said Project and have reached an understanding on the following points with respect to the Parties' rights and obligations towards each other and their working relationship.

As MUTUAL UNDERSTANDING OF THE PARTIES, IT ISHEREBY AGREED AND DECLARED AS FOLLOWS:

- i. The purpose of this Agreement is to define the principles of collaboration among the Parties to:
 - Submit a response jointly to Bid for the "Request for Proposal for Selection of Agency for Selection of Agency for Implementation of Bareilly Smart City Solutions" as a Consortium.
 - b. Sign Contract in case of award.
 - c. Provide and perform the supplies and services which would be ordered by the BSCL pursuant to the Contract.
- ii. This Agreement shall not be construed as establishing or giving effect to any legal entity such as, but not limited to, a company, a partnership, etc. It shall relate solely towards the BSCL for "Request for Proposal for Selection of Agency for Selection of Agency for Implementation of Bareilly Smart City Solutions" for and related execution works to be performed pursuant to the Contract and shall not extend to any other activities.
- iii. The Lead Bidder shall be solely and severally responsible and bound towards the BSCL for the performance of the works in accordance with the terms and conditions of the BID document, and Contract. The consortium members, if any will support the lead bidder in successful

implementation of the objectives. Consortium members will be responsible and liable only for their scope of work.

- iv. ------ (Name of Party) shall act as Lead Partner of the Consortium. As such, it shall act as the coordinator of the Party's combined activities and shall carry out the following functions:
 - a. To ensure the technical, commercial and administrative co-ordination of the work package
 - b. To lead the contract negotiations of the work package with the BSCL.
 - c. The Lead partner is authorized to receive instructions and incur liabilities for and on behalf of all Parties.
 - d. In case of an award, act as channel of communication between the BSCL and the Parties to execute the Contract
- v. That the Parties shall carry out all responsibilities as Developer in terms of the Project Agreement.
- vi. That the broad roles and the responsibilities of each Party at each stage of the Bidding shall be as below:

Party A:

Party B:

Party C:

- vii. That the Parties affirm that they shall implement the Project in good faith and shall take all necessary steps to see the Project through expeditiously.
- viii. That this MoU shall be governed in accordance with the laws of India and courts in Bareilly shall have exclusive jurisdiction to adjudicate disputes arising from the terms herein.

In witness whereof, the Parties affirm that the information provided is accurate and true and have caused this MoU duly executed on the date and year above mentioned.

(Party of the first part) (Party of the second part) (Party of the third part) Witness:

i.

ii.

12 Annexure 8 - Format for Power of Attorney to Authorize Signatory

POWER OF ATTORNEY

We hereby agree to ratify all acts, deeds and things lawfully done by our said Attorney pursuant to this power of attorney and that all acts, deeds and things done by our aforesaid Attorney shall and shall always be deemed to have been done by us.

(Add in the case of a Consortium)

(Signature and Name of authorized signatory)

(Signature and Name in block letters of all the remaining partners of the firm Signatory for the Company)

Seal of firm Company

Witness 1:

Witness 2:

Notes:

- i. To be executed by all the members individually.
- ii. The Mode of execution of the power of attorney should be in accordance with the procedure, if any laid down by the applicable law and the charter documents of the executant(s) and when it is so required the same should be under common seal affixed in accordance with the required procedure.

13 Annexure 9 - Format for Power of Attorney for Lead bidder of Consortium

[To be executed on non-judicial stamp paper of the appropriate value in accordance with relevant Stamp Act. The stamp paper to be in the name of the company who is issuing the power of attorney] Whereas...... has invited TENDER response for...... (Name of the Project) Whereas, the Members of the Consortium comprising of M/s., M/s. and M/s.(the respective names and addresses of the registered offices to be given) are interested in bidding for the Project and implementing the same in accordance with the terms and conditions contained in the TENDER Documents.

Whereas, it is necessary for the members of the Consortium to designate one of them as the lead member with all necessary power and BSCL to do, for and on behalf of the Consortium, all acts, deeds and things as may be necessary in connection with the Consortium's TENDER response for the Project.

NOW THIS POWER OF ATTORNEY WITNESSETH THAT

We, M/s.and M/s....hereby designate M/s.

being one of the members of the Consortium, as the lead member of the Consortium, to do on behalf of the Consortium, all or any of the acts, deeds or things necessary or incidental to the Consortium's TENDER response for the Project, including submission of the TENDER response, participating in meetings, responding to queries, submission of information or documents and generally to represent the Consortium in all its dealings with Client or any other Government Agency or any person, in connection with the Project until culmination of the process of bidding till the Project Agreement is entered into with Client and thereafter till the expiry of the Project Agreement.

We hereby agree to ratify all acts, deeds and things lawfully done by our said Attorney pursuant to this power of attorney and that all acts, deeds and things done by our aforesaid Attorney shall and shall always be deemed to have been done by us or Consortium.

Dated this the.....day of.....2020

(signature) (Name in Block Letter of Executant) [seal of Company] Witness 1 Witness 2

Notes:

To be executed by all the members individually, in case of a Consortium.

The Mode of execution of the power of attorney should be in accordance with the procedure, if any laid down by the applicable law and the charter documents of the executant(s) and when it is so required the same should be under common seal affixed in accordance with the required procedure.



Request for Proposal for Selection of Master System Integrator for Integrated Command and Control Centre (ICCC) of Bareilly Smart City Limited (BSCL) (including 5 years O&M)

> Volume II: Scope of Work Bareilly Smart City Limited (BSCL)

Table of Contents

Та	Table of Contents 2						
1	Proj	ect Introduction9					
	1.1	Back	kground	9			
	1.2	Prea	amble – Bareilly	9			
	1.3	Hist	ory	9			
	1.4	Geo	graphy	9			
	1.5	Clim	nate	9			
	1.6	Trar	nsport & Connectivity	10			
	1.6.	1	Air Connectivity	10			
	1.6.2	2	Railway Connectivity	10			
	1.6.3	3	Road Connectivity	11			
	1.7	Visio	on	11			
	1.8	Goa	ls	11			
	1.8.	1	Goal 1: A well- connected city with seamless mobility	11			
	1.8.2	2	Goal 2: An economically vibrant and prosperous city	11			
	1.8.3	3	Goal 3: A well-functioning smart city	11			
	1.8.4	4	Goal 4: An eco-friendly city - ecologically aware and sensitive citizens	12			
	1.8.	5	Goal 5: A city steering towards sustainable growth	12			
	1.8.	6	Goal 6: A city government with commitment to excellence	12			
2	Scop	be of	Work for Bareilly Smart City (BSC)	13			
	2.1	Ove	rview	13			
	2.2	Proj	ect Activities	16			
	2.2.	1	Project Management	16			
	2.2.2	2	Survey and Detailed Design of all Smart Solutions Components	17			
	2.2.3	3	Software / Hardware Acceptance and Factory Acceptance Testing	19			
	2.2.4	4	Hardware Supply and Installation Stage	20			
	2.2.	5	Software Development	20			
	2.2.	6	System Integration	24			
	2.2.	7	Testing	24			
	2.2.	8	Deployment	30			
	2.2.9	9	Training	36			
	2.2.	10	Change Management	38			
	2.2.	11	Develop Overall Training Plan	38			
	2.2.	12	Develop Training Schedule and Curriculum	38			

2.2.13	Develop Training Material	39
2.2.14	Deliver Training to End Users	39
2.2.15	Deliver Training to Trainers (Internal & External – if specified by BSCL)	40
2.2.16	Training Effectiveness Evaluation	43
2.2.17	Final Deployment and Documentation	43
2.2.18	Operational System Acceptance	46
2.2.19	Comprehensive Maintenance for System and Services	46
2.2.20	Support Staff Required	48
GENERAL	REQUIREMENTS	50
Integrate	d Command and Control Centre (ICCC)	60
.1 Туре	es of Operations:	62
4.1.1	Normal Operation	62
4.1.2	Emergency Operation	62
.2 Site	preparation for ICCC (with Helpdesk) including Data Centre	63
4.2.1	Norms	67
4.2.2	Civil and Architectural work	67
4.2.3	False Ceiling	68
4.2.4	Raised flooring	68
4.2.5	Electrical Distribution System	68
4.2.6	Electrical work	68
4.2.7	Lighting Works	69
4.2.8	UPS requirements and features	69
4.2.9	Diesel Generator Set	69
4.2.10	Fire Detection and Suppression System	69
4.2.11	Building Management System	70
4.2.12	Access Control System	70
4.2.13	CCTV system	70
4.2.14	Water leak detection system	70
4.2.15	Rodent Repellent	70
4.2.16	Furniture and Fixture	71
4.2.17	Ceiling Speakers for Control Centre and Conference Room	71
.3 KPI's	s of ICCC:	71
.4 Fund	ctional Specifications for ICCC & its Application:	71
.5 Fund	ctional Requirement & Technical Requirement	72
4.5.1	Command and Control Centre System	72
4.5.2	Integration Capabilities of Middleware/ IoT Platform	83
	2.2.13 2.2.14 2.2.15 2.2.16 2.2.17 2.2.18 2.2.19 2.2.20 GENERAL Integrate .1 Type 4.1.1 4.1.2 .2 Site 4.2.1 4.2.2 4.2.3 4.2.4 4.2.5 4.2.6 4.2.7 4.2.8 4.2.9 4.2.10 4.2.11 4.2.12 4.2.13 4.2.14 4.2.15 4.2.10 4.2.11 4.2.12 4.2.13 4.2.14 4.2.15 4.2.10 4.2.11 4.2.12 4.2.13 4.2.14 4.2.15 4.2.10 4.2.11 4.2.12 4.2.13 4.2.14 4.2.15 4.2.10 4.2.11 4.2.15 4.2.10 4.2.11 4.2.12 4.2.13 4.2.14 4.2.15 4.2.10 4.2.11 4.2.12 4.2.13 4.2.14 4.2.15 4.2.10 4.2.11 4.2.12 4.2.10 4.2.11 4.2.12 4.2.10 4.2.11 4.2.12 4.2.10 4.2.11 4.2.12 4.2.10 4.2.11 4.2.12 4.2.10 4.2.11 4.2.12 4.2.10 4.2.11 4.2.12 4.2.10 4.2.11 4.2.12 4.2.10 4.2.11 4.2.12 4.2.10 4.2.11 4.2.12 4.2.10 4.2.11 4.2.12 4.2.10 4.2.11 4.2.12 4.2.10 4.2.11 4.2.12 4.2.10 4.2.11 4.2.12 4.2.10 4.2.11 4.2.12 4.2.10 4.2.11 4.2.12 4.2.13 4.2.14 4.2.15 4.2.10 4.2.10 4.2.11 4.2.12 4.2.13 4.2.14 4.2.15 4.2.10 4.2.10 4.2.11 4.2.12 4.2.13 4.2.14 4.2.15 4.2.10 4.2.15 4.2.10	2.2.13 Develop Training Material 2.2.14 Deliver Training to End Users 2.2.15 Deliver Training to Trainers (Internal & External – If specified by BSCL) 2.2.16 Training Effectiveness Evaluation 2.2.17 Final Deployment and Documentation 2.2.18 Operational System Acceptance 2.2.19 Comprehensive Maintenance for System and Services 2.2.20 Support Staff Required GENERAL REQUIREMENTS Integrated Command and Control Centre (ICCC) 1 Types of Operations: 4.1.1 Normal Operation 4.1.2 Emergency Operation 4.1.3 Norms 4.2.4 Raised flooring 4.2.5 Electrical Distribution System 4.2.6 Electrical Overk 4.2.7 Lighting Works 4.2.8 UPS requirements and features 4.2.9 Diesel Generator Set 4.2.10 Fire Detection and Suppression System 4.2.11 Building Management System 4.2.12 Access Control System 4.2.13 CCV system 4.2.14 Water leak detection system 4.2.

	4.5.3	AI based Analytics	83
	4.5.4	Trend Analytics Platform	89
	4.5.5	Video Conferencing Solution	90
	4.5.6	IP Phones Type 1	94
	4.5.7	IP Phone Type 2	95
	4.5.8	IP PBX	96
	4.5.9	Contact Centre	97
	4.5.10	Gateway Requirement1	.01
	4.5.11	Video Wall Display1	.01
	4.5.12	Video Wall Controller1	.02
	4.5.13	Video Wall Management Software1	.03
	4.5.14	LED Display1	.04
	4.5.15	Monitoring Workstations1	.05
	4.5.16	Desktops for ICCC1	.06
	4.5.17	Desktops for Video Feed at Police Stations, Tehsil and Sadar1	.07
	4.5.18	Laptop1	.08
	4.5.19	Multi-Function Laser Printer1	.09
	4.5.20	Laser Printer1	.09
	4.5.21	Projector1	.10
	4.5.22	WIFI Access Points1	.11
	4.5.23	WIFI Controller1	.12
	4.5.24	Dome Camera1	.14
	4.5.25	PTZ Joystick1	.16
	4.5.26	Command Control Center Desk & Interior1	.16
5	Data Cen	tre & Disaster Recovery Centre1	.19
5	.1 Fun	ctional Requirements1	.19
	5.1.1	Scope of Requirement1	.20
	5.1.2	Databases1	.21
	5.1.3	Functional & Technical Requirements for Intranet Router & Internet Router1	.22
	5.1.4	Functional & Technical Requirements for Interconnecting (POE) Switch1	.28
	5.1.5	Functional & Technical Requirements for Core/ Spine Switch1	.29
	5.1.6	Functional & Technical Requirements for TOR/ Leaf Switch1	.31
	5.1.7	Functional & Technical Requirement for SAN Switch1	.34
	5.1.8	Functional & Technical Requirements for Internet Firewall/ Intranet Firewall1	.36
	5.1.9	Functional & Technical Requirements for SIEM1	.37
	5.1.10	Functional & Technical Requirements for HIPS1	.40

5.1.11	APT141
5.1.12	Functional & Technical Requirements for WAF143
5.1.13	Functional & Technical Requirements for Email Security Solution
5.1.14	Functional & Technical Requirements for Anti-DDoS145
5.1.15	Functional & Technical Requirements for Centralized Anti-virus Solution
5.1.16	Functional & Technical Requirements for DLP147
5.1.17	Functional & Technical Requirements for IDAM149
5.1.18	Application & Data Security151
5.1.19	Functional & Technical Requirements for AAA152
5.1.20	Functional & Technical Requirements for Server Load Balancer156
5.1.21	Functional & Technical Requirements for Link Load Balancer
5.1.22	Functional & Technical Requirements for Blade Chassis
5.1.23	Functional & Technical Requirements for Blade Server160
5.1.24	Functional & Technical Requirements for Virtualization Software
5.1.25	Functional & Technical Requirements Storage163
5.1.26	Functional & Technical Requirements Secondary Storage166
5.1.27	Functional & Technical Requirements for Backup & Replication Solution
5.1.28	Functional & Technical Requirements for Enterprise Management System170
5.1.29	Functional & Technical Requirements for Modular Data Center Infrastructure183
5.1.30	Functional & Technical Requirements for KVM Switch
5.1.31	Functional & Technical Requirements for Online UPS for ICCC
5.1.32	Functional & Technical Requirements for DG Set199
5.1.33	Functional & Technical Requirement for Fire Proof Enclosure
5.1.34	Functional & Technical Requirement for Structured Cabling (ICCC & DC)
5.1.35	Functional & Technical Requirement for Outdoor Cables
5.1.36	Functional & Technical Requirement for Fibre Cables
5.1.37	Functional & Technical Requirement for Electrical System & Cabling203
5.1.38	Functional & Technical Requirement for Electrical & Cabling Cooling System
5.1.39	Functional & Technical Requirement for Safety and Security System204
5.1.40	Functional & Technical Requirement for Monitoring System
5.1.41	Functional & Technical Requirements for Rodent Repellent System
5.1.42	Functional & Technical Requirements for Water Leak Detection System
5.1.43	Functional & Technical Requirements for Smoke Detection System
5.1.44	Functional & Technical Requirements for Raised Floor
5.1.45	Functional & Technical Requirements for False Ceiling
5.2 Dis	aster Recovery Centre209

		5.2.	1	Disaster Recovery DR Cloud	210
6		Inte	lliger	nt Traffic Management System (ITMS)	214
	6.	1	Sma	art Traffic Management Overview	214
		6.1.3	1	KPIs for Traffic Management	215
	6.	2	Fun	ctional & Technical Requirement for Adaptive Traffic Control System (ATCS)	216
		6.2.2	1	ATCS Application	218
		6.2.2	2	Traffic Signal Controller	222
		6.2.3	3	Traffic Signal Aspect	225
		6.2.4	4	Countdown Timer	225
		6.2.	5	Traffic Signal and Heads and Poles	225
		6.2.0	6	Traffic Signal Cabinet and Equipment	226
		6.2.7	7	ATCS Sensor	226
		6.2.8	8	Junction Box Requirement	226
	6.	3	Gen	eral System Features of Intelligent Traffic Management System (ITMS)	227
		6.3.2	1	Video Management & Operator Functions	228
	6.	4	Fun	ctional & Technical for Automatic Number Plate Recognition (ANPR) System	229
		6.4.3	1	Automatic Number Plate Recognition (ANPR) Software	229
	6.5 Fund 6.5.1 6.5.2		Fun	ctional & Technical for Red-Light Violation Detection (RLVD) System	232
			1	Red Light Violation Detection (RLVD) Software	233
			2	Technical Requirement for ANPR and RLVD Camera	234
	6.	6	Fun	ctional & Technical for Speed Violation Detection (SVD) System	236
		6.6.3	1	Speed Violation Software	236
		6.6.2	2	Instant and Average Speed Detection for SVD	236
		6.6.3	3	Communication Network:	238
7		City	Surv	eillance	240
	7.	1	KPIs	for City Surveillance	240
	7.	2	Fun	ctional & Technical Requirement	242
		7.2.2	1	Surveillance Cameras	242
		7.2.2	2	Technical Requirement for Outdoor Fixed Bullet Camera	243
		7.2.3	3	Outdoor PTZ (Pan Tilt Zoom) Camera	244
		7.2.4	4	Outdoor Fixed Bullet Camera (4K)	246
		7.2.	5	Surveillance Camera (with Voice Input)	247
		7.2.0	5	Body Worn Camera	250
		7.2.7	7	Drone Based Surveillance System	251
		7.2.8	8	Ruggedized Switch	257
		7.2.9	Э	Video Management System	259
	7.2.	10	Supply and Installation of Camera Infrastructure	267	
---------	--------------	--------------	--	-----	
7.2.11		11	Installation of Poles/Cantilevers/Gantry if required	268	
	7.2.12		UPS for field locations	269	
7.2.13		13	Outdoor Cabinets / Junction Boxes	271	
	7.2.	14	Civil and Electrical Works	272	
8	8 Smart El		ements	274	
8	8.1 Pub		lic Address System (PAS)	274	
8	8.2 Eme		ergency Call Box	276	
8.3 Env		Envi	ironmental Sensor	277	
	8.3.	1	Functional & Technical Requirement of Environmental Sensor	277	
8	8.4	Vari	able Messaging Display (VMD)/ Outdoor Display	280	
	8.4.	1	Functional Requirement for VMD	281	
	8.4.	2	Technical Requirement for Outdoor VMD	282	
8	8.5	Soli	d Waste Management	284	
	8.5.	1	Overview	285	
	8.5.	2	Functional Requirement:	286	
	8.5.	3	Technical Requirement for GPS Device		
	8.5.	4	Technical Requirement for RFID Tag	293	
	8.5.	5	Technical Requirement for RFID Reader Device	294	
	8.5.	6	Technical Requirement for Vehicle Tracking System	295	
8	8.6	E-Go	overnance	296	
	8.6.	1	City Management Platform & integrated Mera Bareilly App	297	
	8.6. Bare	2 eilly's	E-Portal for National & International Promotion, trade and product information for Zari, Manjha and Surma products	301	
	8.6.	3	Single Window Clearance for Bareilly	307	
8	8.7	Sma	art Parking	310	
	8.7.	1	Challenges with Conventional Parking	311	
	8.7.	2	Value Proposition SMART Parking offers to its Stakeholders	311	
	8.7.	3	Functional Requirements for Smart Parking Management System (SPMS)	313	
	8.7.	4	Functional Requirement for Wireless Handheld Devices	314	
	8.7.	5	Functional Requirement for Mobile App	314	
	8.7.	6	Functional Requirement for Boom Barrier & Variable Message Boards:	315	
	8.7.	7	Functional Requirement for Entry Requirement	316	
	8.7.	8	Functional Requirement for Entry and Exit Barrier	316	
	8.7.	9	Functional Requirement for Exit Requirements	317	
	8.7.	10	Functional Requirement for Payment options	318	

	8.7.	11	Functional Requirement for Informative Display Panels	318
	8.7.	12	Functional Requirement for Real-time Monitoring and Dynamic MIS Reporting	318
	8.7.	13	Technical Specifications for Smart Parking Solution	318
8	.8	Cap	acity Building for Smart City Operation and citizen training	319
9	Net	work	from Managed Service Provider	322
10	A	nnex	ure A: Location Details	323
1	0.1	Traf	fic Junction/ Signal	323
	10.1	1	Traffic Junction/ Signal with ITMS + ATCS	323
	10.1	2	Traffic Junction/ Signal with ITMS	323
1	0.2	City	Surveillance	324
1	0.3	Envi	ronmental Sensor Locations	328
1	0.4	Vari	able Messaging Display (VMD)/ Outdoor Display Locations	328
1	1.1	Bill o	of Material	329

1 Project Introduction

1.1 Background

Government of India intends to transform 100 Indian Cities to Smart Cities. The smart city mission was launched by Government of India on June 25, 2015. Ministry of Urban Development, while announcing the round 4 list on of selected Smart cities BAREILLY was the fifth in the list of Nine cities selected Smart City Mission. Bareilly has incorporated a Special Purpose Vehicle (SPV) – Bareilly Smart City Limited (BSCL) (the "Authority") to plan, design, implement, coordinate and monitor the smart city projects in Bareilly.

1.2 Preamble – Bareilly

Bareilly is a city in Bareilly district in the northern Indian state of Uttar Pradesh. Located on the Ramganga River, there is Ramganga barrage build for canal irrigation. it is the capital of Bareilly division and the geographical region of Rohilkhand. The city is 252 kilometers (157 mi) north of the state capital, Lucknow, and 250 kilometers (155 mi) east of the national capital, New Delhi. It is the Eight largest metropolis in Uttar Pradesh and the 50th-largest city in India. Bareilly also figured amongst the PM Narendra Modi's ambitious 100 Smart City list in India.

1.3 History

The city is also known by the name Nath Nagri. (known for the seven Shiva temples located in the Bareilly region - Dhopeshwar Nath, Madhi Nath, Alakha Nath, Tapeshwar Nath, Bankhandi Nath, Pashupati Nath and Trivati Nath), Ala Hazrat, Shah Sharafat Miyan and Khankahe Niyazia (derived the famous Muslim Mausoleum), Zari nagari and historically as Sankasya (where the Buddha descended from Tushita to earth). The city is a centre for furniture manufacturing and trade in cotton, cereal and sugar. Its status grew with its inclusion in the "counter magnets" list of the National Capital Region (NCR), a list also including Hissar, Patiala, Kotaand Gwalior. The city is also known as Bans-Bareilly. Although Bareilly is a production centre for cane (bans) furniture, "Bans Bareilly" is not derived from the bans market; it was named for two princes: Bansaldev and Baraldev, sons of Jagat Singh Katehriya, who founded the city in 1537.

1.4 Geography

Bareilly is located at 28°10′N, 78°23′E, and lies in northern India. It borders Pilibhit and Shahjahanpur on East and Rampur on west, Udham Singh Nagar (Uttarakhand) in North and Badaun in South. It is a level terrain, watered by many streams, the general slope being towards the south

1.5 Climate

BAREILLY has humid subtropical climate (Cfa) under Köppen climate classification. The summer, between April and June, is extremely hot and humid (28/40 °C, 90% max.) and winter is pleasantly cool, around 06/20 °C. Rainfall in BAREILLY Town is comparatively less than the other parts of Uttar Pradesh.



1.6 Transport & Connectivity

1.6.1 Air Connectivity

Bareilly Airport is also known as Bareilly Air Force Station or Trishul Air Base. This airport is for both military airbase and public airport which serves the city of Bareilly in Uttar Pradesh. This air force station is one of the largest airbases of the Indian air forces (IAF).

1.6.2 Railway Connectivity

Bareilly Junction railway station (station code BE) is one of the most important railway stations in Northern India. New Delhi (just 250 km.), the capital of India, is an important Station near Bareilly from where trains to Mumbai, Chennai, Bengaluru, Hyderabad and to most of the places in India are available. However, some important trains to other parts of the country also touch/originate at this station.

1.6.3 Road Connectivity

Bareilly is well linked through road and rail. There are numbers of buses, trains and taxis from which you can easily reach the main city Centre. The city is located around 250 kilometers from the capital of New Delhi.

1.7 Vision

"Facilitate Sustainable Living with Strengthened Traditional Trade and Smart Mobility through ICT based transformation."

1.8 Goals

Bareilly's Vision comprises of Goals of development, which have been presented for the city-region and city.

1.8.1 Goal 1: A well- connected city with seamless mobility

- Multi-modal public transport system geo enabled electric buses and e- rickshaws; renovation of railway station, bus stand, auto/taxi stand into E- Rickshaw stand with charging station & ITMS
- Transport network improvement roads and junction improvement, place making for on street parking, smart parking/ MLCPs, development of new road links, widening of bandh road and road signage's

1.8.2 Goal 2: An economically vibrant and prosperous city

- a. Commercial area development redevelopment of municipal markets, redevelopment of bus stands with commercial space, development of new commercial areas.
- Skill training development of sports academy, renovation of stadium with state of art facilities, up gradation of existing training centres, facilitation centre for embroidery and lac product designing
- c. Infrastructure for agro-based products re-development of freight terminal of railway station as logistic hub, cold storage facility, market, zones for urban orchards and urban farming

1.8.3 Goal 3: A well-functioning smart city

- a. 24x7 water supply with 100% coverage
- b. Underground sewerage system with 100% coverage
- c. Underground storm water drains with 100% coverage
- d. Zero waste SWM system
- e. 24x7 power supply
- f. Robust IT infrastructure

1.8.4 Goal 4: An eco-friendly city - ecologically aware and sensitive citizens

- a. River and lake edge development cleaning, developing an eco-park, urban farms, multipurpose development, Ghat development, rehabilitation of dhobi Ghat, boat club, and Openair theatre
- b. Optimum utilization of open spaces plantation, development of new parks, rejuvenation of ponds.

1.8.5 Goal 5: A city steering towards sustainable growth

- a. Alleviation of urban poverty and slums in-situ up-gradation and development of new housing, primary health centres, slum dwellers information system
- b. Upgrading informal sector improved infrastructure for existing start-ups, solar powered smart kiosks, development of new vending zones, street vendors' information system
- c. Affordable Housing development of LIG and MIG housing
- Encourage NMT & pedestrian safety development of pedestrian walkways, zones, public bike sharing
- e. Energy efficiency & Green Buildings Roof top solar panels, GRIHA rated govt. buildings.
- f. Policy support Preparation of regional development plan, mobility plan, street design guidelines

1.8.6 Goal 6: A city government with commitment to excellence

BAREILLY Municipal Corporation is committed to excellence in every sector, providing its staff opportunities of growth by learning and adopting state of the art technologies and methods to better their performance in every way. Its goal is to become a financially sustainable, credit-worthy, smart ULB attracting investment based on its performance. Other government departments will also adopt e-governance through ICT infrastructure. Local government departments would strive to make BAREILLY 'a city for people' where continuous engagement with citizens is institutionalized in the decision-making architecture. The related sub goals are: (i) city will develop citizen centric mobile application to enhance citizen participation in governance and delivery of public services (ii) City surveillance and delivery of various ICT interventions like ITMS, smart metering, GIS enabled urban services etc. through command and control center (iii) Free access to government portals on city wide Wi-Fi through intelligent street lights (iv) Policy support through city and regional development plans, land monetization plan, urban PPP policy, street design guidelines etc.

2 Scope of Work for Bareilly Smart City (BSC)

2.1 Overview

The Bareilly Smart City Limited (BSCL) intends to select a Master System Integrator (MSI) who will be responsible for the 'Design, Development, Implementation and Maintenance of the Bareilly Smart City for a period of at least five (5) years, post the Go-Live date of the Overall Solution, on a turnkey basis. Under the Smart City initiative, it is envisaged to establish an Command and Control Centre (ICCC), Data center, Disaster Recovery, Intelligent Traffic Management system, City Surveillance, Smart Elements, Smart Parking Management System & Solid Waste Management System& e-Governance applications in real time at the Bareilly City, which shall be the single & dedicated place for integrating, implementing, monitoring, controlling & commanding all City-Wide Smart ICT for line departments. The Overall Scope of Work for the MSI is to provide an end-to-end ICT Solutions, which shall cater to the following primary components:

#	Project	Details
	City Operation & Monitoring	Integrated Command & Control Centre
1.		Data Centre
		Disaster Recovery Centre
	Intelligent Traffic Management	RLVD, ANPR & Integration with Existing E Challan
	System (ITMS):	System.
	Red Light Violation	8 Identified traffic locations/ Junctions with
	• Automatic Number Plate	Adaptive traffic control system with
	Recognition	expandability as per final requirement.
2.	• Speed Violation	• Traffic Signal for remaining 13 identified traffic
	Detection	locations / Junctions
	Class A Traffic Signals -	ITMS for 21 identified traffic locations/
	Adaptive Traffic Control	Junctions' Additional scope to meet final
	System	requirement.
	Class B Traffic Signals	SVD for 6 Locations
	City Surveillance:	City Surveillance:
2	Intelligent Video Analytics	 Analytics and AI for 1000 channels" Two
5.	Drone Based Surveillance	Analytics per camera
	System	6 Nos of Drone Based Surveillance System
Λ	Smart Elements:	3 Nos of Environmental Sensors
4.	Environmental Sensors	Emergency Call Box at 6 locations

#	Project	Details
	 Transactional Kiosk Emergency Call Box Public Address System Variable Messaging Display/ Outdoor Display Solid Waste Management (Smart Bins, Solid Waste Management Application, GPS enabled vehicle tracking system for solid waste) Parking Management System 	 Public Address System at 25 locations Variable Messaging Display/ Outdoor Display of size 3000 mm*1500 mm*200 mm (minimum) at 16 locations Solid Waste Management 10,000 RFID Tag for waste bins for alternative location (household)/ Commercial Site, Solid Waste Management Application, 30 No's GPS enabled vehicle tracking system for solid waste Management 50 location with Smart Parking Management System
5.	 E-Governance Applications Single Window Clearance for Bareilly Capacity Building for Smart City Operation and citizen training Integration with existing/ future Data Digitization System 	 E-Governance (City Management Platform and Integrated MERA Bareilly App, E-Portal for National &International Promotion, trade and product information for Bareilly's Zari, Manjha and Surma products) Single Window Clearance for Bareilly Integration with existing/ future Data Digitization System
6.	Al Based Analytics Use Cases	 The list of Use Cases: Camera tampering Missing object detection & Object Recognition Loitering Crowd alert Congestion detection Number plate recognition Illegal parking detection Traffic light violation

#	Project	Details
		Garbage Overflow Detection
		Stray cattle Identification
7.	Integration of ICCC, ITMS Components, City Surveillance, Smart Elements & AI based Analytics Use cases Integration with Existing Dial 100 Application and weather feed application Integration with existing application (E.g Nagar Nigam Website) of Bareilly Municipal Corporation	 Integration with Existing and Proposed Solution ICT component of Intelligent Traffic Management System ICT component of City Surveillance ICT component of Smart Elements. ICT component of Smart Street Lighting. Any other E-Governance Application Integration with existing E-Challan application & Dial 100 application
8.	Network Backbone	 The connectivity between the end devices and the ICCC shall be through a leased network provided by a telecom service provider. However, MSI shall lay the connectivity medium from JB to end device. The network availability would be monitored through a Network Operations Centre, which will be housed along with the Integrated Command and Centre. The MSI will be responsible to arrange the required bandwidth for connectivity. Seamless and resilient connectivity required for the following but not limited to: Managed Service: End devices to Data Centre Internet Bandwidth DC DR Connectivity Mobile/Wireless Connectivity (GSM or any other mode)

The bidder is to further ensure that all the smart city components and devices are connected to the Data Centre and Command Control Centre in a reliable and resilient mode for smooth & efficient operation of the ICCC.

It should be noted that the subsequent sections of this document detailed out the expectations from the overall ICT Solution with respect to the above components. The activities defined /described/ discussed/ mentioned within this document are indicative in nature and may/may not be exhaustive. The MSI is expected to have performed an independent & in-depth analysis of any additional work(s) that may be required to be carried out to fulfil the requirements for the overall Bareilly Smart City ICT Solutions and duly factor those in while preparing a response to this RFP. The MSI is advised to carry out detailed surveys prior to submission of the RFP response to ensure that the Bidders response caters to the complete solution, for all component requirement in order to finalize infrastructure, network bandwidth, operational & administrative challenges, etc.

2.2 **Project Activities**

While this RFP lists out primary ICT objectives for catering to immediate pressing needs, keeping in view the long-term scalability and sustainability of the ICT Solutions, the Bidders are encouraged to propose the State- of-Art, cutting edge ICT solutions to revive & revamp the Bareilly using Hi-Tech solutions.

The MSI shall be responsible for carrying out the following activities:

- 1. Project Management
- 2. Survey and Detailed Design of all smart solutions components
- 3. Hardware Supply and Installation Stage
- 4. Factory Acceptance Testing
- 5. Software Development
- 6. System Integration
- 7. Testing
- 8. Deployment
- 9. Training
- 10. Change Management
- 11. Final Deployment & Documentation
- 12. Operational System Acceptance Tests
- 13. Comprehensive Operations and Maintenance
- 14. Facility Management Staff

2.2.1 Project Management

MSI shall be responsible for end to end project management for the Implementation and Operations & Maintenance of the Bareilly Smart City ICT components. MSI shall deploy a competent team of experts for Project Management which shall include a Project Manager along with a deputy project Manager. The Project Manager shall be the single point of contact that shall assume overall

responsibility of the Project and ensure end to end working of the project. He/ She shall function as the primary channel of communication for all client requirements to the implementation team. In case of any absence of the Project Manager, the MSI shall ensure that an alternate Project Manager (as approved by the client or its representative) shall be provided during the absence period. MSI shall be responsible for preparing a master schedule of work which shall highlight implementation plan for all the Project Milestones. The schedule shall identify the manufacture, delivery, installation, integration of equipment (Software and Hardware), training programs, test procedures, delivery of documentation and the respective solutions. The schedule shall include Client and any third-party responsibilities along with the activities in the timeline. MSI shall conduct bi-weekly meetings between the Client, PMC and the 'key personnel' to discuss project progress & implementation in Bareilly. All key personnel associated with the project shall also be available for meetings whenever asked by the Client or its representative. MSI shall also be responsible for effective risk and issue management and escalation procedures along with matrix as part of project management. MSI shall identify, analyze, and evaluate the project risks and shall develop cost effective strategies and action plan for mitigation of risks. As part of the Project MSI shall monitor, report and update risk management plans and shall be discussed during project meetings. MSI shall prepare minutes of every meeting which takes place in the absence of PMC and submit to Client or its representative for tracking of the Project. MSI shall propose a suitable progress reporting mechanism for the project duration.

MSI will deploy Project Management Tool which should cater to effective project management, configuration management, issue and risk management, escalation procedure and matrix document repository etc. shall be factored in the proposal submitted by MSI. Based on progress reports, MSI shall also accordingly update the master schedule of work on a continuous basis during the period of the contract. Project Management plan shall be submitted to BSCL before commencing the work. The Client's representative will have at least 15 days to review and comment on every deliverable. The practice of submissions for all deliverables will be at least one hard copy and share all the documents with PMC and BSCL stake holders. All deliveries should be approved be approved by PMC (Project Management Consultant) before submitting to Client.

2.2.2 Survey and Detailed Design of all Smart Solutions Components

MSI shall survey the site to validate the conditions provided as part of the Bid document. MSI shall conduct end-to-end survey of the site area and based on the observations asses and validate the present conditions, implementation approach and methodology, project challenges and mitigations and other project critical information. During the survey stage itself, MSI shall mobilize its entire staff and fully acquaint them with the site conditions. It is MSI's responsibilities to periodically survey the site and be updated on the conditions during the course of the contract.

Note : MSI shall have to provide 2 no. of four wheeled light motor vehicle (Car) along with driver and fuel for supervision of work by the department during execution phase.

During the design stage, MSI is also expected to:

- i. Conduct Workshops with different stakeholders for capturing business requirements, creating awareness of best practices, communicating the changes, building consensus on process design etc. These needs to be organized at different intervals and in different places throughout the duration of the projects as needed.
- ii. Stake holder consultation Other than the workshops with those stake holders, PMC &BSCL identified staff will provide critical inputs, reviews, suggestions, process description etc.
- iii. Review sessions with different stake holders for signing off the deliverables, walking through the deliverables for facilitating quick understanding.

The MSI shall be responsible for the detailed design of the Bareilly smart city solutions. MSI shall discuss in detail with the Client or its representatives the detailed design of the Bareilly Smart City Solutions and fine tune any requirements. It is the MSI's responsibility to satisfy the operational requirements of the Client and adopt industry best practices for implementation during the design stage itself. Based on the survey observation, analysis and discussion with the Client, the MSI shall submit a Detailed Design Report. The IT deliverables would include following details and not limited to System Architecture, Network Architecture, Application Architecture, Security Architecture, Routing & Switching, Integration, Operational procedures etc.

The detailed design report shall include end-to-end design validation for the project including any project understanding, analysis, detailed design, integration plan, and construction drawings. Complete set of design and construction drawing including method of installation as applicable shall also be included in the Detailed Project Report. Construction details shall accurately reflect actual job conditions.

All technical data sheets of the products may be submitted ahead of time by the MSI. It is MSI's responsibility to get all technical data sheets approved by the Client or its representative to meet the overall project schedule.

Design and Construction drawings shall include the following at a minimum for drawings for all the elements as part of holistic solution:

- i. Overall design
- ii. Cable requirements, routing and location (as applicable)
- iii. Typical mounting details
- iv. Single Line Diagrams (SLDs)

- v. Splicing diagrams
- vi. Wiring diagrams
- vii. 3D layouts and renderings
- viii. Any other layouts
- ix. Any other requirement to meet the requirements of the RFP for trouble shooting & maintenance.

All drawings shall be updated/revised to "as-built" conditions when installation is complete. Design submissions shall be based on project requirements and shall include as applicable, but not

limited to, the following:

- i. Complete listing of specifications to be used along with detailed technical data sheet
- ii. Detailed engineering drawings
- iii. Shop drawings including product data sheets
- iv. Revisions to original design submissions.

No work requiring shop drawing submission shall commence until final review has been obtained by Client. However, review of the shop drawings by the Client shall not relive the MSI of his responsibility for detailed design inherent to shop drawings. For the software components like E-Governance applications, MSI will create requirement analysis documents for various components of the solution. This includes System Requirements Specification (SRS) and Functional Requirements Specification (FRS) documentation. The MSI shall be responsible for documenting any existing/planned 'processes' of the Client as part of these deliverables.

2.2.3 Software / Hardware Acceptance and Factory Acceptance Testing

After the approvals of the technical data sheets by the Client or its representative, MSI shall submit the prototype of all the material presented in the Detailed Design Report to the Client for its review and approval. Note that it shall be MSI's responsibility to get the prototypes approved in due course of time without affecting the overall schedule of completion of works.

Material provided as part of the Project shall undergo Prototype Acceptance Test (PAT) [Limited to the specific application developed for BSCL] and Factory Acceptance Test (FAT) [Test reports from certified agency shall be accepted] as per Project Plan. Details regarding the PAT and FAT are presented in Testing Section of the Scope of Work. MSI shall also present to the Client and its representatives the test results for PAT and FAT in the form of Test Result Documentation presented in the Testing section. The client at its own discretion shall visit any FAT site. MSI shall be responsible for organizing all logistics required for this site visit. For all the software components, MSI shall also propose prototype of solution components in this phase and get the required approvals.

2.2.4 Hardware Supply and Installation Stage

MSI shall be responsible for the supply and installation of all components as part of the Bareilly Smart City solutions to meet the Technical, Functional, Business and Performance requirements of this RFP. No deviations from these requirements shall be acceptable by the client. Any additional hardware or software component required to meet the technical and performance requirement of the project and not specified as part of this document but required to meet the overall requirements of the project shall be factored in as part of the Bid, and provided by the MSI. MSI shall deliver the project, install and handle the equipment in accordance with manufacturer's requirements. Installation process of the MSI shall be flexible and shall accommodate Client's requirements without affecting the schedule as specified in the RFP.

MSI shall be responsible for all supply, storage and handling of the material provided as part of the bid document. The OEM proposed for the IT infrastructure shall be in line with the national security policy (Meity Guideline as applicable).

If there is removal/change of any existing material during installation process and belongs to the Client, the material shall be handed-over to the Client. MSI shall also be responsible for reinstating any site in the project limits at no additional cost to the client. It shall be the MSI's responsibility to supply and install all hardware in compliance with the requirements of the RFP. Since this is a turnkey contract, MSI shall be responsible for all implementation works on the project including any civil, structural, electrical, etc. works required to meet the requirements of the project. All power conversions necessary to operate the equipment shall be under the scope of MSI. The Client shall only provide raw power for all the equipment. In case of, there is NO power or insufficient power as per the requirement of the equipment, it may be considered that the new power supply connection has to be applied by MSI on the name of the client and Client will provide all necessary help to the MSI in procuring the Raw power. Recurring changes will be reimbursed by BSCL to MSI.

2.2.5 Software Development

MSI shall be responsible for development and deployment of all software to meet the requirements of the project. It is preferred that MSI will use a world class Commercially of The Shelf (COTS) or widely used software packages. However, some of the modules may require bespoke development. MSI shall be fully responsible for developing and implementing all software required for the project. This software shall be developed based on the approved software and functional requirements specifications. The technology platform chosen for all software shall be based on industry standards based and shall be secure. Migration of data shall be the responsibility of the MSI. MSI is required to take the source data in the format which is available. Subsequently, MSI is required to take complete ownership of data migration and also develop a detailed plan for data migration. MSI will create SRS

for application development and get approval from BSCL for UX design before commencing development and also periodic review meetings should be scheduled for review of application and progress of the project.

All licenses for the software shall be perpetual and the client may purchase any additional licenses at the stated per unit cost (as per financial proposal of the Bidder) during this course of the contract. The MSI shall ensure that full support from the OEM's is provided during the course of the contract. All OEMS should give the Manufacturer's Authorization Form (MAFs) and other supporting documents. MSI shall be responsible to provide any upgrades, patches, fixes to the software during the course of the contract at no additional cost to the client.

System Study, Design, Development, Integration, Testing and Certification

MSI would be responsible for development, adding functionality/Customizing over and above the applications (COTS product) or any bespoke software (If required) based on the unique requirements of the client (BSCL/Other Stakeholders). For the additional functionality that the client wants to be added, the MSI shall carry out a detailed systems study to refine the Functional Requirements Specifications provided in this RFP and formulate the System Requirements Specifications (SRS). The study should also include different integration points of ICCC with external agencies as per client's requirement. The MSI should also prepare a detailed document on the implementation of the customized or developed product with respect to configuration, customization and extension as per the requirement of client. The MSI would also prepare a change/reference document based on changes or deviations from the base version of the application (COTS product). The MSI will also be responsible for:

- Conducting Site preparation study for hardware, networking and office infrastructure
- Preparation of System Requirements Specifications (SRS) for additional functionalities and different integration points with External Agencies.
- Preparation of implementation document with respect to Configuration, Customization and extensions as per the requirement of client.
- Preparation of the Solution Design.
- Solution Development and/or Customization and/or Configuration and/or Extension as required.
- Development of reports.
- Formulation of test plans and test cases for additional functionalities and different integrations with external agencies.
- Preparation of Change/Reference document which will include all the changes or deviations from the base version of the product.

- Testing of the configured solution and additional functionalities.
- Enhancements of functions / additions of new modules / integration requirements to various interfaces (as and when they happen) shall also be incorporated in the SRS and shall form the scope of work for the MSI.

Creation of Test Plans: - Once the SRS is approved and design is started, the MSI would prepare all necessary Test Plans (including test cases), i.e., plans for Unit Testing, Integration and System Testing and User Acceptance Testing. Test cases for UAT would be developed in collaboration with domain experts identified by the client. The Test Plans also include planning for the testing any integration with 3rd party COTS solutions, any external agencies. The Test Plans should also specify any assistance required from the client and should be followed upon by the MSI. The MSI should have the Test Plans reviewed and approved by the PMU. The client will sign off on the test plans on the advice of PMU.

High Level Design (HLD): - Once the SRS is approved, the MSI would complete the HLD and all HLD documents of the additional functionalities, integration with external agencies upon the approved SRS. The MSI would prepare the HLD and have it reviewed and approved by the PMU. The client will sign off on the HLD documents on the advice of PMU.

Detailed (Low Level) Design (LLD): - The LLD would interpret the approved HLD to help application development and would include detailed service descriptions and specifications, application logic (including pseudo code) and UI design (screen design and navigation). The preparation of test cases will also be completed during this stage. The MSI would have the design documents reviewed and approved by the PMU. The client will sign off on the LLD documents upon the advice of PMU.

Application Development and Unit Testing: - The MSI would develop the application in accordance with the approved requirements specifications and design specifications and according to the approved Project Plan; and carry out the Unit Testing of the application in accordance with the approved test plans. The MSI would also implement the changes proposed in the Change/Reference document and carry out a thorough regression testing for the functionality. The user acceptance testing and fine-tuning of the application would be at client location. Also, the key senior resources would continue to be based on site at client location.

Regression, Integration, System and Functional Testing: -After successful unit testing of all components, the MSI would conduct full-fledged integration testing, system testing and functional testing in accordance with the approved Test Plans for the configured/customized product, additional functionalities and also integration with external agencies. This would include exhaustive testing including functional testing, performance testing (including load and stress), scalability testing and security testing. Functional testing will be led by the MSI experts. A thorough regression testing should be conducted for those functionalities identified in Change/Reference document to provide a general

assurance that no additional errors have cropped up in the process of addressing the customizations and/or Extensions. Making all necessary arrangements for testing including the preparation of test data, scripts if necessary and setup of test environment (across multiple platforms) shall be the responsibility of the MSI. The MSI along with PMU should take the responsibility in coordinating with client and other stakeholders for a smooth integration.

Test Reports: - The MSI shall create test reports from testing activities and submit to PMU for validation.

Test Data Preparation: - The MSI shall prepare the required test data and get it vetted by PMU. The test data shall be comprehensive and address all scenarios identified in the test cases. The MSI should also prepare the test data for all required integrations with external agencies.

User Acceptance Testing (UAT): - Test Plans for UAT would be prepared by the MSI in collaboration with the PMU and client nominated domain experts. The MSI will plan all aspects of UAT (including the preparation of test data) and obtain required assistance from client to ensure its success. PMU will assemble representatives from different user groups based on inputs from the MSI and would facilitate UAT. The MSI would make the necessary changes to the application to ensure that the customized/developed product successfully goes through UAT.

Final testing and certification: - The Project shall be governed by the mechanism of final acceptance testing and certification to be put into place by the Client, guided by the following principles:

- Client reserves the right to nominate a technically competent agency ("Final Testing and Certification Agency") for conducting final acceptance testing and Certification.
- Such Final Testing and Certification Agency will lay down a set of guidelines following
 internationally accepted norms and standards for testing and certification for all aspects of
 project development and implementation covering software, hardware and networking
 including the processes relating to the design of solution architecture, design of systems and
 sub- systems, coding, testing, business process description, documentation, version control,
 change management, security, service oriented architecture, performance in relation to
 compliance with SLA metrics, interoperability, scalability, availability and compliance with all
 the technical and functional requirements of the RFP and this Agreement.
- The Final Testing and Certification Agency will be involved with Project from the development stage to ensure that the guidelines are being followed and to avoid large scale modifications pursuant to testing done after the application is fully developed. Certification Agency shall be hired by BSCL at its own cost.

- The Final Testing and Certification Agency may engage professional organizations for conducting specific tests on the software, hardware, networking, security and all other aspects.
- The Final Testing and Certification Agency will establish appropriate processes for notifying the System Integrator of any deviations from the norms, standards or guidelines at the earliest instance after taking cognizance of the same to enable the System Integrator to take corrective action.
- Such an involvement of and guidance by the Final Testing and Certification Agency shall not, however, absolve the System Integrator of the fundamental responsibility of designing, customizing/ developing, installing, testing and commissioning the various components of the Project to deliver the services in perfect conformity with this Agreement.

2.2.6 System Integration

MSI shall be responsible for the integration of all hardware and software supplied as part of this Project as per the technical and performance requirements of this bid document. The system integration scope also includes integration of the Project components with the components provided by others as per the details of the RFP.

In case the integration of any of the systems is not as per the requirements specified in the bid document, MSI shall be responsible to provide any upgrades required to meet the integration requirements at no additional cost to the client unless otherwise agreed by the client. It shall be the responsibility of MSI to take approval of the client for the Integration of the overall system as per the bid document. Post systems integration, the client shall review and approve the overall performance of the integrated system as per the requirements of the bid document. MSI shall be responsible for fixing any requirements that are not found in compliance with the original bid requirements and approved detailed design at no additional cost to the client.

2.2.7 Testing

All materials, equipment, systems, manufacturing or configuration processes, or other items to be provided under the Contract shall be inspected and tested in accordance with the requirements specified in the RFP and will be subject to Client or its representative's approval. The testing shall include any existing civil infrastructure equipment or materials to be taken over by the MSI. Approvals or passing of any inspection by the Client shall not, however, prejudice the right of the Client or its representative to reject the material if it does not comply with the specification or requirements of the RFP when erected or give complete satisfaction in service. The MSI shall design and successfully complete tests to demonstrate that all equipment, materials and systems furnished and installed

function in the manner intended and in full compliance with the requirements outlined in the RFP and the approved detailed design of the MSI.

All tests shall be subject to inspection or witnessing of tests by the Client or its representative. Inspection or witnessing of tests may be waived at the sole discretion of the Client or their representative, subject to the MSI furnishing the Client or their representative with properly completed test certificates in accordance with the requirements of the RFP. Failure of the Client or their representative to witness any test shall not relieve the MSI of the obligation to meet the requirements of the Contract. MSI shall submit an Acceptance Test Procedures document (ATP), for Client's approval prior to undertaking any testing. The ATP shall clearly address:

- Type of testing and device to be tested
- How each testable specification requirement will be demonstrated, including the test environment and set-up, specific functionality to be tested, method for performing the test and quality assurance procedures;
 - o The results that will constitute success for each test
 - o Timing of test within the overall Contract schedule
 - The location for testing
 - Personnel required to conduct the test
 - Approximate time required to execute the test or set of tests
 - o Responsibilities of both the MSI and Client's representatives during each test; and
 - A cross-reference to which Contract requirements from the Compliance Matrix (to be developed by the MSI) are being addressed by each test procedure

The ATP shall include an updated Compliance Matrix to include the test relevant stage at which each contract requirement will be demonstrated; and a cross-reference to the test procedure(s) that serve to address each contract requirement. The Compliance Matrix shall be used as a "punch list" to track which requirements have not yet been demonstrated at each stage of testing. A requirement classified as having been "demonstrated" during a certain ATP stage can be subsequently redefined as having been "not demonstrated" if compliance issues emerge prior to System Acceptance. ATP shall be submitted to Client at least three (3) weeks in advance of any intended testing.

All measuring instruments required to measure test parameters shall be calibrated by an approved testing authority. The equipment shall be inspected for standards of construction and electrical and mechanical safety. MSI will take appropriate certificate from the supplier.

Test results shall be recorded for all tests conducted under this Contract. The MSI shall make test results available to Client or their designate for review immediately after completion of the tests.

ATP for each test shall be collated, bound and delivered as part of the close-out documentation requirements specified herein. ATP submission shall include a hard copy of the originally marked test results and a neatly typed summary. One (1) hard copies and one (1) electronic copy shall be provided. ATP shall incorporate the following distinct stages for each deployed stage:

Prototype Acceptance Tests (PAT): Prototype Approval Test shall be conducted only on the customized equipment / Application developed for BSCL and compliance to functional specifications. PAT shall be completed before conducting FAT and only after approval of PAT by Client's representative, the equipment shall go in production. PAT shall be witnessed by Client's representatives;

Factory Acceptance Tests (FAT): FAT shall be conducted before the equipment and software is shipped to Client for installation, and deficiencies shall be rectified before shipping to Client for installation. All devices furnished by the MSI shall be tested and subjected to a nominal 72-hours burnin period at the factory. MSI will take certificate from OEMs in this regard. FAT shall be witnessed by Client's representatives at their discretion. Factory acceptance tests shall be conducted on randomly selected final assemblies of all equipment to be supplied. In case any of the selected samples fail, the failed sampled is rejected and additional 20% samples shall be selected randomly and tested. In case any sample from the additional 20% also fails the entire batch may be rejected; However test reports from certified agency shall be accepted.

Pre-Installation Testing (PIT): All equipment supplied under this Contract shall undergo preinstallation testing in accordance with the ATP. This shall include existing equipment, any spare parts, any new equipment provided by Client or their designate and new equipment provided by the MSI. If the equipment is considered a standard production item, the MSI may, with the prior consent of the

Client or their designate, supply a copy of the equipment manufacturer's quality control test results in place of MSI performed test. All PIT testing shall be carried out prior to installation of the equipment. After satisfactory completion of the MSI's PIT tests, the MSI shall supply all test.

All PIT testing shall be carried out prior to installation of the equipment. After satisfactory completion of the MSI's PIT tests, the MSI shall supply all test measurements and results to the Client or their designate, together with a Test Certificate.

Installation Acceptance Tests (IAT): IAT shall be conducted after each installation of each equipment type, and deficiencies shall be rectified before the initiation of SAT. IAT may be witnessed by Client's representatives

Proof of Performance Testing (POP): The MSI shall implement a structured proof of performance testing, which will progressively place all components in service. Site tests shall be performed on

individual components, subsystem sites, and the complete subsystems, as necessary to confirm that each element of the system functions satisfactorily and fulfils the requirements of this specification. Completion, submission, and approval of all relevant PIT and IAT tests and results must be completed prior to carrying out any POP tests. All subsystem equipment and components shall be tested by the MSI regardless of whether or not it is a standard item.

After satisfactory completion of the MSI's POP tests, the MSI shall supply all test measurements and results to the Client or their designate, together with a Test Certificate.

System Integration Testing (SIT): The MSI is responsible for the proper and harmonious operation of all subsystems installed under this Contract. Where connections of the new systems to existing subsystems or equipment supplied by others are required, the MSI is responsible for connection of equipment specified in the Contract and for initial system integration tests. Such a test will verify the full functionality of each subsystem as they are interconnected. This will require testing to be coordinated by the MSI with the Client or their designate. This work will be carried out under the direction of the Client or their designate.

Completion, submission and approval of all relevant PAT, FAT, PIT IAT and POP tests and results must be complete prior to carrying out any SIT tests.

The MSI shall:

- Complete all equipment and subsystem tests required in the Contract
- Test each subsystem independently on the communications subsystem
- Add subsystems one at a time and monitor the overall performance
- Fail safe testing of all subsystems one at the time while monitoring overall systems performance

A SIT certificate will be issued when all system tests have been completed satisfactorily, and the MSI has supplied a full set of Test Certificates and a Test Certificate for the complete system, together with final copies of all Operating and Maintenance Documentation for the System.

Security Testing (including penetration and vulnerability test): Security test shall be conducted to demonstrate security requirements at network layer and software applications. Components shall pass vulnerability and penetration testing for rollout of each phase. Components shall also pass web application security testing for portal, Mobile App, and other systems. Security testing shall be carried out for exact same environment/architecture that shall be set up for go-live. Penetration test shall be carried out periodically and vulnerability analysis shall be carried yearly during maintenance phase. For all applications hosted on- cloud or hosted on premises, the security testing shall be a mandatory requirement. The SI shall be responsible for the security audit of the established system to be carried

out by a certified third party as agreed by BSCL before Go-Live & yearly. Security audit report shall be part of FAT documents. Cost of such test equipment/ Agency/ VAPT shall be borne by MSI.

Test: Requirements for Test is explained in the Deployment Section of the Scope of Work.

System Acceptance Tests (SAT): SAT shall be conducted after the entire system has been installed, integrated and commissioned. Deficiencies, if any shall be rectified before the initiation of Burn-in Test. SAT shall be conducted on full system completion only to determine if the system functional and technical requirements as specified in the bidding documents are meet. SAT shall be witnessed by Client's representatives. Data migration, if any will be carried out by ST prior to commencement of this stage. SAT shall also include any performance and load testing for the software applications.

Burn-in Tests (BT): Following successful completion of the SIT and SAT, the approved System will be put into service and its performance monitored for a period of thirty (30) consecutive calendar days for the purpose of verifying system reliability in an operating environment. Any failures and defects occurring in this time will be documented. Any serious defects which affect the availability of the system will be a basis for restarting the test. Upon the satisfactory completion of this performance testing a Completion Certificate will be issued.

The MSI shall not commence BT until SIT and SAT have been performed and successfully completed and all documentation of the successful completion of PAT, FAT, PIT, IAT, POP, SIT and SIT, along with notification of the schedule date of the BT is provided to the Client or their designate in accordance with the requirements. Commencement of BT will be conditional on the Client or their designate providing written notification of Client's readiness to proceed to BT.

The MSI shall be suitably prepared for the BT prior to the start date. Repeated failure of the BT may result in the MSI having to reimburse the Client or their designate for costs incurred. No compensation to the MSI will be made for repeat testing.

Where equipment supplied by the MSI fails during the burn-in period, the MSI shall restart the test at day zero (0) following appropriate corrective measures.

If a utility failure is proved to be the cause of testing failure, then the MSI shall restart the fourteen (14) day burn-in test at the day the failure occurred. If a subsystem failure is proved to be the cause of testing failure, then the MSI shall start the test over at day 0 (zero).

Where tests or burn-in indicate that an existing subsystem or component, not provided by the MSI, is defective, the MSI shall immediately report the deficiency to the Client or their designate. The Client or their designate may assign corrective repairs, retesting and repeat of BT to the MSI, in accordance with change provisions of the Agreement.

The MSI shall provide the Client or their designate with a contact name and phone number(s) for a designated emergency contact person during BT. The emergency contact person shall be accessible twenty- four (24) hour a day, for each day of testing.

Issuance of the Completion Certificate is a basis for the start of the Warranty period for the Systems. **Operational Acceptance Test: s**hall be conducted after successful SAT and Burn-in tests. Continuous fault free running of the System shall be tested. Post the completion of Operational Acceptance Test, System shall be considered for Operational System Acceptance and Defect Liability Period (DLP) shall commence. Operational Acceptance Test shall include the following as a minimum:

- Completion of all activities and fulfilment of all business, functional and technical requirements listed in RFP
- Scrutiny of all inspection reports, audit findings, Contracts, licensing agreements etc.

Client may authorize the MSI to proceed to the next testing stage with certain deficiencies not yet resolved.

The MSI shall provide written notice to Client at least five days in advance of any testing, indicating the specific tests to be completed as well as the date, time and location. The MSI shall be required to reschedule testing if Client witnessing representatives cannot be present or if other circumstances prevent testing from taking place.

MSI shall provide written Test Results Documentation (TRD) within one week of completing each stage of testing. The TRD shall document the results of each ATP procedure and provide an updated Compliance Matrix that indicates which contract requirements have been demonstrated. The TRD must be approved before Client will grant System Acceptance.

MSI shall be responsible to carry out all the testing as per the satisfaction of the Client and its representatives. All the costs those are associated with any testing are to be borne by the MSI including the costs of travel and accommodation of the Client or its representatives from their home locations in their cost bid. In the interest of the MSI maximum of three (3) people shall be nominated by the Client to attend any such testing wherever it is carried out. In case of failure of any testing, the failure component shall be repaired and the test shall be rerun. If a component has been modified as a result of failure, that component shall be replaced in all like units and the test shall be rerun for each unit.

MSI shall provide the Client with a copy of the manufacturer's quality assurance procedures for information. Documentation certifying the showing that each item supplied has passed factory inspection shall also be submitted by the MSI.

Note : Pilot refers to UAT and FAT phase and all the clauses will be applicable before Go-Live.

2.2.8 Deployment

The MSI shall conduct deployment and testing for meeting Client's business requirements before rolling out the complete system. MSI shall also review health, usage and performance of the system till it is stabilized during initial deployment. Based on Client's feedback for incorporating changes as required and appropriate.

2.2.8.1 Third Party Acceptance Testing, Audit and Certification

The primary goal of Acceptance Testing, Audit & Certification is to ensure that the system meets requirements, standards, and specifications as set out in this RFP and as needed to achieve the desired outcomes. The basic approach for this will be ensuring that the following are associated with clear and quantifiable metrics for accountability:

- Functional requirements
- Test cases and Requirements Mapping
- Infrastructure Compliance Review
- Availability of Services in the defined locations
- Performance and Scalability
- Security / Digital Signatures
- Manageability and Interoperability
- SLA Reporting System
- Project Documentation
- Data Quality Review

As part of Acceptance testing, audit and certification, performed through a third party agency, BSCL shall review all aspects of project development and implementation covering software, hardware and networking including the processes relating to the design of solution architecture, design of systems and sub-systems, coding, testing, business process description, documentation, version control, change management, security, service oriented architecture, performance in relation to defined requirements, interoperability, scalability, availability and compliance with all the technical and functional requirements of the RFP and the agreement. Here, it is important to mention that there may be two agencies selected, one for audit & certification of security and control aspect of the system and the other for audit & certification of overall application S/w. BSCL will establish appropriate processes for notifying the MSI of any deviations from defined requirements at the earliest instance after noticing the same to enable the MSI to take corrective action. Such an involvement of the Acceptance Testing & Certification agencies (STQC/CERT-IN Empaneled Agency), nominated/appointed by MSI with prior approval of BSCL, will not, however, absolve the MSI of the fundamental responsibility of designing, developing, installing, testing and commissioning the various

components of the project to deliver the services in perfect conformity with the SLAs. Following discusses the acceptance criteria to be adopted for system as mentioned above: Cost shall be bone by MSI.

Functional Requirements: - The system developed/customized by MSI shall be reviewed and verified by the agency against the Functional Requirements signed-off between BSCL/Concerned Department Authority and MSI. Any gaps, identified as severe or critical in nature, shall be addressed by MSI immediately prior to the deployment of the system in production. One of the key inputs for this testing shall be the traceability matrix to be developed by the MSI from system. Apart from Traceability Matrix, agency may develop its own testing plans for validation of compliance of system against the defined requirements. The acceptance testing w.r.t. the functional requirements shall be performed by both independent third-party agency (external audit) as well as the select internal department users (i.e. User Acceptance Testing).

Infrastructure Compliance Review: - Third party agency shall perform the Infrastructure Compliance Review to verify the conformity of the Infrastructure supplied by the MSI against the requirements and specifications provided in the RFP and/or as proposed in the proposal submitted by MSI. Compliance review shall not absolve MSI from ensuring that proposed infrastructure meets the SLA requirements.

Security Review: - The software developed/customized for system shall be audited by the agency from a security & controls perspective. Such audit shall also include the IT infrastructure and network deployed for system. Following are the broad activities to be performed by the Agency as part of Security Review. The security review shall subject the system for the following activities:

- Audit of Network, Server and Application security mechanisms
- Assessment of authentication mechanism provided in the application /components/ modules
- Assessment of data encryption mechanisms implemented for the solution
- Assessment of data access privileges, retention periods and archival mechanisms
- Server and Application security features incorporated etc.

Performance: - Performance is another key requirement for system and agency shall review the performance of the deployed solution against certain key parameters defined in SLA described in this RFP and/or agreement between BSCL and MSI. Such parameters include request-response time, work-flow processing time, concurrent sessions supported by the system, Time for recovery from failure, Disaster Recovery drill etc. The performance review also includes verification of scalability provisioned in the system for catering to the requirements of application volume growth in future.

• The MSI must provide System and Database Performance System for all servers in the Data centre

- The MSI must provision for End-User response time monitoring and transaction based deepdive analysis for Web based applications.
- The MSI must provision for Integrated Performance Management System for Monitoring Networks, Systems & Databases.
- The MSI must provide a Traffic Analysis and Reporting System for deep-dive diagnostics.

Availability: - The system should be designed to remove all single point failures. Appropriate redundancy shall be built into all the critical components to provide the ability to recover from failures. The agency shall perform various tests including network, server, security, DC/DR fail- over tests to verify the availability of the services in case of component/location failures. The agency shall also verify the availability of services to all the users in the defined locations. The MSI would need to provide an Infrastructure Fault Management System for the following functions:

1. Infrastructure Fault Analysis

- The proposed solution must automatically discover manageable elements connected to the network and map the connectivity between them. The Network Fault Management consoles must provide the topology map view from a single central console.
- The proposed system must support multiple types of discovery including IP range discovery,
 Seed router-based discovery & Trap-Based Discovery
- The system should provide discovery & inventory of heterogeneous physical network devices like Layer-2 & Layer-3 switches, Routers and other IP devices and do mapping of LAN & WAN connectivity with granular visibility up to individual ports level.
- The system must be able to support mapping and modeling of the infrastructure grouped by network connectivity, physical location of equipment and user groups or departments
- The system should support maps grouped by network topology, geographic locations of the equipment's and user group/departments. These should help in understanding physical Network, virtual Network services and the relationships between them.
- The system must provide visualization tools to display network topology and device to device connectivity. The system must also be able to document connectivity changes that were discovered since the last update.
- The proposed solution must provide a detailed asset report, organized by vendor name and device, listing all ports for all devices. When a report is run the administrator must have an option of specifying the number of consecutive days the port must be —unused|| in order for it to be considered —available.
- The proposed solution should provide out of the box root cause analysis with multiple root cause algorithms inbuilt for root cause analysis.

- It should have a strong event correlation engine which can correlate the events on the basis of event pairing, event sequencing etc.
- The system must be able to "filter-out" symptom alarms and deduce the root cause of failure in the network automatically.
- The proposed solution must support an architecture that can be extended to support multiple virtualization platforms and technologies

2. Configuration Management for Critical Network Devices

- The system should be able to clearly identify configuration changes as root cause of network problems
- The proposed fault management solution must able to perform real-time or scheduled capture of device configurations
- The proposed fault management solution must able to store historical device configurations captured in the database and thereby enable comparison of current device configuration against a previously captured configuration as well as compare the current configuration against any user-defined standard baseline configuration policy
- Advanced IP Services Management for technologies like QoS and Multicast
- The proposed solution should be able to support response time agents to perform network performance tests to help identify network performance bottlenecks.
- The proposed solution should be able to monitor QoS parameters configured to provide traffic classification and prioritization for reliable VoIP transport. The proposed solution should discover and model configured QoS classes, policies and behaviors.
- The proposed solution should provide the ability to discover, map & monitor multicast sources
 & participating routers wherein the system should be able visualize the distribution tree in the topology map.

3. Infrastructure-based SLA Management and Integration Requirements

- The proposed service management system should provide a detailed service dashboard view indicating the health of each of the departments / offices in the organization and the health of the services they rely on as well as the SLAs.
- The system must be capable of managing IT resources in terms of the business services they support, specify and monitor service obligations, and associate users/Departments/ Organizations with the services they rely on and related Service/Operational Level Agreements.

- Root cause analysis of infrastructure alarms must be applied to the managed Business Services in determining service outages. SLA violation alarms must be generated to notify whenever an agreement is violated or is in danger of being violated.
- The system must provide the capability to designate planned maintenance periods for services and take into consideration maintenance periods defined at the IT resources level. In addition, the capability to exempt any service outage from impacting an SLA must be available.
- The proposed NMS should provide unified workflow between the fault and performance management systems including bi-directional and context-sensitive navigation
- The system must support seamless bi-directional integration to helpdesk or trouble ticketing system
- The proposed network fault management system should integrate with the helpdesk system by updating the Asset with CI information to support viewing history or open issues in helpdesk on the particular managed asset and associate an SLA to the ticket in the helpdesk.

Manageability Review: - The agency shall verify the manageability of the system and its supporting infrastructure deployed using the Enterprise Management System (EMS) proposed by the MSI. The manageability requirements such as remote monitoring, administration, configuration, inventory management, fault identification etc. shall have to be tested out.

SLA Reporting System: - MSI shall design, implement/customize the Enterprise Management System (EMS) and shall develop any additional tools required to monitor the performance indicators listed under SLA prescribed in this RFP. The Acceptance Testing & Certification agency shall verify the accuracy and completeness of the information captured by the SLA monitoring system implemented by the MSI and shall certify the same. The EMS deployed for system, based on SLAs, shall be configured to calculate the monthly transaction-based payout by BSCL to MSI. The MSI may provide an end to end Service Level Management System for the Data Centre and Network Infrastructure

- Provide end-to-end, comprehensive, modular and integrated management of IT infrastructure components to maximize the availability of IT services and SLA performance.
- The management system needs to aggregate events and performance information from the domain managers and tie them to service definitions. This capability is critical for the administrators to have a complete view of the performance and availability of various application services being managed.
- The proposed tools should automatically document problems and interruptions for various IT services offered and integrate with the service level management system for reporting on service level agreements (SLAs).

- The system must be capable of managing IT resources in terms of the business services they support, specify and monitor service obligations, and associate users/Departments/ Organizations with the services they rely on and related Service/Operational Level Agreements.
- Provide a detailed service dashboard view indicating the health of each of the departments / offices in the organization and the health of the services they rely on as well as the SLAs.
- Provide a high-level view for executives and other users of the system using a real time business services Dashboard.
- Provide an outage summary that gives a high-level health indication for each service as well as the details and root cause of any outage.
- Support for a User Definition Facility to define person(s) or organization(s) that uses the business Services or is a party to a service level agreement contract with a service provider or both. The facility must enable the association of Users with Services and SLAs.
- The Service Level Agreements (SLAs) definition facility must support defining a set of one or more service Guarantees that specify the Service obligations stipulated in an SLA contract for a particular time period (weekly, monthly, and so on). Guarantees supported must include one that monitors service availability (including Mean Time to Repair (MTTR), Mean Time between Failure (MTBF), and Maximum Outage Time thresholds) and the other that monitors service transaction response time.
- SLA violation alarms must be generated to notify whenever an agreement is violated or is in danger of being violated.
- Provide the capability to designate planned maintenance periods for services and take into consideration maintenance periods defined at the IT resources level. In addition, the capability to exempt any service outage from impacting an SLA must be available.
- A historical reporting facility that will allow for the generation of on-demand and scheduled reports of Business Service-related metrics with capabilities for customization of the report presentation.

A List of SLAs that needs to be measured using the proposed monitoring tools is given below. These SLAs must be represented using appropriate customizable reports to ensure overall service delivery.

- 1. Service Level Category: Network Infrastructure
 - a. Network Specific SLAs
 - i. Uptime SLA
 - ii. MTBF (Mean Time Between Failures) & MTTR (Mean Time to Repair)
 - iii. Latency & Response Time (DNS / DHCP / SMTP etc.)

- iv. Traffic-based SLAs
- 2. Service Level Category: Data Centre IT Infrastructure
 - a. System Specific SLAs
 - i. System Availability
 - ii. System Response Time
 - iii. Utilization based SLAs (CPU / Memory etc.)
- 3. Application Specific SLAs
 - a. End-User Based SLAs
 - i. End-to-End Response Time for End-User Web Pages to Load
 - ii. Avg. Response Time, Errors Per Interval, Response per Interval
 - iii. SLAs from Critical Processes (e.g. Submit Button Click, Upload Action in Portal)
- 4. Transaction Based SLAs
 - i. SLAs for Business Process involving with multiple steps / pages
 - ii. Completion Time SLA for Critical Business Processes
- 5. Application Deep-Dive SLAs
 - i. Application Component-Wise SLA within the DC
 - ii. SLA for DB Query to Complete
 - iii. Web Services Call etc.
 - iv. 3rd Party interaction SLAs between Applications

Project Documentation: - The Agency shall review the project documents developed by MSI including requirements, design, source code, installation, training and administration manuals, version control etc. Any issues/gaps identified by the Agency, in any of the above areas, shall be addressed to the complete satisfaction of BSCL.

Data Quality: - The Agency shall perform the Data Quality Assessment for the Data digitized/ migrated (If required) by MSI to the system. The errors/gaps identified during the Data Quality Assessment shall be addressed by MSI before moving the data into production environment, which is a key mile stone for Go-live of the solution.

2.2.9 Training

Post the system integration, MSI shall train Client representatives to operate the equipment installed and to conduct any routine diagnostics and routine maintenance work. Training shall be done during Initial Deployment and before Final Deployment. The period of training shall be mutually agreed upon by Client and MSI.

The MSI shall provide training courses for at least:

• Decision Makers/ Management

- Client's operations personnel
- Users of Various Systems/Applications developed as part of the project

The actual number of each of above categories of trainees will be provided at Design Stage.

MSI shall provide all training materials in both Microsoft Office and Adobe PDF formats, consisting of graphics, video and animations on Compact Disc (CD) and Digital Video Disc (DVD) with a permission to reproduce copies later on.

The Training Plan (TP) shall be developed for each component/module and shall include the training schedule and course outlines. Bidder must be provided to Client the TP for review at least three weeks in advance of the start of training. The TP must be approved by Client before the start of training.

MSI shall also be responsible for full capacity building of BSCL staff. Training and capacity building shall be provided for all individual modules along with their respective integrations. All training materials shall be developed by the MSI.

MSI shall furnish all special tools, training videos, self-learning tools, equipment, training aids, and any other materials required to train course participants, for use during training courses. Training shall include, as a minimum, a four (4) hour session on system maintenance and configuration, and a four (4) hour session on system operation

The instructors shall demonstrate a thorough knowledge of the material covered in the courses, familiarity with the training materials used in the courses, and the ability to effectively lead the staff in a classroom setting. If at any stage of training, the Client feels that on-field sessions are required, the same shall be conducted by the MSI. The language of training shall be in English/Hindi as indicated by the Client during this stage

If any instructor is considered unsuitable by Client, either before or during the training, the MSI shall provide a suitable replacement within one week of receiving such notice from Client.

The MSI shall provide brief refresher versions of each training course to the original trainees and new inductees between three to six months after System Acceptance for each deployment stage at no additional cost. A team of trainers shall be deployed fulltime for one month around the Go-Live period for each component for training the staff and stakeholders.

In addition to the training to the operations staff during system deployment stage, the MSI shall conduct half- yearly training refreshment sessions to train the new staff inducted by the Client and to enhance the knowledge of the Client's staff operating the Bareilly Smart City solutions by adopting "train the trainer" approach.

MSI has to ensure that training sessions are effective and the attendees shall be able to carry on with their work efficiently. For this purpose, it is necessary that effectiveness of the training session is measured through a comprehensive online feedback mechanism.

2.2.10 Change Management

MSI shall help the agencies with complete Change Management exercise needed to make this project a success. In fact, Change Management will have to subsume 'training' as a key enabler for change. Following outlines, the responsibilities of MSI with respect to designing and implementation of change management plan for the Project.

Change Management initiative, to be designed & implemented by MSI, shall focus on addressing key aspects of Project including building awareness in personnel on benefits of new system, changes (if any) to their current roles & responsibilities, addressing the employee's concerns & apprehensions w.r.t. implementation of new system and benefits that are planned for the employees.

It is required that if MSI doesn't operate in the Change Management, Communication and Training domain then he collaborates with/ hires services of a specialist agency who will be responsible for complete Change Management, Awareness and Communication implementation and monitoring, on the lines suggested below

- The agencies requiring change management as part of the project shall form various stakeholder groups to address the Change Management Initiative. Stakeholders are all those who need to be considered in achieving the project goals and whose participation and support are crucial to its success. A key individual stakeholder or stakeholder group is a person or group of people with significant involvement and/or interest in the success of the project.
- Stakeholder analysis identifies all primary and secondary stakeholders who have an interest in the issues with which the Integrated Command & Control Center is concerned. The stakeholder groups will be the set of core users (Change Agents) who will directly participate in the awareness and communication initiatives, workshops, and provide feedback to the governance Committee
- Stakeholder groups can be categorized into below categories, based on their influence and role in managing the change and making it successful.

2.2.11 Develop Overall Training Plan

MSI shall be responsible for finalizing a detailed Training Plan for the program in consultation with BSCL covering the training strategy, environment, training need analysis and role-based training curriculum. MSI shall own the overall Training plan working closely with the BSCL Training team. MSI shall coordinate overall training effort.

2.2.12 Develop Training Schedule and Curriculum

System Integrator shall develop and manage the training schedule in consultation with BSCL, aligned with the overall implementation roadmap of the project and coordinate the same with all parties involved. Training schedule shall be developed by solution and shall be optimized to reduce business

impact and effective utilization of Training infrastructure and capacities. The training curriculum for the BSCL training program should be organized by modules and these should be used to develop the training materials. The training curriculum outlines the mode of delivery, module structure and outline, duration and target audience. These sessions should be conducted such that the users of the application/modules are trained by the time the application "goes-live" with possibly no more than a week's gap between completion of training and going live of modules. Continuous reporting (MIS) and assessment should be an integral function of training. MSI shall also identify the languages to be used by the end-user for entering data and ensuring multi- language training to the end users as per requirement.

2.2.13 Develop Training Material

Based on the specific needs and the objectives of BSCL, training programs should be organized by the MSI. The training program must include training on each of the ICCC modules.

Following is the indicative list of the training programs that needs to be administered to the group of officials as identified above. The overall responsibility of administering the training program lies with the MSI.

- Basic IT skills and use of computers to creating awareness about the benefits of ICT and basic computer skills
- Role-based training on the COTS based/ Applications Basic and Advanced. This training should be in a role based, benchmarked and standardized format, multi-lingual and lead to learning completion and assessment. It should also allow for self-learning and retraining. Training would include mechanism for demonstration using audio / video / simulated / demo practice exercises and evaluation of trainees. The training should be module based
- System Administrator training: a few members of the various departmental staff with high aptitude would be trained to act as system administrators and troubleshooters for the system.
- Customization of the Training Manuals, User Manuals, Operational and Maintenance Manuals provided along with the Software

PLEASE NOTE: The number of training groups will depend on the number of user groups and has to be mutually decided between Client and MSI.

2.2.14 Deliver Training to End Users

MSI shall deliver training to the end users utilizing the infrastructure at the designated Training Centers. Role- based training for the Senior Officers will be carried out for a suitable location by the System Integrator.

MSI shall also impart simulated training on the actual application with some real life like database. The MSI should create case studies and simulation modules that would be as close to the real life

scenario as possible. The objective of conducting such trainings would be to give firsthand view of benefits of using the system. Such specialized training should also be able to provide the participant a clear comparison between the old ways of operation against the post -e-gov scenario. This training needs to be conducted by the MSI at the very end when all the other trainings are successfully completed.

Most of the training would be an Instructor-Led Training (ILT) conducted by trained and qualified instructors in a classroom setting. To maintain consistency across trainings, standard templates should be used for each component of a module.

An ILT course will have the following components

- Course Presentation (PowerPoint)
- Instructor Demonstrations (The ICCC Application training environment)
- Hands-on Exercises (The ICCC Application training environment)
- Application Simulations: Miniature version of the ICCC Application with dummy data providing exposure to the officers to a real-life scenario post implementation of the ICCC.
- Job Aids (if required)
- Course Evaluations

In addition to the ILT, for the modules that may be more appropriate to be conducted through a Computer Based Training (CBT), a CBT should be developed for them. CBT should involve training delivered through computers with self-instructions, screenshots, simulated process walk-through and self-assessment modules.

Select set of staff with high aptitude group and/or relevant prior training, are to be imparted with the training/skills to act as system administrators and also as troubleshooters with basic systems maintenance tasks including hardware and network.

2.2.15 Deliver Training to Trainers (Internal & External – if specified by BSCL)

MSI shall help BSCL in assessing and selecting the internal trainers as well as external trainers who can conduct the end user training subsequent to the training by the MSI. MSI shall coordinate the 'Train the Trainer' session for the identified trainers to ensure that they have the capability to deliver efficient training.

In addition to the training delivered to the end-users, the trainers should also be trained on effectively facilitate and deliver training to end users. Also, it is advisable to always run pilots for any training program before deployment. This training will hence serve as the pilot and as a training session for trainers as well.

In addition, the end-user training sessions, Training of Trainers training will consist of three segments:

- The first segment will be set of workshops covering effective presentation skills and coaching techniques and discussing the benefits and structure of the trainer model.
- The second segment will be the formal the ICCC training which will consist of all modules relevant for their role.
- The third segment will be a teach-back session where trained trainers will present course content and receive feedback regarding content, flow, and presentation techniques. This will also include a feedback session where trainers can provide feedback on the training materials, flow, comprehension level, and accuracy.

To strengthen the staff, structured capacity building programs shall be undertaken for multiple levels in the organizational hierarchy like foundation process/ soft skills training to the staff for pre-defined period. Also, refresher trainings for Command Control Centre/City Operation Staff, designated Authorities & Police staff shall be part of Capacity Building. It is important to understand that training needs to be provided to each relevant staff personnel (authorized by BSCL) of such operation centres. These officers shall be handling emergency situations with very minimal turnaround time.

- The Selected MSI shall prepare and submit detailed Training Plan and Training Manuals to BSCL /authorized entity for review and approval.
- Appropriate training shall be carried out as per the User Training Plan prepared in detail, stating the number of training sessions to be held per batch of trainees, course work for the training program, coursework delivery and evaluation methodologies in detail.
- The selected MSI shall be responsible for necessary demonstration environment setup of overall ICT solutions covered in this DPR to conduct end user training. End user training shall include all the equipment's but not limited to all the applications and infrastructure at Operation centres, data centres & field Locations. End user training shall be conducted at a centralized location or any other location as identified by BSCL with inputs from MSI.
- MSI shall conduct end user training and ensure that the training module holistically covers all the details around hardware and system applications expected to be used on a daily basis to run the system.
- MSI shall impart operational and technical training to internal users on solutions being implemented to allow them on effective and efficient use of surveillance system.
- MSI shall prepare all the proposed solution specific training manuals covering all the parameters (e.g. Training Manuals, operation procedures, visual help-kit etc.)
- MSI shall provide training to selected officers of BSCL profile wise (e.g. administrative staff, field staff etc.) covering functional, technical aspects, usage and implementation of the products and solutions.

- MSI shall ensure that all concerned personnel receive regular training sessions, from time to time, as and when required. Refresher training sessions shall be conducted on a regular basis. It is proposed that MSI would be required to impart training on smart solutions and their usage, maintenance & operations for a total of two-man year spread across the entire contract period of MSI. The details of the training schedule/ roster would be finalized by BSCL with the selected MSI for the purpose of capacity building.
- An annual training calendar shall be clearly chalked out and shared with BSCL along with complete details of content of training, target audience for each year etc.
- MSI shall update training manuals, procedures manual, deployment/Installation guides etc. on a regular basis (Quarterly/ Biannual) to reflect the latest changes to the solutions implemented and new developments.
- MSI shall ensure that training is a continuous process for the users. Basic computer awareness, fundamentals of computer systems, basic overview, intermediate and advanced application usage modules shall be prepared and provided by MSI.
- Systematic training shall be imparted to the designated trainees that shall help them to understand the concept of solution, day-to-day operations of overall solution and maintenance and updating of the system to some extent. This shall be done under complete guidance of the trainers provided by MSI.
- Time Schedule and detailed program shall be prepared in consultation with BSCL and respective authorized entity (E.g. Police). In addition to the above, while designing the training courses and manuals, MSI shall take care to impart training on the key system components that are best suited for enabling the personnel to start working on the system in the shortest possible time.
- MSI is required to deploy a Master Trainer who shall be responsible for planning, designing and conducting continuous training sessions.
- Training sessions and workshops shall comprise of presentations, demonstrations and handson demonstration mandatorily for the application modules.
- BSCL shall be responsible for identifying and nominating users for the training. However, MSI shall be responsible for facilitating and coordinating this entire process.
- MSI shall be responsible for making the feedback available for the Authority/authorized entity to review and track the progress, in case, after feedback, more than 30% of the respondents suggest that the training provided to them was unsatisfactory or less than satisfactory then the MSI shall reconduct the same training at no extra cost.
2.2.15.1 Types of Trainings

Following training needs is identified for all the project stakeholders:

- a. **Basic IT training** This module shall include components on fundamentals of: Computer usage, Network, Desktop operations, User admin, Application installation, Basic computer troubleshooting etc.
- b. Functional Training Basic IT skills, Software Applications (City Operation Centre and Command & Control Centre), Networking, Hardware Installation, Centralized Helpdesk, Feed monitoring
- c. Administrative Training System Administration Helpdesk, FMS, BMS Administration etc., Master trainer assistance and handling helpdesk requests etc.
- d. **Senior Management Training** Usage of all the proposed systems for monitoring, tracking and reporting, MIS reports, accessing various exception reports
- e. **Post-Implementation Training** Refresher Trainings for the Senior Management, Functional/Operational training and IT basics for new operators, Refresher courses on System Administration, Change Management programs.

2.2.16 Training Effectiveness Evaluation

MSI shall evaluate the effectiveness of all end user's trainings using electronic or manual surveys. MSI shall be responsible for analyzing the feedback and arrange for conducting refresher training, wherever needed. State will periodically monitor the training effectiveness through the performance metrics and Service levels and the MSI shall comply with the same.

2.2.17 Final Deployment and Documentation

After addressing the Client feedback and any deficiency observed during the initial deployment and upon completion of System Acceptance Tests (SAT), final deployment of the Bareilly Smart City solutions shall be considered by the MSI. For achievement of final deployment, MSI shall also be responsible for development of a cutover strategy which shall include initial data take on, sequence of data takes on, set up of support mechanisms to minimize business impact due to any cutover activities.

Post the final deployment, MSI shall handover detailed documentation that describes the site conditions, system design, configuration, training, as-built conditions, operation and maintenance. All documentation shall be in English and Hindi (as agreed with the client), shall utilize metric measurements, and shall be submitted directly to Client in paper hardcopy and electronically in Word/AutoCAD/Excel/Project and Adobe Acrobat that should be editable or updated.

All installation drawings shall be prepared in AutoCAD, GIS and Adobe Acrobat and provided on CD-ROM as well as hard copies. The drawings shall contain sufficient detail including but not limited to equipment dimensions, interfaces, cable details, equipment mounting and fire protection. Electrical

and electronic drawings shall be supplied to show engineering changes made to any component or module any time during the contract period.

'As-built' Documents delivered by the MSI shall include:

- An inventory of all components supplied including model name, model number, serial number and installation location
- An inventory of all spare parts supplied including brand, model number, and serial number and storage location
- All reference and user manuals for system components, including those components supplied by third parties
- Point of Contact for each OEM for maintenance
- Warranties and Maintenance schedules for the hardware procured
- All warranties documentation, including that for components supplied by third parties
- As-built in CAD and GIS
- A diagram indicating the as-built inter-connections between components
- Software documentation which also includes the version number of all software, including that supplied by third parties
- Cable run lists and schedules
- All network and equipment details such as IP addresses, user names, and passwords
- Data communication protocols; and
- 'As-Built' drawings for all components installed

MSI shall submit to the Client copies of comprehensive operating and maintenance manuals, and log sheets for all systems and hardware supplied as part of this RFP. These shall be supported with the manufacturer's operating and maintenance manuals. The manuals shall be complete, accurate, up-to-date, and shall contain only that information that pertains to the system installed. Maintenance documents shall include:

- Equipment installation and operating documentation, manuals, and software for all installed equipment
- System Installation and setup guides, with data forms to plan and record options and configuration information
- The schedule/procedures for preventative maintenance, inspection, fault diagnosis, component replacement and on-site warranty support administration on each system component

- Hard copies of manufacturer's product specification sheets, operating specifications, design guides, user's guides for software and hardware, and PDF files on CD-ROM or non-volatile memory stick of the hard-copy submittal
- Complete list of replaceable parts including names of vendors for parts not identified by universal part numbers (such as EIA codes)
- Manufacturer's product specification sheets, operating specifications, design guides, user's guides
- Permits
- Contractor names and telephone number lists for all project trades MSI shall provide Systems Manuals (SM), documentation including:
 - o The configuration and topology of central systems hardware and software
 - o Central systems software functions and operations
 - o Scheduled maintenance required for the central systems; and
 - Database structure and data dictionary

MSI shall also provide following documents for any be-spoke software development:

- Business process guides
- Program flow descriptions
- Data model descriptions
- Sample reports
- Screen formats
- Frequently Asked Questions (FAQ) guides
- User Manuals and technical manuals
- Any other documentation required for usage of implemented solution

Documentation of processes shall be done using standard flow-charting software. An intuitive online learning tool depicting standard operating procedures of system usage are required to be deployed. There shall be a provision of training system in the deployment architecture so as new employees can be inducted easily.

All pages of the documentation shall carry a title, version number, page number and issue date, and shall contain a complete subject index. MSI shall be responsible for fully coordinating and cross referencing all interfaces and areas associated with interconnecting equipment and systems.

Documentation shall require re-issues if any change or modification is made to the equipment proposed to be supplied. MSI may re-issue individual sheets or portions of the documentation that are affected by the change or modification. Each re-issue or revision shall carry the same title as the original, with a change in version number and issue date.

Each volume shall have a binder (stiff cover and spine), and drawings shall be protected by clear plastic to withstand frequent handling. The binding arrangement shall permit the manual to be laid flat when opened. The paper used shall be of good quality and adequate thickness for frequent handling.

2.2.18 Operational System Acceptance

At the completion of operational acceptance test, the system shall be considered for operational system acceptance. At the closure of the work and before issue of final certificate of completion by the Client, the MSI shall furnish a written guarantee indemnifying Client against defective materials and workmanship for a period of one (1) year after completion which is referred to as Defect Liability Period. The MSI shall hold himself fully responsible for reinstallation or replace free of cost to Client during the Defect Liability period. MSI shall provide approved temporary replacement equipment and material such that the system remains fully functional as designed and commissioned during repair or replacement activities at no cost to the Client.

2.2.19 Comprehensive Maintenance for System and Services

MSI shall be responsible for comprehensive maintenance of both hardware and software, required up- gradations in the system, expansion of the system, technical manpower, spares management and replenishment, performance monitoring and enhancements of the Bareilly Smart City solutions deployed as part of this project and shall maintain service levels as defined in the RFP. All equipment and material supplied by the MSI shall be provided with standard warranty against defects of design and manufacturing and against faults and failures associated with workmanship of MSI and its subcontractors commencing from operation acceptance of the system. All equipment found to be defective during comprehensive maintenance shall be repaired or replaced by the MSI at no cost to the Client.

MSI shall provide all the technical, managerial, and other staffing required to manage day to-day maintenance of the Bareilly Smart City solutions during the Contract period. MSI shall deploy project manager stationed at Bareilly who shall be the single point of contact to the client and shall be responsible for operation and maintenance of the system.

All spares required for the smooth operation of the Bareilly smart city solutions shall be maintained by the MSI for the entire duration of the contract to meet SLA requirements. The cost of the spares, repairs, and replacement shall all be deemed to be included in the price quoted by the MSI. MSI shall also institutionalize structures, processes and reports for management of SLA. Root cause analysis and long-term problem solutions shall also be part of MSI scope.

MSI shall maintain all data regarding entitlement for any upgrade, enhancement, refreshes, replacement, bug fixing and maintenance for all project components during Warranty. MSI shall be responsible for updates/upgrades and implementation of new versions for software and operating

systems when released by the respective OEM at no extra cost to the Client during the entire duration of contract. Requisite adjustments / changes in the configuration for implementing different versions of system solution and/or its components shall also be done by MSI. The MSI shall also ensure application of patches to the licensed software covering the appropriate system component software, operating system, databases and other applications. Software License management and control services shall also be conducted by the MSI during this phase. Any changes/upgrades to the software during comprehensive maintenance shall be subjected to comprehensive and integrated testing by MSI to ensure that changes implemented in system meets the specified requirements and doesn't impact any other function of the system. Issue log for errors and bugs identified in the solution and any change done in solution (vis-à-vis the FRS, BRS and SRS signed off) shall be periodically submitted to the Client. MSI shall also be responsible for operating City website, city portal, and city application including all support, content updates and upgrades throughout the duration of contract.

Periodically, IT audits will be conducted by BSCL/ PMC during the support period.

MSI shall ensure OEM support during Comprehensive Maintenance stage for system performance, performance tuning, upgrades etc. MSI shall provide all support for formulation of all policies and procedures related to System Administration, Data Base Management, applications, archives, network management & security, back up and data recovery and archive, data synchronization after crash. Assistance to Client shall be provided as needed in management of legacy data interfaced, print spools, batch jobs, printer configuration etc.

MSI shall prepare a detailed System administration manual, Data administration manual, operational manual, User manual which shall be used by Client's employees to run Bareilly Smart City system's production environment. This shall also include how the various parameters shall be monitored/ tuned in a live system. Preparation of requisite system configuration for disaster recovery management and fail over system plan shall also be under the supervision of MSI. The MSI shall also maintain the following minimum documents with respect to ICT components:

- High level design of system;
- Module level design of system;
- System Requirement Specifications (SRS);
- Any other explanatory notes about system;
- Traceability matrix;
- Compilation environment

MSI shall also ensure Updating of following documentation of software system

• Documentation of source code;

- Documentation of functional specifications;
- Application documentation is updated to reflect on-going maintenance an enhancement including FRS and SRS, in accordance with the defined standards;
- User manuals and training manuals are updated to reflect on-going changes/enhancements;
- Adoption of standard practices in regards to version control and management

The communication costs (Internet charges, telephone charges, 3G/GPRS connectivity charges) and any other incidental charges related to maintenance period shall be in the scope of the MSI and considered to be included in the proposal submitted by the MSI for the entire contract duration. Any planned and emergency changes to any component during maintenance period shall be through a change management process. For any change, MSI shall ensure

- Detailed impact analysis;
- Change plan with roll back plan;
- Appropriate communication on change required has taken place;
- Approvals on change;
- Schedules have been adjusted to minimum impact on production environment;
- All associated documentation is updated post stabilization of the change;
- Version control maintained for software.

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

If the Operating System or additional copies of Operating System are required to be installed/reinstalled/ de- installed, the same should be done as part of the post implementation support.

2.2.20 Support Staff Required

Two (2) types of support staff shall be provided by MSI during Operations and Maintenance phase:

- Maintenance Support Staff
- Helpdesk Support staff

2.2.20.1 Maintenance Support Staff

Well trained, efficient and effective Maintenance Support Staff shall be provided by the MSI during the maintenance phase of the project to support Client's operational and technical requirements in day to day operations of the smart city solutions provided by MSI. Any fault originating for the Bareilly smart city components shall be addressed by the MSI Maintenance Support staff in the least time possible. The staff assigned shall be well qualified to attend to the emergency situations and shall be able to communicate in an effective and efficient manner. The supports staff shall provide 24*7 services, work in a shift-based system and provide full support coverage of the Bareilly Smart City solution and maintain the system as per the SLA's defined.

Maintenance personnel shall be deputed during Maintenance phase in the following shifts:

- Two (2) shifts of Eight hours comprising of 2 personnel each;
- One (1) shift comprising of 1 personnel.

The ICCC Operators shall be well trained on all the smart city components to understand and take necessary action in any kind of situation

2.2.20.2 Helpdesk Support Staff

MSI shall also depute support staff at Helpdesk. The support staff at Helpdesk shall provide 24*7 services, work in a shift-based system and provide full support coverage of Helpdesk and maintain the system as per SLAs defined. At a minimum, 5 support personnel shall be deputed at Helpdesk during maintenance phase in following shifts:

- Two (2) shifts comprising of 2 personnel each;
- One (1) Night shift comprising of 1 personnel each

3 GENERAL REQUIREMENTS

- A. The MSI is required to draft / prepare and then finalize the detailed architecture for the overall ICT systems for the Smart City features, by incorporating findings of site surveys. The Solution so envisaged by the MSI should be able to provide real time Integrated City Operation and Monitoring Center (ICCC). All the components & Sub-Components of the Overall Smart City Solution and the respective Technical Architecture should:
 - i. at least comply with the published e-Governance standards, frameworks, policies and guidelines available on http://egovstandards.gov.in (updated from time-to-time); and
 - ii. be of leading industry standards

While responding to the RFP, the Bidders are to submit the detailed Technical Architecture for all the components along with the detailed description of each of the Smart City ICT Component, their Sub- Components. The Solution should factor in and take into consideration following guiding principles:

- i. Scalability Important technical components of the architecture must support scalability to provide continuous growth to meet the growing demand of the Bareilly City. The system should also support vertical and horizontal scalability so that depending on changing requirements from time to time, the system may be scaled upwards. There must not be any system-imposed restrictions on the upward scalability in number of cameras, data centre equipment or other smart city components. Main technology components requiring scalability are storage, bandwidth, computing performance (IT Infrastructure). The architecture should be scalable (cater to increasing load of internal and external users and their transactions) and capable of delivering high performance till the system is operational. In this context, it is required that the application and deployment architecture should provide for Scale-Up and Scale out on the Application and Web Servers, Database Servers and all other solution components. MSI need to design the solution as per RFP requirement considering the userbase of whole contract duration.
- ii. Availability The architecture components should be redundant and ensure that are no single point of failures in the key solution components. Considering the high sensitivity of the system, design should be in such a way as to be resilient to technology sabotage. To take care of remote failure, the systems need to be configured to mask and recover with minimum outage. The MSI shall make the provision for high availability for all the services of the system. Redundancy has to be considered at the core / data centre components level.

The Core network uptime should be 99.999% while all the major loops/links uptime should not less than 99.99%.

- iii. Security The architecture must adopt an end-to-end security model that protects data and the infrastructure from malicious attacks, theft, natural disasters etc. MSI must make provisions for security of field equipment as well as protection of the software system from hackers and other threats. Using Firewalls and Intrusion Prevention Systems such attacks and theft should be controlled and well supported (and implemented) with the security policy. The virus and worm attacks should be well defended with gateway level Anti-virus system, along with workstation level Anti-virus mechanism Appropriate insurance cover must be provided to all the equipment supplied under this project. All the system(s) implemented for the Bareilly Smart City Project should be highly secure, with adequate security & protection of the sensitive data relating to the Bareilly City and its residents. Few such overarching security considerations are briefly described below; the MSI is expected to submit the most appropriate Security Features for the overall ICT Solution:
 - The Generic architecture of smart city generally consists of four layers a sensing layer, a communication layer, a data layer and an application layer, and these four layers are overseen by the smart city security system. Architecture of information Technology Systems deployed in Smart City need to be open, interoperable and scalable
 - The message exchange between various applications in the smart city should be fully encrypted and authenticated. Any application outside the Data Centre (DC) should talk to the applications hosted in the datacenter through only predefined APIs.
 - Convergence of multiple infrastructures into one Central platform for ease of management in a Smart City is mandatory. Applications hosted in the central Data Centre should support multi-tenancy with adequate authentication and Role based access control mechanism for each tenant pertaining to their respective line department infrastructure
 - The smart city architecture should be capable of managing heterogeneous data, which would be continuously communicated through numerous devices following different protocols. In order to ensure that the flow of data between devices does not run into latency issues, appropriate protocols need to be deployed so as to minimize latency. The following communication protocols could be used for the different layers for data flow;
 - Between applications and back end systems: HTTP, SQL, FTP, SNMP, SOAP, XML, SSH, SMTP
 - Between back end systems and field devices: Message Queue Telemetry Transport (MQTT), xMPP, RESTful HTTP, Constrained Application Protocol (CoAP), SNMP, IPv4/6, BACnet, LoNworks, Low Power Wide Area Network (LoRa), Fixed, 4G/5G, Wi-Fi, WiMax,

2G / 3G From field devices: ZigBee olP, ETSI LTN, IPv4/6,6LowPAN, ModBus, Wi-Fi, 802.15.4, enocean, LoRA, RFID, NFC, Bluetooth, DashT' Fixed, ISM & short-range bands.

- iv. Data Layer (termed as City Digital platform/ fabric) should be capable of communicating with various types of sensors/ devices and their management platforms/applications for single/multiple services irrespective of software and application they support. Data exchange between various sensors and their management applications must strictly happen through this layer, thus making it one true source of data abstraction, normalization, correlation and enable further analysis on the same. Adequate security checks and mechanisms as described in later points to be deployed to protect data layer from data confidentiality breach and unauthorized access.
- v. The entire information Technology (IT) infrastructure deployed as part of Smart city will follow standards like ISO 27001, ISO 22301, ISO 37120, ISO 3712, ISO 27017, ISO 27018, BSI PAS 180,BSI PAS 18'1, BSI PAS'182, for Wi-Fi access PEAP (Protected Extensible Authentication Protocol), 3rd Generation Partnership Project (3GPP), etc. or preferably MSI should engage with TPA at the requirement formulation stage for STQC/Cert-in. Cost of the certification will be borne by MSI.
- vi. Application Program interfaces (APIs) should be published and the IT systems be running on standard protocols like JSON / XML or REST etc.
- vii. From a network security perspective all information that flows on the network should be encrypted to ensure safety and privacy of confidential data. The devices at each endpoint of the network should be authenticated (using mechanisms based on attributes one of which could use passwords). The authentication system so used on these endpoint devices should ensure that only authorized users are sending data over the network, and there is no rogue data that is sent to the control systems to generate false alarms or sabotage the systems
- viii. All sensors deployed as part of IT and IT based systems in the Smart cities should talk only to the identified Bareilly Smart City network, and do not hook on to the rogue networks' the guidelines to secure wi-fi networks as published by Department of Telecom must be followed
- ix. As various sensors use multiple protocols to communicate with the underlying network with varied security capability, the system should allow provisioning necessary authentication and encryption at the gateway or the nearest data aggregation level if the sensor is not able to do the same.
- The Sensors or edge device deployed in Smart city should not have any physical interface for administration. Monitoring of systems and networks should be undertaken remotely.

- xi. All the sensors in the Smart city should connect to an identified network for Bareilly Smart City.
- xii. The Data Centre should be segmented into multiple zones with each zone having a dedicated functionality e.g. all sensors for one operational domain can connect to the Data Centre in one zone, and the internet facing side of the Data Centre should be in another zone
- xiii. The internet facing part of the Data Centre should have a Demilitarized zone where all the customer application servers would be located that are customer facing. Only these servers can access the data from the actual utility application servers on predefined ports
- xiv. The customer application servers should be accessed only by the web server that is hosted in a different zone of the data center.
- xv. The following should be implemented in the Data Centre firewalls, intrusion detection & intrusion prevention systems, Web Application Firewalls, Denial of Service prevention device, Advanced Persistent Threat notification mechanism, Federated identity and access management system, etc.

Web Proxy Solution: Offered solution should be hardened Web Proxy, Caching, Web based Reputation filtering, URL filtering, Antivirus and Anti-malware appliance. All these functionalities should be preferably in a single appliance. Provided operating system should be secured from vulnerabilities and hardened for web proxy and caching functionality.

Email Security Solution: Provided solution should be comprehensive email security solution that integrates against inbound and outbound, Internal defenses against email threat such as spam, virus, etc. Hardware appliance-based solution should provide support for anti-spam, anti-virus, outbreak filter, on appliance detail reporting and on- appliance quarantine handling. Appliance should also provision to run Advance malware protection for future requirements.

NGIPS: Solution should include Next Generation Intrusion Prevention System (NGIPS) to provide Advanced Threat Protection solution with future enhancements and protocols. Solution should be for both passive (i.e., monitoring) and inline (i.e., blocking) modes. Detection should be capable of detecting and preventing a wide variety of threats (e.g., malware, network probes/reconnaissance, VoIP attacks, buffer overflows, P2P attacks, zero-day threats, etc.). Solution should also be able to detect threats, including at a minimum exploit-based signatures, vulnerability-based rules, protocol anomaly detection, and behavioral anomaly detection techniques.

xvi.

All "applications' and "apps" will undergo static and dynamic security testing before deployment and be tested with respect to security on regular basis at least once in a year'

- xvii. All applications and "Apps" deployed as part of Smart city be hosted in India.
- xviii. The said architecture Provide:
 - Automatic and secure updates of software and firmware etc.
 - All systems and devices should provide auditing and logging capabilities'
 - Ensure vendor compliance to remove any backdoors, undocumented and hard cored accounts.
 - End-to End solution should be provided with annual end-to-end service availability of 99.999 percent. The end to end service agreement should be in place for minimum period of five years form the date of operation. Appropriate teams may be set up to monitor cyber incidents and mitigation of same
 - All the information on incidents be shared regularly with Indian Computer Emergency Response Team (CERT-In) and NCIIPC (National Critical Information Infrastructure Protection Centre) and take help to mitigate and recover from the incidents.
 - xx. The solution should provide for maintaining an audit trail of all the transactions and should also ensure the non-repudiation of audit trail without impacting the overall performance of the system
- xxi. The security services used to protect the solution shall include: Identification, Authentication,Access Control, Administration and Audit and support for industry standard protocols
- xxii. The solution shall support advanced user authentication mechanisms including digital certificates and biometric authentication
- xxiii. Security design should provide for a well-designed identity management system, security of physical and digital assets, data and network security, backup, recovery and disaster recovery system
- xxiv. The solution should provide for maintaining an audit trail of all the transactions and should also ensure the non-repudiation of audit trail without impacting the overall performance of the system
- xxv. The overarching requirement is the need to comply with ISO 27001 standards of security

The application design and development should comply with OWASP top 10 principles
Manageability - Ease of configuration, ongoing health monitoring, and failure detection are vital to the goals of scalability, availability, and security and must be able to match the growth of the environment. Network should be auto/manual configurable for various future requirements for the ease of maintenance / debugging.

Interoperability - The system should have capability to take feed from cameras installed by private / Govt. at public places, digitize (if required) & compress (if required) this feed & store as per requirements.

Open Standards - Systems should use open standards and protocols to the extent possible.

Support for Public Key Infrastructure (PKI) based Authentication and Authorization- The solution shall support PKI based Authentication and Authorization, in accordance with IT Act 2000, using the Digital Certificates issued by the Certifying Authorities (CA). In particular, 3 factor authentications (login id & password, biometric and digital signature) shall be implemented by the MSI for officials/employees involved in processing citizen services.

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

- at least comply with the published e-Governance standards, frameworks, policies and guidelines available on http://egovstandards.gov.in (updated from time-to-time); and
- be of leading industry standards

All the personnel working on the Project and having access to the Servers / Data Centre should be on direct payroll or possess valid authorization letter of the MSI/OEM/Consortium Partner. The MSI would not be allowed to sub-contract work, except for the following activities:

 Any Passive Networking or Site Preparation/Civil/Electrical work(s) during implementation and O & M period

• Viewing Manpower at the ICCC / viewing centers & Mobile Vans during post-implementation However, even if the work is sub-contracted, the sole responsibility of the timely completion of the work & the quality of the work done shall lie with the MSI. The MSI shall be held responsible for any delay/error/non-compliance/penalties/negligence etc. of its sub-contracted vendor. The details of the sub- contracting agreements (if any) between both the parties would be required to be submitted to the BSCL and approved by the Competent Authority before any such resource mobilization.

GIS Integration- MSI shall undertake a detailed assessment for an integration of all the Smart City ICT components with the Geographical Information System (GIS). MSI is required to carry out the seamless integration to ensure ease of use of GIS in the Dashboards in Command and Control

Centre (ICCC). If this may require any field surveys, it needs to be carried out by the MSI. Any such data readily available with the BSCL, shall be shared with MSI. However, the MSI is to check the availability of such data and its suitability for achieving the project outcomes. MSI is required to update GIS maps from time to time.

SMS Gateway Integration- MSI shall carry out SMS Gateway Integration with the Smart Bareilly City System and develop necessary applications to send mass SMS to groups/individuals, wherever required. Any external/third party SMS gateway can be used, but this needs to be specified in the Technical Bid proposal, and approved during Bid evaluation. Also, wherever feasible, it is envisaged that the MSI proposes to leverage the existing State Solutions, such as NIC Gateways for this purpose. MSI shall understand the scope and solution requirement include the SMS Gateway with 1 Lac SMS / PM.

Application Architecture- The Applications designed and developed for the Departments concerned must follow the Industry Best Practice(s) and Industry Standard(s). In order to achieve the high level of stability and robustness of the application, the System Development Life Cycle (SLDC) must be carried out using the industry standard best practices and adopting the security constraints for access and control rights. The various modules / application should have a common Exception Manager to handle any kind of exception arising due to internal/ external factors.

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

- B. MSI shall design and develop the Smart Bareilly City System as per the study and would be done by the MSI and as per the scope defined in the RFP
 - i. The Modules specified will be developed afresh based on approved requirement
 - Apart from this, if some services are already developed/under development phase by the specific department, such services will be integrated with the Smart Bareilly City System.
 These services will be processed through department specific Application in backend
 - iii. The user of citizen services should be given a choice to interact with the system in local language (Hindi) in addition to English. The application should pave the provision for uniform user experience across the multi lingual functionality covering following aspects:
 - Front end Web Portal in English and local language
 - E-forms (Labels & Data entry in local languages). Data entry should be provided preferably using the Enhanced In script standard (based on Unicode version 6.0 or later) keyboard layout with option for floating keyboard

- Storage of entered data in local language using UNICODE (version 6.0 or later) encoding standard
- Retrieval & display in local language across all user interfaces, forms and reports with all browsers compliant with Unicode version 6.0 and above
- Facility for bilingual printing (English and the local language)
- The application(s) should comply with World Wide Web Consortium (W3C) Web Content Accessibility Guidelines (WCAG) 2.0 Level AA/Other time to time issued Govt. of India/Govt. of Uttar Pradesh guidelines for making web content accessible to differently-abled person.
- v. Application should have a generic workflow engine for citizen centric services. This generic workflow engine will allow easy creation of workflow for new services. At the minimum, the workflow engine should have the following features:
 - Feature to use the master data for auto-populating the forms and dropdowns
 - Creation of application form, by "drag & drop" feature using Meta Data Standards
 - Defining the workflow for the approval of the form
 - First in First out
 - o Defining a Citizen Charter/Delivery of service in a time bound manner
 - Creation of the "output" of the service, i.e. Certificate, Order etc.
 - Automatic reports
 - o of compliance to citizen charter on delivery of services
 - o delay reports
- vi. The application should have a module for Management of Digital Signature including issuance, renewal and suspension of Digital Signatures based on the administrative decisions taken by the Govt. of India / Govt. of Uttar Pradesh. MSI shall ensure using Digital signatures/e-authentication to authenticate approvals of service requests, etc.
- vii. e-Transactions & SLA Monitoring Tools and maintenance of the links
 - The MSI should be able to measure and monitor the performance of the deployed infrastructure and all SLAs set out in this RFP. More importantly, it should be possible to monitor in REALTIME, the number of citizens touched through e- Services each day, month and year, through appropriate tools and MIS reports.
 - The Infrastructure Management and Monitoring System shall be used by MSI to monitor the infrastructure (Both IT and Non-IT) hosted at the Data Centre and DR site.
 - For monitoring of uptime and performance of IT and non-IT infrastructure deployed, the MSI shall have to provision for monitoring and measurement tools, licenses, etc. required for this purpose.

C. Other Key Expectations from the MSI

- MSI shall engage early in pro-active consultations with all the Competent Authority, Bareilly City Police and all other key stakeholders to establish a clear and comprehensive project plan, which is in line with the priorities of all project stakeholders and the project objectives.
- MSI will coordinate with the Network Service Provider, shall study the existing fiber layout and existing network in the Bareilly City to understand the existing technology adopted in each of the following areas (not limited to):
 - Surveillance Infrastructure CCTV Cameras, Data Communication, Monitoring, Control Room and Infrastructure
 - Any other Smart City initiatives envisaged for Bareilly
 - MSI shall assess existing infrastructure's current ability to support the entire solution and integrate the same with the proposed solution wherever applicable and possible
 - MSI shall judiciously evaluate the resources and time planned for undertaking the current state assessment, given the overall timelines and milestones of the project.
 - Validate / Assess the re-use of the existing infrastructure if any with Competent Authority site.
 - o Supply, Installation, and Commissioning of entire solution at all the locations
 - MSI shall plan the bandwidth required for operationalizing each Smart Bareilly City initiative as part of the scope of work of this RFP. The bandwidth requirement shall be analyzed and procured by the MSI at its own cost / risk.
 - Network Latency should not be less than 15ms.
 - MSI shall Install and commission connectivity across all designated location
 - MSI shall establish high availability, reliability and redundancy of the network elements to meet the Service Level requirements
 - MSI shall be responsible for planning and design of the access network architecture (access controllers, backhaul connectivity, routers, switches, etc.) to meet the technical, capacity and service requirements for all smart Bareilly City initiatives
 - MSI shall be responsible for upgradation, enhancement and provisioning additional supplies of network (including active / passive components), hardware, software, etc. as requisitioned by Competent Authority
 - MSI shall ensure that the infrastructure provided under the project shall not have an end of life during the entire contract period.
 - MSI shall ensure that the end of support is not reached during the concurrency of the contract and 5 years thereafter

- MSI shall ensure compliance to all mandatory government regulations as amended from time to time
- The MSI shall ensure that all the peripherals, accessories, sub-components required for the functionality and completeness of the solution, including but not limited to devices, equipment, accessories, patch cords (fiber), cables, software, licenses, tools, etc. are provided according to the requirements of the solution
- Competent Authority shall not be responsible if the MSI has not provisioned some components, sub-components, assemblies, sub-assemblies as part of Bill of Materials in the RFP. The MSI shall have to provision these & other similar things to meet the solution requirements at no additional cost and time implications to Competent Authority
- All the software licenses that the MSI proposes shall be perpetual software licenses along with maintenance, upgrades and updates for the currency of the contract. The software licenses shall not be restricted based on location and Competent Authority shall have the flexibility to use the software licenses for other requirements if required. The bidder shall not propose any open source freeware software/ community edition as a part of the solution, and that if any Open Source product is proposed, the same shall be the Enterprise Edition Open Source product supported by a reputable OEM having Support Centre in India. MSI shall ensure Software OEM, including the Enterprise Open Source Software OEM shall have defined product life cycle and update policies for the all the supplied products. MSI shall ensure continuous availability of security patches, updates and upgrades has to be ensured from OS OEM for the entire duration of the contract.
- The MSI shall ensure there is a 24x7 comprehensive onsite support for duration of the contract for respective components to meet SLA requirement. The MSI shall ensure that all the OEMs have an understanding of the service levels required by Competent Authority. MSI is required to provide the necessary MAF (Manufacturer Authorization Form) as per the format provided in the RFP in support of OEMs active support in the project. MSI shall ensure 24x7 supports is required with no limitation of no of cases/ incidents.
- Considering the criticality of the infrastructure, MSI is expected to design the solution considering the RFP requirement of no single point of failure with high level of redundancy and resilience to meet the system uptime requirements

- MSI shall be responsible for periodic updates & upgrades of all equipment, cabling and connectivity provided at all locations during the contract period
- MSI shall be responsible for setting up / building / renovating the necessary physical infrastructure including provisioning for network, power, rack, etc. at all the locations
- MSI is expected to provide following services, including but not limited to:
 - i. Provisioning hardware and network components of the solution, in line with the proposed Competent Authority's requirements
 - ii. Size and propose for network devices (like Router, switches, security equipment including firewalls, IPS / IDS, WAF, WSA etc. as per the location requirements with the required components/modules, considering redundancy and load balancing in line with RFP
 - iii. Size and provision the WAN bandwidth requirements across all locations considering the application performance, data transfer, DR and other requirements for smart Bareilly City initiatives
 - Size and provision the internet connectivity for Service Provider network and Network Backbone
 - v. Size and provision for bandwidth as a service for operations of Bareilly City Kiosk, CCTV surveillance till operationalization of network backbone
 - vi. Liaise with service providers for commissioning and maintenance of the links
- vii. Furnish a schedule of delivery of all IT/Non-IT Infrastructure items
- viii. All equipment proposed as part of this RFP shall be rack mountable
- ix. Competent Authority may at its sole discretion evaluate the hardware sizing document proposed by the MSI. The. MSI needs to provide necessary explanation for sizing to the Competent Authority
- x. Complete hardware sizing for the complete scope with provision for upgrade
- xi. Specifying the number and configuration of the racks (size, power, etc.) that shall be required at all the locations.
- xii. The MSI shall provide for all required features like support for multiple routing protocols, congestion management mechanisms and Quality of Service support
- xiii. The MSI shall ensure that all active equipment (components) are Simple Network Management Protocol (SNMP) V3 compliant and are available for maintenance/management through SNMP from the date of installation by a Network Monitoring System

4 Integrated Command and Control Centre (ICCC)

The ICCC shall be created at Nagar Nigam Building, Bareilly (U.P). The ICCC shall provide a comprehensive system for planning, optimizing resources and response pertaining to the standard functions of the concerned authorities. With a view of enabling varied and respective stakeholders to operate specified Smart City Components, it is proposed to build an ICCC Center, which will cater to the City operations, City Surveillance and Helpdesk in an integrated manner.

With respect to the City Surveillance aspect, there shall be a viewing and controlling mechanism for the selected field locations in a fully automated environment for optimized monitoring, regulation and enforcement of services. The ICCC shall be accessible by the operators and concerned authorized entities with necessary authentication credentials. The ICCC shall be used and manned by the designated officials/personnel/staff authorized by the respective Depts. Such as the City Police, Traffic Police and Municipal Corporation, etc. to keep surveillance on civil issues and monitor all civic, PAN City operations.

Competent Authority shall review and carry out a detailed assessment of the proposed design solution and review design for the ICCC and its Data Centre (DC) on the parameters of overall Design, Safety & Security and reserves the right to accept, reject or suggest for modifications on the proposed solution. The video feed from the surveillance cameras shall be received at the ICCC, where a video wall shall be installed for viewing relevant feed from the surveillance cameras. The operator on each of the workstation shall be able to work on multiple monitors at the same time, for which there is requirement of multi screens with one computer (specifically two) to be installed on work desks (appropriate furniture) with appropriate multi monitor mounts.

In the Bareilly City, various Government agencies provide multiple services to the citizens. With increasing Urbanization, operational challenges are increasing, which in turn affect the quality of services offered to the citizens. These agencies, which often function in silos can provide a wealth of information, which can be utilized for efficient service delivery across the City and facilitate in making decisions anticipating the probable problems and by ensuring cross-agency responsive actions to the issues with faster turnaround time.

The 'Data Center' (DC) infrastructure catering to all the Components & features of the Bareilly Smart City – ICT Solutions, will be co-housed in the ICCC building itself, for which the BSCL will provide the MSI with requisite space and electric power depending on the requirement as per the proposed solution of MSI(Nagar Nigam Building, Bareilly(U.P)has been identified tentatively as a proposed site for ICCC). The MSI shall be required to undertake a detailed assessment of the requirements at the ICCC and commission all the necessary ICT and non-ICT infrastructure and also carry out the civil/ electrical work as required. The Data and Surveillance Network can/may share the same physical infrastructure with guaranteed bandwidth for each individual segment. The software components shall provide for a comfortable monitoring experience, easy extraction of clips, and management of storage.

The Bareilly Smart city solution's platform shall support & have the ability for adding more/new layers of solutions seamlessly with minimal effort as and when required, as and when intended by the Competent Authority intends to develop in time to come such as Water Management, Smart Health, Smart Education & Disaster Management.

The proposed information will be shareable on intra Bareilly City and inter cities levels based on approved rights on mutual consent.

The ICCC will have provisions for monitoring and control of all the Smart City Components. However, the Competent Authority intends to provision for Bareilly City surveillance monitoring cum viewing for critical field cameras and other security equipment as per the Bareilly City's requirement. The inputs/feeds from the different components of Smart Bareilly City Solutions shall be received at ICCC Center video wall for monitoring, tracking and decision support purpose on real time basis supported with GIS technology. Further, operators shall be working on their respective monitors for assessing the inputs and triggering actions at ground level.

4.1 Types of Operations:

4.1.1 Normal Operation

Normal operation is when the services function as per pre-planned operation schedule or methodology. Under normal operating conditions various members of Operations team shall coordinate their activities and exchange information through voice and data communications systems about the equipment / facilities under their supervision to facilitate a safe and secure arrangement throughout the entire Bareilly City. Under the normal condition, the operations team shall continuously supervise the main assets and identify any fault, anywhere in system promptly. Operation team shall isolate faulty element and operate the system in a manner to arrange alternatives wherever appropriate alternative is possible (element redundancy, rerouting of services, alternate feeding path etc.). Faulty elements are further referred to appropriate team for respective corrective action. The ICCC Framework shall enable faster isolation of faulty elements & identification & implementation of inbuilt alternatives in system.

4.1.2 Emergency Operation

In a Smart City, the emergency situations, need to be averted beforehand. Emergency operations are enforced in case of an unforeseen or abnormal situation, when it's not possible to carry on the services. An emergency or disaster is a sudden or great calamity leading to deep distress affecting men and machinery. Many of the accidents / incidents like an act of vandalism, terrorist attack, an accidental fire, critical system failure, force majeure, etc. may lead to crisis / disaster. In cases of

disasters, the main objective is to disperse the affected persons, as early as possible, from the affected site of occurrence and avoid loss of life and properties. Management of such situation requires sharing of clear and accurate information and necessary actions shall be initiated without any delay to ensure the restoration of normalcy.

- This requires seamless & timely sharing of information amongst multi-disciplines (viz. Traffic, Parking, Helplines, & Signal etc.) involved in Operations and
- Necessitates that appropriate actions are initiated without any delay and the situation is tackled in the most appropriate and efficient manner, so that distress is relieved expeditiously.

Thus, for effective management of such scenarios, it is preferable to have visibility and ability to manage critical disciplines at one place. The ICCC framework shall support Automation of Disaster Management Procedure. The CCTV Cameras throughout the Bareilly City and analytical tools would perform the emergency operations ONLY during this situation.

4.2 Site preparation for ICCC (with Helpdesk) including Data Centre

The detailed design in all aspects for the design-build (including but not limited to civil, mechanical, structural, electrical, communications, fire, fit-outs, furniture, etc. of the ICCC shall be the responsibility of the MSI and be approved by the Client or its representative. All interior works of ICCC shall be modular in nature allowing expansions. The MSI may have the required personnel on the team including architect, structural engineer, MEP (Mechanical, Electrical, Plumbing) etc. if needed for this design-build. At least two (2) options for the design-build shall be proposed for the ICCC. Interior layouts and material to be procured for the ICCC shall be approved by the Client or its representative. Preparation includes Command and Control Centre (ICCC) with help desk& Data centre. Maintenance of all the infrastructure (Whole Project) will be part of Operations & Maintenance till end of contract. BSCL shall provide the space in building for ICCC, DC, help desk, Conference, Staff offices for smart city, Power Room, Panty etc, as illustrated in diagram. MSI shall be responsible for all work mentioned in section and subsection.

The following is an illustrative diagram of ICCC Site Plan. MSI may suggest better design and get the approval from BSCL.



The following is an illustrative diagram of ICCC Ground Floor. MSI may suggest better design and get the approval from BSCL.



The following is an illustrative diagram of ICCC First Floor. MSI may suggest better design and get the approval from BSCL.



4.2.1 Norms

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

- 1. The proposed interior material should meet to basic control room norms, including but not limited to:
 - ASTM E84 or equivalent fire norms.
 - High scratch resistant surfaces or equivalent.
 - Green Guard certified Desks for ensuring safe environment for operators or equivalent.
 - Bareilly seismic zone (Zone 4) compliance or equivalent.

The MSI shall be responsible for complete site preparation, installation and commissioning for Integrated Command and Control Centre (ICCC) with help desk & Data Centre as per the requirement in consultation with the Competent Authority.

4.2.2 Civil and Architectural work

The scope for civil work in this RFP is to furnish the Integrated Command and Control Centre (ICCC), Data center, in all aspects. The furnishing includes but not limited to the following:

- I. Cutting and chipping of existing floors
- II. Trench works
- III. Masonry works
- IV. Hardware and metals
- V. Glazing
- VI. Paint work
- VII. False flooring
- VIII. False ceiling
- IX. Storage
- X. Portioning
- XI. Doors and locks
- XII. Painting
- XIII. Fire proofing all surfaces
- XIV. Cement concrete works
- XV. Insulation
- XVI. Furniture
- XVII. Ergonomic Officer Furniture and Fixture with Chairs
- XVIII. Conference Table with Chairs

All material to be used shall be of fine quality ISI marked unless otherwise specified. MSI is responsible for quality of the civil infrastructure and should take care there is no water leakage in the work.

4.2.3 False Ceiling

The MSI shall install the top false ceiling with 1' 6" of space from the actual room ceiling. This false ceiling shall house A/C ducts (if required) and cables of electrical lighting, firefighting, and CCTV. Appropriate pest control measures shall be taken to keep pests at bay.

4.2.4 Raised flooring

The MSI shall be responsible for raised flooring and provide for suitable pedestal and under structure designed to withstand various static and rolling loads subjected to it in server racks. The entire raised floor shall have laminated floor covering and beadings on all sides of the panel.

4.2.5 Electrical Distribution System

The MSI shall be responsible for proper and uninterrupted working and shall ensure this by having the power distribution system with redundancy:

- 1. Incoming HT feeder supply from sub-stations. MSI shall directly interact with electricity board for provision of mains power supply for ICCC Building. MSI shall be responsible to submit the electricity bill including connection charge, meter charge, recurring charges etc. to the electricity board directly. MSI shall have to submit the challan of bill submission to BSCL. BSCL will reimburse the amount submitted to MSI after verification. MSI has to calculate the electrical load for ICCC & DC, considering 40% more load for future expansion
- 2. All the external and internal electrical cabling, Electrical panels, feeders etc are in MSI Scope
- 3. Provision of Transformers & Electrical Panels
- 4. Emergency Diesel- Generator backup on failure of main feeders.
- 5. UPS system with battery bank for critical loads.
- 6. Connection between UPS system and the network switch racks shall be redundant. No single point of failure shall exist in the power connectivity between network racks and UPS system.

4.2.6 Electrical work

The electrical cabling work shall include but not limited to the following:

- i. Main electrical panels
- ii. Power cabling
- iii. UPS distribution board
- iv. UPS point wiring
- v. Power cabling for utility component and utility points etc.
- vi. Online UPS
- vii. Separate Earth pits for the component

- viii. The MSI shall use fire retardant cables of rated capacity exceeding the power requirements of existing and proposed components to be used at maximum capacity.
- ix. All materials to conform to IS standards as per industry practice

4.2.7 Lighting Works

MSI shall be responsible for the lighting works in the facility. Following items need to be undertaken by MSI for lighting:

- i. Supply of all equipment associated with implementation of lighting including fixtures, lamps, wiring etc.
- ii. Wiring for lighting system in the building
- iii. Installation of lighting fixtures
- iv. Warranty for the lighting equipment
- v. Critical lights shall be connected to UPS for uninterrupted lighting
- vi. Post the installation, MSI shall ensure that lux levels of the building are as per IES-HB-10-11 and requirements of this RFP.

4.2.8 UPS requirements and features

UPS system shall provide a redundant power supply to the following needs:

- i. Servers, important network, storage equipment and another critical ICCC & DC equipment.
- ii. Access control, Fire Detection & suppression system and surveillance system

The system shall be automatic with power supply from the mains and automatic switchover to DG set as secondary source.

4.2.9 Diesel Generator Set

MSI has to specify the technical specifications based on the requirement over minimum specification mentioned in document. The MSI shall be responsible for regular operations and maintenance of the DG set. The MSI shall be responsible for but not limited to:

- i. Fuel
- ii. Preventive maintenance
- iii. Corrective maintenance
- iv. AMC, if any
- v. Replacement of any parts etc.

4.2.10 Fire Detection and Suppression System

The facility shall be equipped with adequate and advanced Fire Detection and Suppression system. The system shall raise an alarm in the event of smoke detection. The system shall have proper signage, response indicators and hooters in case of an emergency. The system shall be based as per NFPA

standards. The facility is to be equipped with gas based (Suitable for Data Centre environments) fire suppression system appropriately sized for the given size of the Data Centre and ICCC.

4.2.11 Building Management System

Building Management System shall be implemented for effective monitoring, management, control and integration of various building systems such as HVAC, lighting, electrical, fire detection and suppression system, CCTV system, Access Control System etc. over a single platform. BMS shall perform various functions such as data collection and archival, alarm and event management, trending, reports and MIS generation, preventive maintenance etc.

Design-Build of the BMS shall be under the scope of MSI. IO summary and other BMS related provisions shall fall under the scope of the MSI.

4.2.12 Access Control System

The Biometric/Access card-based Access Control System shall be deployed with the objective of allowing entry and exit to and from the premises to authorized personnel only with appropriate door locks and controller assemble connected with BMS system. The system deployed shall be based on proximity as well as biometric technology for critical areas and proximity technology for non-critical areas.

4.2.13 CCTV system

The MSI shall provide CCTV system within the Data Centre and ICCC on 24X7 basis. All important areas of the Data center, ICCC along with the non-critical areas like locations for DG sets, entry exit of Integrated City Operation and Monitoring Centre (ICCC), Entry and Exit of building premises need to be under constant video surveillance. Monitoring cameras shall be installed strategically to cover all the critical areas of all the respective locations.

4.2.14 Water leak detection system

The Water Leak Detection System shall be installed to detect any seepage of water into the critical area and alert the security control room for such leakage. It shall consist of water leak detection cable and alarm module. The cable shall be installed in the ceiling and floor areas around the periphery.

4.2.15 Rodent Repellent

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

4.2.16 Furniture and Fixture

Complete Furniture and Fixture including cutting holes & fixing of cable manager etc. complete with polish. The desk shall have the necessary drawers, keyboard trays, cabinets etc. along with sliding / opening as per approved design with quality drawer slides, hinges, locks etc. All workstations, cabins should be as per industry best practices and standards.

4.2.17 Ceiling Speakers for Control Centre and Conference Room

- The ceiling speakers shall have high power and high sensitivity with extended frequency responses
- The ceiling speakers shall have wide, controlled constant directivity dispersions for optimum coverage
- The ceiling speakers shall have output of at least 15W peak. They shall have in-built amplifiers or shall be supported by an external amplifier.
- MSI shall quantify and space speakers to provide full audio coverage within the command centre room and conference room
- System shall be with all the required accessories.

4.3 KPI's of ICCC:

- Command and Control Centre involves leveraging on the information provided by various departments and providing a comprehensive response mechanism for the day-to-day challenges across the city. ICCC shall be a fully integrated, web-based or Client Server based solution that provides seamless incident – response management, collaboration and geo-spatial display.
- ICCC shall facilitate the viewing and controlling mechanism for the selected field locations in a fully automated environment for optimized monitoring, regulation and enforcement of services. The smart city operations center shall be accessible by operators and concerned authorized entities with necessary authentication credentials.
- 3. Various smart elements are able to use the data and intelligence gathered from operations of other elements so that civic services are delivered lot more efficiently and in an informed fashion.
- 4. ICCC will provide 24*7 City Surveillance System for effective management of the city.
- 5. ICCC shall leverage state of the art technology to effectively manage Road Traffic and
- ICCC should be able to integrate with various Utility systems such as Water/SCADA, Power, Gas, ITMS, Sewerage/ Drainage system, Disaster Mgmt. System etc.

4.4 Functional Specifications for ICCC & its Application:

Proposed components/requirements of Command and Control Centre for Bareilly city:

i. Integrated Command and Control Application.

- ii. Integrated with ITMS, City Surveillance, SWM, Smart Parking, etc.
 - a. As mentioned in the RFP GIS integration to be performed with ICCC
 - b. ICCC platform shall also be open for any GIS integration
 - c. BSCL will facilitate the integration activity between MSI & prospect GIS vendor. MSI shall not charge any additional cost for these integrations
- iii. Video Wall & Controller System.
- iv. Operator Workstation and Accessories.
- v. Alerting System.
- vi. Integration with Third Party Shared Services.
- vii. Helpdesk Service
- viii. Necessary Civil, Electrical work including furniture, including Air-conditioning for Data Centre, and Command & Control Centre.



Figure: Illustrative Logical Representation of Integrated City Operation & Monitoring Centre

4.5 Functional Requirement & Technical Requirement

4.5.1 Command and Control Centre System

The SI has to provide, deploy and configure an integrated operations and dashboard application that integrated various Smart City use cases on this platform.

Proposed Solution architecture should have combination of data normalization IOT Software for cities and City operation center software with below capabilities;

-	
T	

Functional Parameters Description

Make	:		
Mode	l:		
		The platform shall be able to normalize the data coming from	
		different devices of same type (i.e. Different lighting sensor	
1.		from different OEMs, different energy meters from different	
	Data Normalization	OEMs etc.) and provide secure access to that data using data	
	capabilities	API(s) to application developers.	
		The platform shall support distributed deployment of functions	
2.		(workflows & policies) across city's network and compute	
		infrastructure with centralized management and control.	
		System shall support for GIS tool which allows easy map editing	
3.	GIS Map Support	for wide area monitoring (Google map, Bing map, ESRI Arc GIS	
		map, etc.).	
А		Platform must provide various visual widgets like Maps,	
	Platform Visualization	Graphs, KPI, Tables, Scorecards, etc.	
5		Platform must provide end-users an ability to create	
5.		dashboards and configure various widgets	
		a. Map services and geospatial coordinates: provides the	
6.		geographical coordinates of specific facilities, roads, and	
	Location engine	city infrastructure assets, as well as unmapped facilities.	
7.		b. Geospatial calculation: calculates distance between two,	
7.		or more, locations on the map.	
8		a. Aggregation and abstraction of sensors: provides	
9.		aggregation of sensors from diverse sensor cloud.	
	Device engine	b. Normalization of sensor data: organizes sensor data and	
		assigns attributes based on relations; raw data removed	
		and passed to data engine.	
10		a. Data archive and logging: stores data feeds from the	
Data and	Data and Analytics	device engine and external data sources.	
11 engine	engine	b. Analytics: provides time-shifted or offline analytics on the	
	_	archived data.	
12]	c. Reporting: delivers reports based on events triggered by	
12.		device engine data and external notifications.	

#	Functional Parameters	Description
		Sensor platform OEM shall provide Developer Program tools
10	Developer Program	that will help City to produce new applications, and/or use
15.	tools	solution APIs to enhance or manage existing solution free of
		cost.
1.4	Authentication,	System shall support standard Authentication, Authorization
14.	Authorization	Performs.
15	Data plan	Live data and visual feed from diverse sensors connected to the
15.	Functionalities	platform.
		Normalized APIs shall be available for the listed domains
		(Parking, Outdoor Lighting, Traffic, Environment, Urban
10		mobility etc.) to monitor, control sensor and/or actuators
10.		functionality to enable app developers to develop apps on the
	ADI Demositerre (ADI	platform. For example, Lighting APIs: Vendor agnostic APIs to
	API Repository / API	control Lighting functionality.
	Guide	The OEM should have capability to Integrate all smart element
		mentioned in the current RFP scope of work as well as any
17.		future smart elements to be integrated with ICCC with Open
		source Middleware or develop the connectors/API required by
		BSCL without any additional cost for contract period.
		API management and gateway: Provides secure open source
10		APIs lifecycle and monitoring mechanism on demand of BSCL
18.		for all existing and customized API's for ISV's/developers with
		in the contract duration of 5 years without any additional cost.
	Platform functionality	User and subscription management: Provides different tier of
19.	& Users and roles	user categorization, authentication, authorization, and services
		based on the subscriptions.
20.	Application management: Provides role-based access view to	
		applications.
21	The platform shall also be able to bring in other e-governance	
21.		data as i-frames in the command and control centre dashboard.
22.		All of these data shall be rendered / visualized on the command
		and control centre dashboard.

#	Functional Parameters	Description
		This platform is expected to integrate various urban services
22		devices at the street layer so that urban services applications
23.		can be developed on top of this platform independent of the
		technology that is used in the devices.
		Integrate devices using their APIs in to this platform. For
		example, if the City wants to deploy Smart Parking solution, this
		platform shall have the ability and provision to write adapters
24.		which interface with the parking sensors or management
		software of the parking sensors to collect parking events, data
	Integration capabilities	and alerts and notifications from the devices and their software
		managers.
		Enables City and/or its partners to write software adaptors
25		based on the API(s) provided by device vendors and have the
25.		ability to control, monitor and collect the data from these
		street devices.
		Provides urban services API(s) to develop Operations
		applications for each of the Urban Services domains. For
		example, the lighting operator of the City shall be able to
20		develop a City Lighting management application based on the
20.		API(s) provided by the platform. This lighting application shall
		also have the ability to access data from other domains like
		environment based on the access control configured in the
		system.
27		The bidder Platform must provide or develop open API to
27.		developer/ISVs
28. F 29.		System shall allow policy creation to set of rules that control
		the behavior of infrastructure items. Each policy shall a set of
	Policies and Events	conditions that activate the behavior it provides.
		System shall allow Default, Time-based, Event-based and
		Manual override polices creation. For example, an operator
		might enforce a "no parking zone" policy manually to facilitate
		road repairs.

#	Functional Parameters	Description
30.		System shall generate Notification, Alert and Alarm messages
		that shall be visible within the Dashboard/GIS Platform and the
	Notifications Alerts	Enforcement Officer Mobile App if required.
-	and Alarms	All system messages (notifications, alerts and alarms) shall
31		always visible from the Notifications view, which provides
31.		controls that operator can use to sort and filter the messages
		that it displays.
22		The access to data shall be highly secure and efficient. Access
52.		to the platform API(s) shall be secured using API keys.
	Data Security	Software shall support security standards: OAuth 2.0, HTTPS
33.		over SSL or equivalent security standards help protect the data
		across all domains.
		OEM for ICCC Software should have deployed in at least 4 Smart
		Cities either in India or Globally. In addition, ICCC Software
34.		should have at least one deployed /ongoing deployment in
	Presence & Support System	India.
		*Smart Cities means any city wide deployment of ICCC Software
25		ICCC OEM shall have registered office in India at least from last
55.		03 Years at the date of the Submission of the tender.
		Command & Control Centre shall provide for authoring and
26		invoking un-limited number of configurable and customizable
50.		standard operating procedures through graphical, easy to use
	Evente 9 Standard	tooling interface.
	Operating Procedures	Standard Operating Procedures shall be established, approved
37. Operating Procedures	Operating Procedures	sets of actions considered to be the best practices for
		responding to a situation or carrying out an Operations.
	The users shall be able to create SOP the SOP, including adding,	
38.		editing, or deleting the activities.
39.		The users shall be able to also add comments to or stop the SOP
		(prior to completion).
40.		There shall 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.

#	Functional Parameters	Description
11		Workflow must support both automated and manual activities
71 .	41.	(tasks) and each of the activity should be configurable
		a. Integrates with existing/proposed Video Management
42		Systems. Shall support multiple video sources from
42.	Video Display and	multiple locations. Platform shall have no limitation in
	integration canabilities	displaying the number of CCTV video sources.
		b. Integrate and assess inputs from different sources such as
43.		CCTV, Video Analytics, and sensors further to assist with
		actionable intelligence.
		ICCC OEM shall have 24x7x365 technical assistance support
11	Technical support	center (TASC) in India. TASC shall provide online website and
44.	center	phone number to register service request, service request can
		be raising by partner and customer.
		a. The solution shall be implemented and compliant to
45.		industry open standard commercial-off-the-shelf (COTS)
		applications that are customizable.
		b. The solution shall integrate with GIS and map information
46.		and be able to dynamically update information on the GIS
		maps to show status of resources.
47	47. CCC Operations	c. The solution shall also provide an integrated user interface
-7.		for all the smart elements implemented.
		d. The solution shall provide operators and managers with a
		management dashboard that provides a real time status
48.		and is automatically updated when certain actions,
		incidents and resources have been assigned, pending,
		acknowledged, dispatched, implemented, and completed.
		The above attributes shall be color coded.
		e. The solution shall provide the "day to day Operations",
49.		"Common Operating Picture" and situational awareness
		to the centre and participating agencies during these
		modes of Operations.
50		f. It shall provide complete view of sensors, facilities, e-
50.	governance/ERP, video streams (live and recorded) and	

#	Functional Parameters	Description
		alarms in an easy-to-use and intuitive GIS-enabled
		graphical thick client application interface with a powerful
		workflow and business logic engine.
		1. ICCC application MUST have inbuilt Video Interface Drivers
		to play live and recorded video feeds from multiple video
		management systems. Within ICCC application interface.
		2. ICCC Software licenses must not be based on count of edge
		devices such as cameras, sensors, zones etc. It must
		support unlimited number of edge devices as long as they
51.	51.	are integrated. This is to prove that the ICCC is scalable for
		future expansion without being dependent on additional
		cost / license per edge device.
		The number of ICCC user licenses should be considered as
		minimum 20 User internal and 30 User external.
		ICCC OEM should be agnostic to any third-party system and is
		not biased towards its own company products.
52.		a. The access to data shall be highly secure and efficient.
53		b. Access to the platform API(s) shall be secured using API
55.		keys.
		c. Software shall support security standards: OAuth 2.0,
54.	ΔPI & Interface	HTTPS over SSL, and key management help protect the
	Security	data across all domains.
	Security	d. Shall support security features built for many of its
55.		components by using HTTPS, TLS for all its public facing
		API implementations. For deployment where CCC
		Software API(s) exposed to application eco system, API
		Management, API security features and API Key
		management functions are required.
EC		e. The platform should be based on open API for various
50.		data & IOT providers to integrate with platform
E7		f. The platform should be providing an ability to restrict
57.		access to certain API
#	Functional Parameters	Description
-----	-----------------------	--
		The platform should have capability to integrate with Dispatch
58.	Dispatch System	system through middleware or open API without any additional
		cost.
		a. Real time dashboard should provide the real-time
		information and situational Awareness for the Authorities
		and senior officials in a single go.
59.	Real Time Dashboard	b. Analysts / Operators shall be allowed to view dashboards if
		they are granted the appropriate privilege. Modification to
		the dashboards should also be allowed to users granted the
		appropriate privilege.
		a. The ICCC shall receive all incoming events from one or more
		Unified Systems. The ICCC shall take the appropriate
		actions based on user-define event/action relationships.
60	Incident Management	b. The operator shall be able to create standalone incident
00.	& Reporting	reports or incident reports tied to alarms.
		c. It shall be possible to create a list of Incident categories, tag
		a category to an incident, and filter the search with the
		category as a parameter.
		Command & Control Center should be able to relate events
		coming from different subsystems (incoming sensors) based on
61.	Event relation	different attributes and provide notifications to the operators
		based on predefined business and operational rules in the
		configurable and customizable formats

Note : Bidder has to integrate ICCC Platform with existing/ upcoming GIS.

4.5.1.1 Smart City Use Cases

Note : These are the indicative use cases and further used cases will be instructed to bidder by BSCL.

Departments/ Systems	Relevant ICCC Use Cases	Information to be displayed in ICCC
	Show position of Fleet on the city	Real-time/Near real- time location of the
Solid Waste	тар	Fleet
Management	Display type of fleet vehicle	Categorized information of various fleet
	Display type of neet vehicle	types available in the city

Departments/ Relevant ICCC Use Cases Systems		Information to be displayed in ICCC
	Show status of Garbage collection	Real-time/Near real- time status of
	by ward	Garbage collection in each ward
Transit	Show position of Buses on the bus	Documentation of Bus Routes
Management		Real-time/Near real- time location of the
System	Toute	Buses
	Show location of traffic lights	Location coordinates of traffic light
	show location of traine lights	installations at junctions
	Show Status of Traffic Lights	Real-time/Near real- time status of
	Show Status of Hume Lights	traffic lights downtime
	Show location of CCTV Cameras	Location coordinates of CCTV Cameras
		installations at junctions
	Show Status of CCTV Cameras	Real-time/Near real- time status of CCTV
ITMS & City		Cameras downtime
Surveillance	Show location of Enforcement	Location coordinates of Enforcement
	System	System installations at junctions
	Show Status of Enforcement System	Real-time/Near real- time status of
	Show Status of Emoleciment System	Enforcement System downtime
	Show location of VMD Boards	Location coordinates of VMD Boards
		installations at junctions
	Show Status of VMD Boards	Real-time/Near real- time status of VMD
		Boards downtime
	Identify location of Energy Assets	Location coordinates of Energy Assets
	Show the Energy Network on GIS	Location of Energy network (pipelines)
Electrical/Power	map	across the city
SCADA	Identify status of Energy Assets	Real-time/Near real- time status of
	(Sub-stations, Transmission	energy assets downtime
	network etc.)	
	Identify location and number of	Location coordinates and Information of
Smart Parking	Parking Slots	Parking facilities
System	Show availability status of Parking	Real-time/Near real- time status of
	Slots	Parking Occupancy (2- wheeler and 4-
		wheeler)

Departments/ Systems	Relevant ICCC Use Cases	Information to be displayed in ICCC
	Show Revenue Collections by each Parking Facility	Real-time/Near real- time status of Parking Fee Collections (2- wheeler and 4-wheeler)
	Identify location of Street Lights	Location coordinates of Street Lights
Street Lights	Control Street Lights status	Real-time/Near real- time status of street lights functioning
	Show Status of Street Lights	Real-time/Near real- time status of street lights functioning
Property Tax	Show the Properties on GIS map	Location geo-fenced coordinates of Properties
	Display heat map of tax collections by each ward	Tax collections data by each ward
	Show Population by each ward	Base Population data based on latest census Birth and Death data at a regular frequency
	Transmit information to citizens	Data/Information that has to be broadcast to citizens
F-Governance	Show status of Grievances by Ward	Details of Grievances received
	Show location of Public Advertisement Boards	Location coordinates of Public Advertisements
	Show Public Advertisements availability status	Booking status of Public Advertisements
	Display heat map of advertisement tax collections by each ward	Tax collections data by each ward
	Identify Location of Fire Hydrants	Location coordinates of Fire Hydrants
Emergency	Show position of Fleet on the city map	Real-time/Near real- time location of the Fleet
	Display type of fleet vehicle	Categorized information of various fleet types available in the city

Departments/ Systems	Relevant ICCC Use Cases	Information to be displayed in ICCC
		Documented Standard Operating
Respond to Emergency Situation		Procedures
	Identify location of Water Assets	Location coordinates of Water Assets
	Show the Water Network on GIS	Location of water network (pipelines)
	map	across the city
	Identify status of Water Assets	Real-time/Near real- time status of
Water	(Overhead Tanks, Pumps etc.)	Water assets downtime
Water	Display heat map of high water	Meter Readings from various
		Commercial and Residential installations
	usage areas	with their location details
	Identification of Non-Revenue	Water inflow details across the water
	water	network
	Identify location of Smart Poles	Location coordinates of Smart Poles
	Show Status of Smart Poles – Wi-Fi	Real-time/Near real- time status of Wi-Fi
	Hotspots	Hotspots functioning
	Show Status of Smart Poles - Panic	Real-time/Near real- time status of Panic
	Button/Emergency Call Box	Button/Emergency Call Box functioning
	Show Status of Smart Poles - Public	Real-time/Near real- time status of PAS
	Address System	functioning
	Show Status of Smart Poles -	Real-time/Near real- time status of
	Environmental sensors	Environmental Sensors functioning
Smart Poles	Show Status of Smart Poles - Smart	Real-time/Near real- time status of
	Billboards	Smart Billboards functioning
	Show Status of Smart Poles -	Real-time/Near real- time status of
	Surveillance	Surveillance Cameras functioning
	Show Status of Smart Poles - LED	Real-time/Near real- time status of LED
	Lights	Lights functioning
	Show Status of Smart Poles - Solar	Real-time/Near real- time status of Solar
	Panel	Panel functioning
	Receive and Display Surveillance	Real-time/Near real- time feed of
	Feed	Surveillance Cameras

Departments/ Systems	Relevant ICCC Use Cases	Information to be displayed in ICCC
Receive and Display Environmental		Real-time/Near real- time feed of
	Sensor Feed	Environmental Sensors
	Broadcast message on PAS	Message to be broadcast on PAS
	Play music on PAS	Music tracks to be played on PAS

4.5.2 Integration Capabilities of Middleware/ IoT Platform

- Platform able to integrate, connect and correlate information from Middleware/ IoT Platform and other IT & non-IT system, providing rule based information drawn from various subsystems for an alert. Platform shall have ability to add/ remove sensors including new vendor types as per future business requirements. It should support SDK/API based integration with the Smart system elements.
- The software solution should be scalable and modular in structure and should be able to integrate another future IT initiative of **Bareilly** Smart City without any additional cost.

#	Кеу	Description	
1.	OS	The AI Based Video Analytics Application Software shall be supported on Windows or Linux Platform.	
2.	Highly parallel and distributed	IelThe algorithms should possess capability to operate parallel and distributed manner across cluster of machines. Both training and inference should be. distributed.	
3.	Complete S. Visibility of all the resources in the system, such as cameras and their live status on Map View, all industry standard and open GIS Map should also integrated ICCC platform.		
4.	User _ Management	Each of the Video Intelligence and Video Analytics use-cases should be structured as an app that can be deployed on any camera using a camera-app matrix, providing a complete visibility of the apps and which cameras they are running on.	
5.		The system should support user with a hierarchical access level, with different access level for different users demarcated with respect to cameras, apps and the data.	

4.5.3 AI based Analytics

#	Кеу	Description		
		The System shall be a real-time video analytics engine that utilizes advanced		
		image processing algorithms to turn video into actionable intelligence. The AI		
6.		based Video Analytics system should consists of video-processing & analytics		
		engine that works seamlessly both on saved videos or camera streams in real-		
		time and provide events to the user based on the use-case basis.		
7		The system should be compatible with all ONVIF compliant IP cameras with		
7.		H.264/H.264+ / H.265 video decoding.		
Q		The System should be deployable using any of the following kinds of		
0.		deployment architectures, namely:		
		Central Deployment: Under this model all the video streams are processed		
		centrally at the data center with one or more servers for video processing.		
		The user should be able to log in to the system through the central dashboard		
9.		to access all the data from all the servers. The processing of videos as well as		
		alert generation should be done on-premise. At no point in time should the		
	Multi data from the site be shared over the internet or sent over to the cl			
	Architecture	System UI should only be accessible using terminals available on-premise.		
	deployment	Edge + Central deployment: In this type of deployment, some of the video		
	Support	streams may need to be processed on edge using Edge computing devices.		
		However, the metadata generated as a result of this processing should be		
10.		sent over to a Master Server where it would be stored in a unified database		
		and made accessible to the end-user. The Master Server may either be		
		situated on the central data-center, on the cloud or on some remote location		
		on-premise.		
11		The system should be able to switch between the above modes seamlessly		
11.		on demand based on the availability of hardware		
		The AI system should also support third-party developed apps that can		
12		provide the user with a large base of developed apps and also the turnaround		
12.		time to develop a new App for a particular use case can be reduced		
	App Market	significantly.		
	Place	If a new use-case or an app needs to be developed based on Video		
12		Intelligence, the system should provide a developer Software Development		
13.		Kit (SDK) for this purpose. The SDK should be provided along with detailed		
		documentation for building end-to-end apps on the system without any		

#	Кеу	Description		
		additional cost to BSCL. The source code/SDK will be property of BSCL from		
		day 1.		
		Algorithms being containerized should ensure both interoperability and		
	Eloviblo	portability, allowing for code to be written in any programming language or		
14	Technology	any version of library and framework but then seamlessly exposes a single		
14.	rechnology	API to be integrated and ported with multiple modules/AI components of		
	SLACK	diverse stack. It should seamlessly integrate with other components and		
		should be portable/ replica-table easily across the machines automatically.		
15	Third Party	The system should support integration with any third-party application / use		
15.	Apps case.			
Тес	hnology Specifica	ations		
		The Video Analytics system should be compatible with the latest		
	Advanced Al	technological advancements in the domain of computer vision and artificial		
16.	compatible	intelligence. Hence it should be able to quickly adapt to newer libraries and		
		Al advancements. All analytics should be calibrated to reduce the false		
		alarms.		
	Librarios and	The system should be fully compatible with popular Computer Vision and		
17.	frameworks	Artificial Intelligence frameworks such as OpenCV / TensorFlow/CAFFE/		
		Keras/ Darknet/Any other Equivalent.		
	Unsupervised	The system should be able to use algorithms and unsupervised deep learning		
10	deep learning	methods to provide alerts and useful actionable insights from live streaming		
10.	methods	video feed data. System shall have capability to automatically analyze hours		
	(Optional)	of video data for defining own rule.		
Use	r Interface Speci	fications		
19.		The System should provide the following key user-interface screens:		
		Event Notifications: The result of any video analytics app should be in the		
		form of events that contain the screenshot with other metadata describing		
20	Key UI Views	the event, such as detected objects, timestamp, camera/video that		
20.		generated the event and all other metadata representing the event from		
		different apps. The User Interface should have a grid and list view with all the		
		events from different cameras etc.		

#	Кеу	Description		
		App Camera Grid: The user interface should have a matrix to assign, start,		
21.		stop and schedule any app on any camera. The status of active and non-active		
		apps should be clearly visible with color coded information.		
		Data Analytics Dashboard: The user interface should also have an analytics		
		dashboard listing all the patterns of events from different cameras and apps		
22.		with a heat map of number of events on an hourly basis Dashboard must be		
		developed as part of ICCC to represent all instances and applications of		
		Bareilly smart city , without any additional cost during the contract.		
	Common III	The user interface should be a unified dashboard that shows events from all		
23.	for all the appe	the apps (Video Analytics use-cases) and all the cameras in a common UI, and		
	for all the apps	which gets populated in real time from event notifications.		
		The User interface of the system should be a web interface or GUI that can		
24	Web based	be accessed by any system in the local area network with login credentials. It		
24.	Interface	should allow multiple users to log in at the same time, and receive real-time		
		alerts and notifications.		
		The system should allow each application to be uniquely configured for every		
		individual camera stream, with parameters for camera calibration, image		
		quality improvement, night/day settings etc. The video analytics should have		
25		an easy to use calibration tool (Internal or External) where calibration objects		
23.		are matched to the actual camera viewing scene. The calibrating parameters		
		include cameras height, cameras viewing angle and camera tilt angle (Picture		
		of calibration tool of the Software to be attached with the tender document		
	Configuration	as proof of the same).		
	per-app per-	The app should be able to run on different cameras with different settings		
	camera level	(e.g., different Zones for Intrusion, different lines for line crossing detection,		
26.		Loitering, Dwell detection, counting, Enter/exit, appear /disappear, camera		
		tampering, object stopped, directional filter detection, left object, alarm		
		snoozing upto 24hr, calibration etc.) at different hours of the day		
		The configuration page should allow a user to choose any of the available AI		
27		models to detect and classify objects within the image. The description of the		
27.		models should clearly specify performance and hardware requirements of		
		each of the model.		

#	Кеу	Description		
	Kov	The Video analytics application should allow setting up configuration of		
28.	configuration	multiple detect	tions zones such as lines, Field of view, camera height, camera	
		angle and regions that can be used to define perimeters, regions of interest.		
	parameters	Multiple zones should be supported by the software.		
		The system sho	ould allow a user to filter and retrieve all the events based on	
29.	Filtering and	any combination of the following parameters:		
	Retrieval			
30.		Time Filtering - the user should be able to filter all the events through a time		
		range with a start time and end-time		
#	Use Cases	Арр	Description	
			The system should be able to detect any camera tampering	
	Camera	App Scope	attempt such as covering, fogging, disconnection, defocusing	
1.	tampering		and change of view	
	(For all		The system should provide the user with a configuration	
	Camera)	Configuration	parameter for tuning the sensitivity of tampering, the	
			frequency of checking of camera tampering	
			The system shall be capable of detecting left objects that	
			have remained stationary for a period of time that is	
			considered suspicious by the user.	
			Camera Tampering to be shown in different scenarios:	
		Арр	If someone defocuses the camera lens	
	Missing object	Detections	If someone moves the camera from its FOV	
	detection &		If someone put the cloth on camera	
2	Object		If someone covers the camera lens with hand	
2.	Recognition		If someone put the torch light flash on camera,	
	(City		If someone put spray on camera lens.	
	Surveillance)		The system shall have the ability to detect multiple objects	
		Multinle	that are left stationary in a scene.	
		object	The system shall be able to detect multiple objects each with	
			its own timer as per the defined detection time. If multiple	
			objects are abandoned in the scene one after the other and	
			alarm shall be raised for each object (one after the other)	

#	Кеу	Description	
			once that object has been left in the scene for longer than
			the detection time.
			The user shall have the ability to configure the detection time
		Configuration	to suit the environment, from seconds to minutes or hours.
		of detection	The detection time is the elapsed time between when the
		time	object is first detected as an abandoned object and the time
			when an alarm is required to be raised.
			The system shall be able to immediately review the event
3.		Event Review	(with a click of a single jump to event button) to detect the
			person who has left the object.
	Dorson/	Ann Scono	The system should be able to detect any person loitering for
	Person	Арр эсоре	more than a certain duration with in the camera view.
1	Loitering		The system should allow the user to set the threshold of time
4.		Configuration	in seconds for loitering detection. The system should also
	(City Survoillanco)	Configuration	allow the user to mark the area of interest within the camera
	Survemance)		view.
		٨٥٥	The system shall be capable of detecting overcrowding or
	Crowd alert (City Surveillance)	App detection	congestion in an indoor or outdoor environment provide the
			real time alert based on analytics.
E		Object	The system shall be able to count in a very large area using
5.		counting	one or multiple user-defined areas of interest
		Configurable	The user shall be able to get the area and volume of group of
		threshold	neonle before it is deemed to be overcrowded
		value	people before it is deelled to be overcrowded.
		Арр	The system shall be capable of detecting parked vehicles that
		Detection	have remained stationary for a pre-defined period of time.
			The system shall be able to detect multiple vehicles each with
6	Illegal parking	Detection of multiple vehicles	its own timer as per the defined detection time. If multiple
0.	detection		vehicles are parked in the scene one after the other and
			alarm shall be raised for each object (one after the other)
			once that vehicle has been parked in the scene for longer
			than the detection time.

#	Кеу	Description	
7.	Garbage Overflow Detection		Garbage should be detected if garbage is around the garbage bin and if bin is full.
8.	Stray cattle Identification	Report	The system should able to provide a report automatically the number and movement of cattle with respect the time. The system should report a heat map with respect to sighting to cattle and a heat map capturing the movement at hourly level.

Note : During Implementation phase BSCL will guide on AI bifurcation as per site the survey. MSI has to propose VA for 1000 Cameras and AI licenses for 200 Cameras considering minimum Two Analytics per camera.

4.5.4 Trend Analytics Platform

Analytics Engine should be an artificial intelligence-based smart city analytics platform module to maximize business value through advanced machine learning capabilities. The machine learning capabilities aid in automating policies that result in better asset and infrastructure management. The Platform refer to data and predictive analytics of IoT and data.

The solution should be flexible to integrate with other city and government software applications. Analytics Engine module should have below intelligence capabilities:

- a. Advanced Predictive Analytics should be part of the solution.
- b. The solution should be flexible to integrate with other city and government software applications
- c. The solution should be able to predict insights consuming data from city infrastructure viz.,
 Traffic, Parking, Lighting etc.
- d. The solution should have predictions with measurable accuracy of at least > 70%
- e. The solution should be able to predict and integrate with Smart City solutions helping in driving operational policies creation.
- f. The solution should be robust, secure and scalable.

The solution should have a visualization platform to view historic analytics

The application should enable the customers to discover, compare, and correlate data across heterogeneous data sources to unravel the patterns that are previously hidden. At a broader level, when you work with the application, system do the following tasks:

a. Connect to a variety of data sources

- b. Analyze the result set
- c. Visualize the results
- d. Predict outcomes

Analytics Engine should support multiple Data Sources. Min below standard data sources should be supported from day one:

- a. CSV, TSV, MS Excel, NoSQL, RDBMS
- b. Analytics Engine should provide analysis of data from a selected data source(s).
- c. Analysis enables to define arithmetic and aggregation operations that result in the desired output.
- d. Analytics engine should provide capability to check analysis with multiple predictive algorithms

4.5.5 Video Conferencing Solution

It is essential requirement of city to connect virtually from various stakeholders and other cities:

- The VC Room system must support H.323, and SIP standards for communications.
- The VC Room System Must Support High Definition room video up to 1080p60 format (1920x1080 pixels at 60fps progressive) and 720p60. It should also provide a PTZ (Pan, Tilt Zoom) High Definition autofocus camera with automatic exposure and automatic white balance supporting up to the 1080p60 format, a minimum horizontal field of view of 60, at least a 10x optical zoom and a minimum range for PAN of +/- 100° and for TILT of +20° /- 30°. Camera parameters must be configurable on the VC system user interface, and in particular white balance, back light compensation, exposure compensation, focus and sharpness.
- The VC Room System must be a dual camera/two camera system with both cameras of minimum 10X Optical Zoom to provide automatic voice and speaker framing of the active speaker in the room with a range up to 30 feet. It should be possible to send both active speaker in zoomed mode and room view in PIP to far side location during a VC call and two screens, and Support dual video capabilities both in H.323 (H.239) and SIP (BFCP based). Position of content and live video on available displays must be configurable.
- The VC Room System must support the ITU-T standards H.263, H.264, H.264 High Profile/H.265 and the ITU-T standards G.711, G.722, G.722.1 for narrowband, wideband and super wideband audio.
- The VC Room System must Provide up to 4 microphones with each microphone independently echo cancelled
- The VC Room System must be able to increase and decrease the audio on connected displays.

- The VC Room System must be capable of capturing high definition content from a laptop/ PC/ DVI/ HDMI source up to 1080p 30 fps.
- Collaboration between pre-defined VC Endpoints in response to an event
- Ability to bring multiple stake holders on a Common Video Conference Call and share content on the call
- HD Video Conference Setup with VC Endpoints and Software VC Clients
- The ICCC should have capability of Conducting High Definition Video Conference with defined Stake Holders beyond Command and Control (like Fire Dept, Traffic, Police, Ambulance, etc.)
- The ICCC should have 2 Conference Rooms with High Definition End points with Dual Screens and 4 more Nagar Nigam locations shall have Video conference solution with single screen at each location. (* list of locations shall be communicated to successful bidder)
- Video Firewall
- All departments beyond Command and Control would be Connected using High Definition Video Conference Unit
- Key Executives for Smart City and Various Departments will have Person VC Unit with Touch screen, Mic, Speakers and Document Camera.
- The Personal VC/ Software VC Client should be able to Communicate over WiFi, Broadband or mobile dongle.
- Number of concurrent conferences should only be limited by port capacity of MCU considering the conference will have minimum 1+2 participants (i.e. minimum 5 concurrent conferences). These concurrent conference licenses must not be tagged in any manner-to an VC end point, a soft client and named user employee. They must be freely floating for any user to utilize

4.5.5.1 Video Conferencing Solution

#	Minimum Specifications		
Make:	Make:		
Model			
1.	Video Standards: H.263, H.264 or any other latest video protocols		
2.	The Video Conferencing unit should support inbuilt 1+5 Full HD Multi Party Conferencing		
3.	Should support 30 fps & 60fps (frames per second) with 1080p resolution from day one		
	Video Features: Ability to send and receive two live simultaneous video sources in a single		
	call, so that the image from the main camera and PC or document camera can be seen		
4.	simultaneously		
5.	Should support H.239 and BFCP protocols with 1080p resolution		

#	Minimum Specifications
	Video Output: Should have at least 2 HDMI / DVI (High Definition Multimedia Interface)
	output to connect Full High Definition display devices such as LCD / LED and projectors for
6.	both Video and Content. (Dual Monitor Support)
	It should be possible to display the main video on one HD screen and the presentation /
7.	dual video on the other HD screen
	Video Input: Should have at least one HD video Input to connect HD camera with full
8.	functionalities as mentioned in the camera specifications
	Should have dedicated DVI (Digital Video Interface) / HDMI input to connect PC / Laptop
	directly to the Video conferencing system and display resolutions 1080p60 along with PC
9.	Audio
	Audio standards: G.711, G.722, G.722.1, 64 kbps MPEG-4 AAC-LD or equivalent standards
10.	must be supported.
	Audio Inputs: Should support minimum 4 Omnidirectional Microphones either directly
11.	connected to VC codec or in daisy chain. 1 needs to be supplied from day one.
12.	1 LAN / Ethernet - 10/100/1000 Mbps
13.	IP - at least 2 Mbps bandwidth support
14.	Security: Password protected system menu
15.	ITU-T standards-based Encryption of the video call
16.	Camera: Minimum of 10 X Optical zoom PAN of +/- 100° and for TILT of +20°/-30°
17.	1920 x 1080 pixels progressive @ 60fps
18.	Should have at least 65 degrees field of view (horizontal)
19.	The Camera and codec should be from the same manufacturer
20.	The end point should support local recording from day 1 through external DVR/USB, etc.
4.5.5.2	Multiparty Conference Solution
#	Minimum Specifications
	Make:

	Make:
	Model:
	The Bridging should be running on the standard Intel servers on standard Virtualized or
1.	dedicated hardware appliance platforms. The hardware, software and virtualization
	software should be supplied and supported by a single bidder
2.	From day one the bridge must provide 50 full HD video ports @1080p 30 fps

#	Minimum Specifications
3	All necessary hardware to support the above capacity needs to be supplied from day one.
5.	Bridge must have a redundant power supply
4	All the 50 ports must be able to connect different sites at different bandwidths and
	protocols. H.264 AVC standard must be supported at the minimum to connect all the sites
	The bridge should support room-based video end points, users joining from browsers' and
5	its own clients. In case additional components are required for this functionality, all
5.	additional components required to have this functionality has to be included in the
	solution
	The bridge should have the capability to host meetings with internal and external
6.	participants in a secure way such that it should co-exist with the enterprise security
	policies
7	The bridge should have components such as the Web Server for, Scheduler as part of the
/.	offering from day one.
8.	Should support H.263, H.263+, H.264, video algorithms
9.	Should support video resolution from SD to Full HD to join into a conference
10	Along with the Support for basic algorithms like G.711 and G.722.1 the bridge should also
10.	support wideband Audio protocols
	Must support the ability to allow Video conferencing devices, Clients on Mobile phones,
11.	Smart phones and Laptops to join into conference. These clients can be inside the WAN
	network or even on the Internet without a VPN.
12.	The bridge should support transcoding of different Audio/video Protocols.
13.	The bridge should have H.239/BFCP protocol for sending and receiving dual video streams
201	(Presenter + Presentation).
14.	The bridge must also support advanced continuous presence such that the site that is "on-
	air" to be seen on a larger window and the other sites are seen in smaller quadrants
15.	The bridge must be a secure Non-PC Hardware with a strong operating system. The
10.	Hardware and software must be from the same OEM
16	The bridge should support 128 Bit strong AES encryption for calls and H.235/SHA1 for
20.	authentication
	It should be possible for outside agencies (for state government, central government,
17.	police department, etc.) to join the bridge for multi-party video conference call securely
	over internet

#	Minimum Specifications
18	They should be able to join the bridge using standards-based VC endpoints using internet
10.	(as long as these endpoints are exposed to internet) securely.
19	It should be possible to connect all external endpoints / locations concurrently at any given
15.	point of time
20.	It should use secure firewall traversal technology.
21.	It should support any standards-compliant SIP or H.323 video conferencing endpoints
22	It should support for H.323 SIP Interworking Encryption and H.323 SIP Interworking
22.	DuoVideo
23.	It should use standards based firewall traversal methods - H.460.18/19
24.	The MCU should support viewing of minimum 25 parties in continuous presence mode.

4.5.6 IP Phones Type 1

#	Minimum Requirement	
	Make:	
	Model:	
1.	Grayscale display – 2.8 inches x 2.1 inches (7.0 cm x 5.3 cm) – Diagonal width: 3.5 inches (8.8	
	cm)	
2.	8 buttons with dual LEDs (red, green)	
3.	4 softkeys	
4	Hard buttons for phone, messages, contacts, history, home, navigation cluster, headset,	
	speaker, volume, mute	
5.	LEDs for speaker, mute, headset, message, history	
6.	24 administrative buttons	
7.	Wideband audio in handset and headset	
8.	Full duplex speakerphone	
9.	Ergonomic hearing aid compatible handset supports TTD acoustic coupler	
10.	Message waiting indicator	
11.	Mute key with optional mute alerting	
12.	IC call alerting with 360-degree visibility	
13.	Rich, classic, alternate, and downloadable ringtones	
14.	Dual-position stand, optional wall-mount stand.	
15.	Gigabit Ethernet (10/100/1000) line interface	
16.	Second Ethernet interface 10/100/1000 Mbps	

#	Minimum Requirement
17.	PoE Class (IEEE 802.3af) registers as class 1 device and supports 802.3az.
18.	Optional AC to 5-volt power supply
19.	SIP & H.323 protocol support
20.	Standards-based codec support: G.711, G.726, G.729A/B, G.722, Opus.

4.5.7 IP Phone Type 2

#	Minimum Requirement
	Make :
	Model :
1.	8" Capacitive Touch color display
2.	Resolution: 1280 X 800 pixel
3.	24 bits color depth
4.	An integrated camera (A mechanical camera shutter that covers the camera lens)
5.	Standards-based codec support: G.711, G.726, G.729A/B, G.722,H 264, Opus.
6.	No mechanical dial-pad
7.	Message Waiting Indicator
8.	1X RJ9 analog headset port or higher
9.	1X 3.5 mm audio jack socket or higher
10.	1X USB Type-C port or higher
11.	1X Handset cradle connector
12.	Power over Ethernet EEE 802.3af (Class 3) or 802.3at (Class 4)
13.	SIP protocol support
14.	Downloadable ring tones
15.	Downloadable Wallpapers
16	End users can install third party applications on Google Play™ store. The system
10.	administrator can restrict installation of certain applications
17.	16 GB flash memory
18.	Dual Port RJ45 connected Ethernet
19.	Wireless access point mode
20.	5GHz Wireless 802.11a/b/g/n/ac
21.	Hotspot

4.5.8 IP PBX

#	Minimum Requirement
1.	The IP telephony system should be a converged communication System with ability to run
	analog and IP on the same platform using same software load based on server and Gateway
	architecture
	Proposed Solution should support remote site survivability on local gateways and the
	survivable system should provide all the telephony features as of main site. Survivability
2.	features and options that allow gateways to continue operating even if the primary server
	fails or in the event a WAN failure affects communications between the gateway and the IP
	PBX.
	System should support High availability and seamless failover from primary server to
3.	secondary server. It should allow the administrator to make configuration changes even
	when primary server is down.
4.	The single IP PBX system should be scalable to support up to 500 stations (any
	mix/percentage of Analog/IP) to achieve the future capacity
5.	The system should be based on server gateway architecture with external server running on
5.	Linux OS. No card-based processor systems should be quoted
6.	The voice network architecture and call control functionality should be based on SIP
7.	The call control system should be fully redundant solution with no single point of failure &
	should provide 1:1 redundancy. IP Telephony shall be in DC Only.
8	The communication server and gateway should support IP V6 from day one so as to be future
	proof
9.	The entire solution (IP PBX, its hardware, IP Phones, Voice Gateway, recording, headsets,
	customer automated center, etc.) should preferably be from a single OEM
10.	Should support signaling standards/Protocols – SIP, H.323, Q.Sig
11.	Voice Codec support - G.711, G.729, G.729ab, g.722
12.	The System should have GUI support web based management console
13.	The protection of signaling connections over IP by means of authentication, Integrity and
	encryption should be carried out using TLS
14.	System should support MLPP feature
15.	Proposed system should support SRTP for media encryption and signaling encryption by TLS
	Secure HTTP support for Call Server Administration, Serviceability, User Pages, and Call
16.	Detail Record Analysis and Reporting Tool. Should support Secure Sockets Layer (SSL) for
	directory

#	Minimum Requirement
17.	The administrator logging on to the call control server needs to authenticate by suitable
	mechanism such as User Login Information and Passwords/ Radius Server
	There should be seamless integration between Video IP phone and Video End point for point
18.	to point and multipoint conferences. For this both the components should be from the same
	OEM.
19.	Voice gateway to be provided with 1 PRI card scalable to 3 PRI in future for PSTN (PRI) line
	termination.
20.	System should allow custom client applications to support all call operations like make call,
	receive call, hold call, voice mail etc using REST API available from PABX.

4.5.9 Contact Centre

#	Minimum Requirement		
	Make:		
	Model:		
1.	Automatic call distribution		
2.	No of call center agents license: 20		
3.	Automatic identification of incoming number based on landline and mobile number mapping		
4	Call recording mapped to incident tickets (Retention period of recording should be available		
ч.	as per govt. rules and regulations)		
5.	Customizable agent and supervisor desktop layout		
6.	Inbound and outbound capability		
7.	Call control		
8.	Multisession web chat		
9.	Email		
10.	Live data reporting gadets		
11.	Phone book		
12.	Speed Dial in IP phones		
	This call center solution also needs to seamless Integrate with the existing UP DIAL 100		
13.	architecture:		
	- Transfer of agent calls from Bareilly to UP Dial 100		
	- Integration of this call center with CAD deployed in UP Dial 100.		
14.	Integration of Social Media		
Autor	Automatic Call Distribution (ACD):		

#	Minimum Requirement	
	Should be highly available with hot standby and seamless failover in case of main server	
1	failure. There should not be any downtime of Contact Center in case of single server failure.	
1.	IP Telephony Sball be in DC only. 1:1 redundancy is required only for major components of	
	Contact center	
2	Should support skill-based routing and it should be possible to put all the agents in to a single	
2.	skill group and different skill groups	
3	ACD support routing of incoming calls based upon caller input to menus, real-time queue	
5.	statistics, time of day, day of week, ANI, dialed number etc.	
1	ACD should support call routing based on longest available agent, circular agent selection	
4.	algorithms	
	ACD should support the playing of customizable queuing announcements based upon the	
5.	skill group that the call is being queued to, including announcements related to position in	
	queue and expected delay	
6	Agents should be able to chat with other Agents or supervisor from the Agent desktop	
0.	software	
7	Supervisor should be able to see the real-time status of agents, supervisors should be able	
7.	to make agent ready or logout from the supervisor desktop	
8	Should support Queuing of calls and playing different prompts depending on the type of call	
0.	and time in the queue.	
	The call center solution should have been implemented in minimum 2 projects of Emergency	
9.	handling over 50,000 calls per day in India. Documentation proof should be submitted as	
	part of the tender submission	
10	All contact center related components including ACD, PABX, Gateways, Recording, CTI,	
10.	softphone, hard phone, Customer Interactive Center, Emergency Notification System, etc.	
Intera	ictive Voice Response (IVR):	
	IVR Platforms should support following standards from Day 1	
1.	VXML, CCXML, SMIL, SRGS/SISR, MRCP, SIP/H.323, WSDL/SOAP, HTML5	
2.	IVR should play welcome messages to callers Prompts to press and collect DTMF digits	
3.	IVR should be able to integrate with backend database for self-service, as and when required	
4.	GUI based tool to be provided for designing the IVR and ACD call flow	
5.	IVR should support Voice XML for ASR, TTS, and DTMF call flows	
6.	IVR should be able to Read data from HTTP and XML Pages	

#	Minimum Requirement	
7	IVR should be able to run outbound campaigns. (agentless and agent based) without need	
7.	of any separate external Outbound dialer solution	
8.	IVR should support voice, email and sms channels with two-way communication capabilities	
	and be capable of visual IVR capabilities.	
	The Call center needs to integrate with Emergency response system of the state / city. For	
9.	the same, the call center suggested should have deployment / experience in Emergency like	
	100/ 101/ 108, or similar emergency systems	
Repor	ting:	
1	System to provide report of IVR Application Performance Analysis, Call by Call details for all	
1.	the calls, Traffic analysis reports etc.	
2	Reporting platform to support Agent level reports, Agent login, logout report, report on	
Ζ.	agent state changes	
2	Queue reports, Abandon call reports all the reports should be summary, tabular and detailed	
э.	report format to be available for the agents.	
4	Reporting platform to support custom reports using a combination of the Crystal Reports	
4.	Developer's Toolkit and SQL stored procedures.	
	Users of the Historical Reports should be able to perform the following functions View, print,	
5.	and save reports. Sort and filter reports, Send scheduled reports to a file or to a printer.	
	Export reports in a variety of formats, including PDF, RTF, XML, and CSV	
6.	Administrator should be able to assign one or more email addresses to a single Queue	
7	Email routing support integration with Microsoft Exchange 2003 or Microsoft Exchange	
7.	2007 or 2010 or similar	
8.	Agents should be able to automatically resume of e-mail processing on voice disconnect.	
9.	Agent should be able to save email draft response and resume at a later time	
10.	Agent should be able to re-queue email	
11	Supervisor should be able to access real-time reporting for Agent E-Mail mail volume by	
11.	Queue	
Emer	gency Notification System	
1.	Notification Formats	
	System must Support Voice Call Notification – Office Phone, Cell Phone, Home Phone	
	System must support SMS, Email, Speakers / Paging	
2.	User Contact Lists	
	System must offer Web based self-service management	
L	1	

#	Minimum Requirement	
	It should be possible by administrator to define attributes (location, role, etc.) for users	
	It should support CSV File Upload for contacts	
3.	Message Configurations	
	System should support One-way Notification & ACK	
	System should be able to notify and respond and Notify to Conference to all stake holders	
	System should support auto Escalation or cascading chains of notifications whenever	
	needed	
4.	Administration Portal (Web Application)	
	User/Group Mgmt.	
	Partition Mgmt for different departments	
	Conferencing Configuration	
	Security Configuration	
	Channel (Device) Configuration & Mgmt.	
	Communications Resource Mgmt.	
	Broadcast Trigger Configuration	
	Inbound Call Trigger Configuration	
	Message Inbox Configuration	
5.	Operations Portal (Web Application)	
	System Admin must be able to define Notification Scenario for quick management	
	System admin must be able to do Message Mgmt. (Pre-recorded, "record on the fly", Text-	
	To-Speech)	
	User / Group Profile Mgmt.	
	Escalation Configuration	
	Security Configuration	
	Message Broadcast (Priority)	
	Audit logs and Reports (Web and PDF formats), Data and Analytics	
	The notification platform should tightly integrate with the call center solution and be part	
	of one platform.	
	System must be able to reach 500 people within 10 minutes to play 30 second voice	
	announcements.	

4.5.10 Gateway Requirement

#	Minimum Requirement	
	Make:	
	Model:	
1.	The voice/media Gateway may be a dedicated standalone voice / media gateway.	
2.	Voice / Media Gateway shall be of same make as the IP Telephony Server.	
3.	Shall have at least 2 x 10/100/1000BaseT ports.	
4	It shall also have at least three (03) slots to support variety of Voice interfaces like FXO, FXS,	
ч.	Channelized PRI (E1), etc.	
5.	It shall have embedded voice / video capable digital signal processor (DSP) or equivalent.	
6.	The voice gateway should have minimum 64 channel DSP resource scalable to 128 channels.	
	It should be capable of Survivable Call Control functionality so as to provide fall back call	
	control service to locally connected IP and Analog phones, in case the remote site loses all	
7.	connectivity to both the primary $\&$ secondary Call Control Servers .The survivability call	
	control system has to provide all telephony features to the end users that are available from	
	the main call control system.	
8.	It shall support QoS including classification, marking and prioritization.	
٥	Shall have support for management using CLI, Web UI (HTTP/HTTPS), Telnet, SSH and	
э.	SNMPv3 as well as out of band management through console.	

4.5.11 Video Wall Display

#	Parameters	Minimum Specification	
	Make		
	Model		
1.	Technology	LASER DLP based Rear Projection Video wall	
		70" (70 Inches diagonally 5X3 configuration) with Laser Light	
2.	Screen Size	Source complete configuration with covered base. All cubes	
		have to be of the exactly same size, configuration	
2	Combined Native	Minimum Native resolution should be full HD only	
5.	Resolution of The Wall	within that we resolution should be rull no only,	
4.	Screen Support	Screen should be anti reflected and not buldgeout.	
5.	Brightness Uniformity	Uniformity: 95% or better certified by third party	
6.	Viewing angle	178 degree or better	
7.	Bezel Gap	<1mm or better at temp 20~24 degree	

#	Parameters	Minimum Specification	
8.	Pixel clock	165 MHz or higher to ensure flicker less display	
9.	Heat Dissipation	Less than or equal to 1400 BTU/Hr	
10.	Dust Prevention	Should be IP6X certified by third party laboratory	
11.	Response time	12 ms	
12.	Input	min 1 x DVI	
		System should be based on web browser architecture	
		Should be able to control & monitor individual cube, multiple	
		cubes and multiple video walls	
	Cuba control &	Should provide a virtual remote on the screen to control the	
13.	Monitoring	videowall	
	Monitoring	Input sources can be scheduled in " daily", "periodically" or	
		"sequentially" mode per user convenience	
		System should have a quick monitor area to access critical	
		functions of the videowall	
14	Light Source Type	The light source lifetime of the Light Source in eco mode shall	
14.		be 100,000 hours. This should be certified by the OEM.	
15	Cube Size including screen	as par OEM architecture	
13.	module		
16.	Brightness of engine	Min 1800 Lumens or better	
17	Pomoto	Should have IR remote control in addition to IP control for quick	
17.	Remote	access	
18.	Access	Rear Only	
19.	Power Consumption	Less than 350 Watt	
20	Cooling Inside Cube	Any advanced cooling mechanism and Cooling mechanism	
20.	Cooling Inside Cube	should not have any hazardous liquid.	

4.5.12 Video Wall Controller

#	Parameters	Minimum Specification	
Ma	Make		
Model			
1.	Display controller	Controller to control Video Wall as per offered	
		configuration	
2.	Processor	Latest Generation 64-bit Quad Core processor or better	

#	Parameters	Minimum Specification
3.	RAM	16 GB RAM or better
4.	HDD	Minimum 1 Tb
5.	RAID	Should support all RAID, 0, 1,
6.	Networking	Dual-port Gigabit Ethernet Controller with RJ-45 ports
7.	Accessories	Wireless 104 key Keyboard and Wireless Optical mouse
8.	USB Ports	Minimum 2 USB Ports
9.	Platforms	Should support 64-bit Architecture
10.	Power Supply	(1+1) Redundant hot swappable
11.	Chassis Type	19" Rack mount
12.	Redundancy support	Power Supply, HDD, LAN port
13	Scalability	Display multiple source windows in any size, anywhere on
10.	oculubility	the wall
14.	Output Resolution	Should support Full HD resolution day-1
15.	Universal Inputs	Min 6 Nos
16.	Operation	The controller shall be designed for 24 x 7 operation and
10.		high availability
17.	Wall configuration	Outputs as per the no. of cubes offered.
	Video Well, Controller, Cubo P	Video Wall Cube & Controller should be from the same
		OEM for ensuring smooth operations. However, Video
		Wall cube & controller management software shall be
		tried, tested and fully functional and compatible with the
18.	wall management	proposed Video wall solution. The software should be
	wan management	certified by the video wall OEM. All licenses of the
		software supplied with video wall solution should be
		perpetual licenses and cost of the same should be
		included in the quoted cost
19.	Redundancy	Controller Shall be in HA

4.5.13 Video Wall Management Software

#	Parameters	Minimum Specification
	Make	
	Model	
1.	Display and Scaling	Display multiple sources anywhere on display up to any size

#	Parameters	Minimum Specification
2	Input Management	All input sources can be displayed on the video wall in freely
-		resizable and movable windows
2	Scenarios management	Save and Load desktop scenarios/layouts from local or remote
		machines
4.	Lavout Management	Support all Layout from Input Sources, Browser, Desktop and
ч.		Remote Desktop Application
5	Multi View Option	Multiple view of portions or regions of Desktop, Multiple
5.		Application Can view from single desktop
6	Sharing & Collaboration	Content should be able to push or pull over the complete network
0.		for live monitoring and mission critical application
	Other features	Remote management
		Drag and Drop enable layouts/ scenarios
		Operator shall able to Live preview the content before pushing to
7.		video wall
		Able to select a moving area on a screen that shows changing
		information/ text/ content
		Able to set User Roles, Permission and user Authentication

4.5.14 LED Display

#	Description	Specifications Parameter
	Make	
	Model	
1.	Screen Size (Diagonal)	55 inches
2.	Panel Type	LED
3.	Native Resolution (Pixels)	3840 x 2160 (UHD) or better
4.	Brightness (Nits) Minimum	400 cd/m2 or better
5.	Viewing Angle (Horizontal/Vertical)	1780 / 1780
6.	Native Contrast Ratio	1100:1 or better
7.	Response Time (milli seconds)	8
8.		3 x HDMI
9.	Innuts (Minimum)	1 x VGA Port
10.		1 x Display Port
11.		1 x DVI Port

#	Description	Specifications Parameter
12.		3 x USB Port
13.		1 x RJ 45 Port
14.		1 x Audio IN
15.		1 x Communication Port RS-232 & RJ-45 Port
16.	Out Puts	1 x Audio OUT
17.	Audio Power	20 W (10 W X2)
18.	Warranty	5 Years Warranty

4.5.15 Monitoring Workstations

#	Parameters	Minimum Requirements
	Make:	1
	Model:	
1.	Processor	Latest generation 64bit, 3.4 Ghz, 8 Core Xeon or better Processer
		with Intel C612 or latest chipset
2.	Motherboard	OEM Motherboard
3.	RAM	Minimum 32 GB DDR4 RAM expandable to 64 GB
4.	Graphics card	Graphics card with min 2 GB video memory (non-shared)
5.	Monitor	Two Monitors of 24" Curved TFT LED, with Minimum 1920 x1080
		resolution, Minimum input of 1xDP, 1x HDMI, Energy star 5.0/BEE
		star certified
		OR
		Monitor: Two Monitors of 34" Curved TFT LED, with Minimum
		3440x1440 resolution, Minimum input of 1xDP, 1x HDMI, Energy
		star 5.0/BEE star certified
6.	Hard Drive	Min. 1 TB Hard Drive@7200rpm+ Min256GB SSD
7.	Other Accessories	Line/Mic IN, Line- out/Speaker Out (3.5 mm), Minimum 6 USB
		ports (out of that 2 in front), 104 keys Heavy Duty Mechanical
		Switch Keyboard (USB Interface) with 50 million keystrokes life
		per switch. Rupee Symbol to be engraved
		[Keyboard OEM may be different from workstation OEM (If
		workstation OEM is not manufacturing the required keyboard)],
		USB Optical OEM mouse,

#	Parameters	Minimum Requirements
8.	Operating System	Pre-loaded Windows 10 (or latest) Professional 64-bit, licensed
		copy All Utilities and driver software, bundled in CD/DVD/Pen-
		drive media.
9.	Antivirus feature	Advanced antivirus, anti-spyware, desktop firewall and
		encryption as required.
11	Network Interface Port	1G Port
12	Dust Protection	Dust Filter
13	RoHS Compliance	Yes
14	Energy Efficiency and	EPEAT Registered, BIS Standards
	other Compliance	
15	Software	Microsoft Office shall be preinstalled with perpetual license

4.5.16 Desktops for ICCC

#	Parameters	Minimum Requirements		
Make	Make:			
Mode	el:			
1.	Processor	Intel Core i5-latest generation (3.0 GHz) or higher		
2.	Memory	8 GB DDR4 RAM @ 2400 MHz One DIMM Slot must be free for future		
		upgrade		
3.	Motherboard	OEM Motherboard		
4.	Hard Disk Drive	Minimum 1 TB Hard Disk @7200 RPM or higher		
5.	Audio	Line/Mic In, Line-out/Speaker Out (3.5 mm)		
6.	Network port	10/100/1000 Mbps auto-sensing on-board integrated RJ-45 Ethernet		
		Port(Min 1Port).		
7.	Wireless	Wireless LAN - 802.11b/g/n/		
	Connectivity			
8.	USB Ports	Minimum 4 USB ports		
9.	Display Port	Minimum 1 Display Port (HDMI/VGA) port		
10.	Keyboard	104 keys Heavy Duty Mechanical Switch Keyboard (USB Interface) with		
		50 million keystrokes life per switch. Rupee Symbol to be engraved		
		[Keyboard OEM may be different from workstation OEM (If workstation		
		OEM is not manufacturing the required keyboard)]		
11.	Mouse	Optical with USB interface (same make as of desktop)		

#	Parameters	Minimum Requirements
12.	Monitor	Minimum 21.5" diagonal LED Monitor with 1920x1080 or higher
		resolution. (Same make as desktop). Must be TCO05 certified.
13.	Operation	Pre-loaded Windows 10 (or latest) Professional 64-bit, licensed copy All
	System and	Utilities and driver software, bundled in CD/DVD/Pen-drive media.
	Support	
14.	Certification for	Energy Star 5.0 or above / BEE star certified
	Desktop	
15.	Software	Microsoft Office shall be preinstalled with perpetual license.

4.5.17 Desktops for Video Feed at Police Stations, Tehsil and Sadar

The MSI will provide the video feed at police station in Bareilly City. The details of these police stations will be shared with Successful. The desktop will be used only for monitoring purpose. No data copy, down load access will be allowed at these stations. The MSI shall responsible to install, configure & support ICCC camera feeds/ dashboards at all 11 locations along with necessary connectivity & any additional software/ hardware / Switch required at ICCC to support these applications. The MSI Shall also be responsible to supply/ configure & maintain 1 workstation at all these locations, as per the specifications.

#	Parameters	Minimum Requirements		
Make	Make:			
Mode	el:			
1.	Processor	Intel Core i5-latest generation (3.0 GHz) or higher		
2.	Memory	16 GB DDR4 RAM @ 2400 MHz One DIMM Slot must be free for future		
		upgrade		
3.	Motherboard	OEM Motherboard		
4.	Hard Disk Drive	Minimum 1 TB Hard Disk @7200 RPM or higher		
5.	Audio	Line/Mic In, Line-out/Speaker Out (3.5 mm)		
6.	Network port	10/100/1000 Mbps auto-sensing on-board integrated RJ-45 Ethernet		
		Port (Min 1Port).		
7.	Wireless	Wireless LAN - 802.11b/g/n/		
	Connectivity			
8.	USB Ports	Minimum 4 USB ports		
9.	Display Port	Minimum 1 Display Port (HDMI/VGA) port		

#	Parameters	Minimum Requirements
10.	Keyboard	104 keys Heavy Duty Mechanical Switch Keyboard (USB Interface) with
		50 million keystrokes life per switch. Rupee Symbol to be engraved
		[Keyboard OEM may be different from workstation OEM (If workstation
		OEM is not manufacturing the required keyboard)]
11.	Mouse	Optical with USB interface (same make as of desktop)
12.	Monitor	Minimum 42" diagonal LED Monitor with 1920x1080 or higher
		resolution.
13.	Operation	Pre-loaded Windows 10 (or latest) Professional 64-bit, licensed copy All
	System and	Utilities and driver software, bundled in CD/DVD/Pen-drive media.
	Support	
14.	Certification for	Energy Star 5.0 or above / BEE star certified
	Desktop	
15.	Software	Microsoft Office shall be preinstalled with perpetual license.

4.5.18 Laptop

#	Item	Minimum Requirement
	Make:	
	Model:	
1	Processor	Latest generation Intel Core i7 (1.8 Ghz) or higher OR AMD (1.8
1.	110003301	Ghz) Processor or higher OR Equivalent 64-bit x86 processor
2	Display	Minimum 14" Diagonal TFT Widescreen with minimum 1366 x
2.	Display	768 resolution (16:9 ratio)
2	Memory	Min 16 GB DDR3 RAM or better @ must be free for future
5.		upgrade. Min 2GB Graphics card
4.	Hard Disk Drive	Minimum 500 GB SATA HDD @ 5400 rpm
E	Ports	3 USB Ports; 1- Gigabit LAN (RJ 45); 1- HDMI/Display port; 1-
5.		headphone/ Microphone USB 3.0 or later
6.	Web Camera	Built in web cam
7.	Wireless Connectivity	Wireless LAN – with latest released technology
8.	Audio	Built-in Speakers
		Minimum 3 cell (41W hr. Express Charge Capable 3-cell) lithium
9.	Battery backup	ion or polymer long life battery with a backup of minimum 4
		hours

#	Item	Minimum Requirement
10.	Keyboard and Mouse	84 Keys Windows Compatible keyboard, Integrated Touch Pad.
11.	Software	Microsoft Office shall be preinstalled with perpetual license.

4.5.19 Multi-Function Laser Printer

#	Parameter	Minimum Specifications			
Make	Make:				
Mode	21:				
1.	Technology	Laser			
2.	Monthly duty cycle/RMPV (pages)	200,000/5K-20K			
3.	Print speed – simplex (A4)	Up to 41 ppm			
4.	Scan speed – Black/Color simplex	Up to 50/30 ppm			
5.	Scan speed – Black/Color duplex	Up to19/14 ppm			
6.	Scan-to destinations	Email, Network folder, USB			
7.	Processor (MHz)	600			
8.	Memory (MB)	1,024			
9.	Hard disk drive (HDD)/Capacity (GB)	Yes/240			
10	Connectivity	2 Hi-Speed USB 2.0 or better; 1 Gigabit Ethernet,			
10.	connectivity	Wireless			
11	Print resolution – Max/Best print	Up to 1200x1200			
11.	quality (dpi)				
12.	Input capacity – Std/Max (sheets)	600/4,600			
13.	Output size – Min/ Max (mm)	76.2 x127/312x469.9			

4.5.20 Laser Printer

#	Parameter	Minimum Specifications
Make	2:	
Mode	el:	
1.	Print speed black (normal, A4)	Up to 22 ppm
2.	Print quality black (best)	Up to 1200 x 1200 dpi
3.	Print technology	Monochrome Laser
4.	Duty cycle (monthly, A4)	Up to 15,000 pages
5.	Recommended monthly page	volume 250 to 2000
6.	Standard memory	Minimum 128 MB
7.	Processor speed	Minimum 700 MHz

#	Parameter	Minimum Specifications	
8.	Paper handling standard/input	Up to 250-sheet input tray	
9.	Paper handling standard/output	Up to 150-sheet output bin	
10.	Media sizes supported	A4, A5, A6, B5, postcard	
11.	Media types supported	Paper, transparencies, postcards, envelopes, labels	
12	Standard connectivity	Hi-Speed USB 2.0 port with USB data cable, Ethernet with	
		RJ45 connectivity, Wireless	
13.	Duplex printing	Automatic (standard)	
		Microsoft Windows 7 Professional(64bit), Windows 8 Pro	
14.	Compatible operating systems	(64 bit), Windows 8.1, Windows 10, Server 2008 R2,	
		Server 2012 R2, MAC OS 9.0, MAC OS X, Linux	
15.	Power requirements:	Input voltage 220 to 240 VAC (+/- 10%), 50 Hz (+/- 2 Hz);	
16	Power consumption during	Less than 500W	
10.	printing		
17.	Energy Efficiency	BEE or Energy Star certified	
18.	Front operating Panel	Graphical LCD display	

4.5.21 Projector

#	Item	Minimum Specifications	
Make	Make:		
Mod	el:		
1.	Display Technology	Poly-silicon TFT LCD	
2.	Resolution	HD 1080p	
3.	Colors	16.7 million Colors	
4.	Brightness	2500 or more ANSI lumens (in Normal Mode)	
5.	Contrast Ratio	2000:1 or more	
6.	Video Input	One computer (D-Sub, Standard 15 pin VGA connector), One S-	
0.		Video, One HDMI	
7.	Audio	Internal speaker	
8.	Output ports	External Computer Monitor port, audio ports	
9.	Remote Operations	Full function Infrared Remote Control	
10.	Other features	Auto source detect, Auto-synchronization, Keystone Correction	

4.5.22 WIFI Access Points

4.5.22.1 Indoor Access Point

#	Minimum Requirement			
	Make:			
	Model:			
1.	Access Point radio should be minimum 4x4 MIMO with 4 spatial streams on 802.11ac radio			
2.	AP should able to support up 1.7 Gbps in the 5GHz band and 300 Mbps in the 2.4GHz banded			
3.	Access Point should be 802.11ac Wave 2 ready from day one			
4.	AP should have 1x10/100/1000 Ge POE LAN port			
5.	802.11 a/b/g/n/ac functionality certified by the Wi-Fi alliance.			
6.	Access Point can have integrated or external Antenna.			
	AP should support Max transit Power up to 21 dBm on 2.4 Gz and 5 Ghz radio. OEM to give a			
7.	undertaking letter stating that the AP will configured as per WPC guidelines for indoor AP and			
	also submit the WPC certificate showing approval.			
8.	Should support 8x BSSID per AP radio.			
9.	Access point should support 802.11ac beam forming for 802.11ac.			
	The access point should be capable of performing security scanning and serving clients on the			
10.	same radio. It should be also capable of performing spectrum analysis and security scanning			
	using same radio.			
11	Should support BPSK, QPSK, 16-QAM, 64-QAM and 256 QAM (256 QAM for 802.11ac only)			
11.	modulation types			
12.	Access point should support 802.3af/at POE standard.			
13.	Access point should have option of external power adaptor as well.			
14.	Access point should have console port.			
15.	Must support Proactive Key Caching and/or other methods for Fast Secure Roaming.			
16	Must support integrated wireless intrusion protection offers threat protection and mitigation,			
10.	and eliminates the need for separate RF sensors and security appliances.			
17	AP model proposed must be able to be both a client-serving AP and a monitor-only AP for			
17.	Intrusion Prevention services			
10	The Access Point should have the technology to improve downlink performance to all mobile			
10.	devices.			
19.	Access point must incorporate radio resource management for power, channel, coverage hole			
	detection and performance optimization			

#	Minimum Requirement	
20.	Support fair distribution of air time in a mixed environment (11ac, 11n, 11a, 11g and 11b	
	clients)	
21.	Support continuously steers clients to 5Ghz radio, even post association to move capable	
	clients to a cleaner RF spectrum	
22.	Support continuously balances clients across the available number of APs and channels for	
	increased system throughput	
23.	Support DoS attack identification and classification without an additional appliance	
24.	AP should support Temperature: 0* C to +40* C and Humidity: 5% to 90% non-condensing	
25.	AP should have Kensington lock slot.	
26.	AP should support standalone mode/ Inbuilt Virtual controller mode for specific requirements.	
27	AP should have certification - UL 2043, EN 300 328 or EN 301 489 or EN 301 893, UL/IEC/EN	
27.	60950EN	

4.5.23 WIFI Controller

#	Minimum Requirement				
	Make:				
	Model:				
1.	WLC must be compliant with IEEE CAPWAP or equivalent for controller-based Wireless				
	LANs(WLANs)				
2.	The proposed architecture should be based on centralized controller with thin AP deployment.				
	AP's should download OS and configuration from controller for improved security.				
3.	WLC should be dedicated appliance with support for upto 500 Access points. Should be				
	single/multiple appliance in High Availability mode. Should have 4 nos. 10 Gig SFP+ ports and				
	minimum 2 nos. of four dual-media (1000BASE-X or 10/100/1000BASE-T) ports for LAN. Shall				
	be supplied with minimum 50AP, s and advance WIPS license from day 1.				
4.	Controller should have atleast 20 GBPS of stateful firewall throughput per appliance				
5.	Controller should have console port and USB port.				
6.	Controller should have dual firmware storage				
7	The controller should have capacity to handle minimum 10000 or more concurrent				
7.	devices/users.				
8.	Redundancy Features: Active: Standby; Active: Active and 1: Many redundancies. Licenses of				
	each Wireless switch/Controller should be aggregated so that all the licenses are usable.				

#	Minimum Requirement		
9.	The controller should support 802.11ax (Wi-Fi 6), WPA3, and Enhanced Open- and existing		
	standards.		
10.	The Controller must support an ability to dynamically adjust channel and power settings based		
	on the RF environment.		
11.	The Controller RF management algorithm must allow adjacent APs to operate on different		
	channels, in order to maximize available bandwidth and avoid interference.		
	The Controller must support interference detection and avoidance for both Wi-Fi and non-Wi-		
12.	Fi interferes. Quoted Access point must support necessary spectrum analysis functionality to		
	achieve this.		
13	Must support coverage hole detection and correction that can be adjusted on a per WLAN		
15.	basis.		
	The controller should support advance QOS to implement role-based access for data, voice		
14.	and video applications. It should support session prioritization as well like Voice, Video, Data		
	of MS Lync should get different QOS.		
15	Controller should able to detect 2600+ applications for Application based QOS, Access Control		
10.	per use roar per SSID.		
16.	Rules for access rights should be based on any combination of time, location, user identity and		
10.	device identity.		
	The controller/overlay solution should provide differentiated access for Guests and staff group		
17	on same SSID, Guests should have restricted access like not able to telnet & SSH to servers		
-/.	while connecting on same SSID similarly other ROLE BASED ACCESS policy support should be		
	available for differentiated access.		
18	The controller should provide latest network authentication (WEP, WPA, WPA2, WPA3) and		
10.	encryption types like DES/3DES, TKIP and AES.		
19.	Controller should support reliable fast roaming standards 802.11k/r		
20.	Controller should support management frame protection.		
21	Solution must support per user Rate limiting control, like employee should get 4 MBPS and		
21.	guest should get 2 mbps on same SSID.		
	The Controller Should provide a dashboard of spectrum quality in terms of the performance		
22	and impact of interference on the wireless network identifying the problem areas, channel		
22.	utilization. Quoted Access Point should support this feature to send necessary data to		
	controller.		

#	Minimum Requirement			
23.	The Controller should provide a spectrum Quality detail on a per-radio basis to help gauge the			
	impact of interference on the network. Quoted Access Point should support this feature to			
	send necessary data to controller.			
	Advance WLAN Security			
	The WLAN solution should have the HW to implement advance WIDS & WIPS from day 1 to			
24	provide advanced spectrum analysis and wireless intrusion protection (WIPS/WIDS) to help			
24.	identify and mitigate Wi-Fi and non-Wi-Fi sources of interference, as well as containment of			
	potential security risks			
25.	WIPS solution should Automatically blacklist clients when it attempts any attack.			
	WIPS solution should detect & prevent an Ad-hoc connection (i.e. clients forming a network			
26.	amongst themselves without an AP) as well as windows bridge (client that is associated to AP			
	is also connected to wired network and enabled bridging between two interfaces)			
27	The system should detect an invalid AP broadcasting valid SSID and should prevent valid clients			
27.	getting connected from these AP's.			
28.	WIPS Solution should track the location of interferer objects.			
20	For advance forensic WIPS solution should perform spectrum analysis to detect and classify			
25.	sources of interferences up to 10 Categories like Bluetooth, microwave, cordless etc.			
30.	System should provide upto 10 chart for real-time troubleshooting and visualization			
	The WIPS solution should support Automatic rule-based classification, Wireless containment			
31.	via tar pitting and able to detect and locate the rogue access point on floor maps once			
	detected.			
	The WIPS solution should support Impersonation Detection and Prevention like			
22	- Hotspotter attack detection			
52.	- MAC address spoofing			
	- AP impersonations			
	The WIPS solution should support Client Intrusion Prevention			
33.	- Honeypot AP protection			
	- Valid station protection			

4.5.24 Dome Camera

#	Parameter	Minimum Requirement		
Make:				
Model:				
mum 4 MP or				

automatically				
id be at least				
reams (H.265,				
P, UDP, IGMP,				
TP, ARP				
st alarm video				
1X				

#	Parameter	Minimum Requirement	
21.	Audio Interface	1 Ch Input / I Ch Output	
22.	Audio Codec	G.711/ G.726	
23.	On board Storage	Support upto 128 GB or better	
	General Camera		
	Features		
24.	Operational	-10°C to 50 °C	
	Temperature °C		
25.	Casing	IP66 or better rated housing and Vandal proof rating IK10	
26.	Power	PoE IEEE 802.3af class0, DC12V/ AC24V	
27.	Certifications	UL/EN.FCC.CE, BIS, ROHS	

4.5.25 PTZ Joystick

#	Minimum Requirements		
Ma	Make:		
Мо	del:		
1.	The Digital Keyboard (Joystick) shall be fully functional, multipurpose keyboard used for		
	controlling of connected PTZ Camera.		
2.	Digital Keyboard shall include an integral variable speed Pan/Tilt/Zoom joystick and shall be		
	able to select PTZ Camera.		
3.	Digital Keyboard shall support RS-232/RS-485 or Ethernet or USB port connectivity and shall		
	be supplied along requisite interface units.		
4.	The Digital Keyboard (Joystick) should be ONVIF compliant and supports all features/		
	functionality of the VMS and NVR.		

4.5.26 Command Control Center Desk & Interior

#	Minimum Requirement		
	Make:		
	Model:		
1.	Scope of Work: The scope of the project includes designing; engineering, supply &		
	installation of 24X7 mission critical Control Centre Interiors. Being a project of National		
	repute this state- of-the-art facility & all its components like ceiling, flooring, control desk,		
	paneling, Glass partitions, ceiling light & luminaire's electrical etc. shall be treated as a part		
	of one single solution i.e. control room. To ensure an integrated solution, to qualify as per		
	the international control room design & safety norms. These packages should have been		

#	Minimum Requirement		
	executed on or before Bid release date. Supporting work orders and completion		
	appreciation certificates to be enclosed along with the bid. Conventional office designers		
	shall be deemed unacceptable. All the certifications mentioned here under and in BOQ		
	should be submitted along with the bid. Main bidder to submit MAF from Control Room		
	Solution Provider for entire control room solution, MAF to be enclosed along with the bid.		
	Designing, manufacturing, testing, integration etc., all complete, preparation of the related		
2.	drawings, documents, etc. of the Control room shall be in the supplier's scope. The Control		
	room design shall confirm the requirements & specifications of this bid document		
	The Metal Paneling and Designer Metal Ceiling shall be RoHS certified (from UL / Intertek) to		
	ensure restriction of hazardous substance so that the final product does not contaminate		
2	the environment and we give a healthy life to our coming generations. Conventional grid		
3.	type ceilings shall be deemed unacceptable in the main control room area. Valid RoHS		
	certificate (from UL / Intertek) must be submitted along with the bid or can be submitted		
	during execution.		
	The proposed wall paneling and ceiling tiles should be tested and certified for surface spread		
4.	of flame and smoke generation. This is mandatory to ensure that the materials used in the		
	interiors do not provoke fire.		
	Safety of User & control room equipment safety is a high concern area therefore, The test		
5.	must be carried out by authorized government agency. Certificate to be enclosed with the		
	Technical bid for project level approval.		
	Sound transmission class (STC) value should be 35 for Wall Paneling & Partition (According		
C	to IS: 9901 (Part III) – 1981, DIN 52210 Part IV- 1984, ISO: 140(Part III) -1995, test report from		
6.	reputed agency to be submitted along with the technical bid or Can be submitted during		
	execution phase.		
	The control desk solution shall conform to high standard of engineering as mentioned in the		
7.	document; meeting the specified codes, standards and designs. It shall be capable of		
	performing 24X7 operations under the specified environmental condition.		
8.	Illumination: - Control Room illumination shall be designed as per ISO 11064 norms		
	Structure: - Made of heavy duty Extruded Vertical and Horizontal Aluminum profiles of		
0	HE9WP grade. The Extrusions shall be duly powder coated with 40+ microns over all surfaces.		
9.	All sheet metal parts must be finished with a durable, black, electrostatic powder coating.		
	OEM must be FSC certified.		

#	Minimum Requirement		
	To allow future extension and expansion, a weld free system shall be proposed.		
10.	Interconnecting joints shall not be visible. The structure shall allow easy assembly of Hinged		
	Shutters, Slat wall, Gland Plate, Monitor arms in extremely rigid manner.		
	Table top: - The material of the working surface should be minimum 25 mm thick MDF with		
High Pressure ANSI/NEMA LD3 certified scratch-resistant Laminate.			
	2. The entire design proposal must be Flexible, Dynamic, Scalable, Expandable and		
11	redeployable to accommodate any technological changes / future needs which are not		
11.	envisaged now. Hence 100% modular interior system (pre-fabricated and ready to install)		
	solution is required. Modularity shall also help in quick and easy up-gradation.		
12	3. The non-uniform gaps between the designer metal ceiling and the adjacent walls/partition		
12.	shall be covered with calcium silicate ceiling.		
	Acoustic Flooring: - The decorative flooring shall reduce impact sound by 14dB (ISO 717-2)).		
13.	It shall be twin-layer linoleum built up from 2 mm acoustic laminate and 2 mm Corkment		
	backing.		

5 Data Centre & Disaster Recovery Centre

5.1 Functional Requirements

The Planning, Design and Implementation Services for Data Centre transformation combine the people, processes and technology, with the program and project management necessary to transform a client's existing data centers into ones that provide business agility at a lower cost, a wide range of services for discovery, analysis, optimization, virtualization and migration of data centers that can complement client efforts and fill gaps in client skills and capacities.

Various aspects of the data centers include:

- Tier III based Architecture
- Facilities: layout, power/cooling, physical security;
- System infrastructure: servers, networking (with LAN), storage, and security;
- Applications, infrastructure mapping & dependencies;
- Service management and operations considerations
- Design Standard: as per state data center meity guideline. <u>https://meity.gov.in/writereaddata/files/guidelines.pdf</u>
- The availability of data must be guaranteeing to 99.99% availability.
- Receiving Power: Commercial power substation next to DC
- UPS: UPS system with N+N redundancy
- Generator: Gen-set with N+1 redundancy
- Power Provision: Dual power feed, PDU sources to each rack, Power supply to a rack as per requirement

IT operations are a crucial aspect of most organizational operations around the world. One of the main concerns is business continuity, administration relies on their information systems to run their operations and surveillance. If a system becomes unavailable, surveillance & operations may be impaired or stopped completely. It is necessary to provide a reliable infrastructure for IT operations, in order to minimize any chance of disruption.

Information Security is also a concern, and for this reason a Data Centre has to offer a secure environment which minimizes the chances of a security breach. A Data Centre must therefore keep high standards for assuring the integrity and functionality of its hosted computer environment. This is accomplished through redundancy of both fiber optic cables and power, which includes emergency backup power generation.

5.1.1 Scope of Requirement

- MSI shall be responsible for detail designing and Solutions architecture of required Infrastructure, setup, applications of BSCL and premise shall be software defined data center which has zero dependency on the proprietary hardware.
- II. MSI is required to prepare and submit along with their technical proposal, the details of methodologies and computations for sizing and capacity of storage, compute, backup, network and security resources.
- III. Understanding the existing Infrastructure, setup, software, applications of BSCL and planning for DC-DR solution
- IV. MSI must ensure that virtual machine is into separate network tenant and virtual LAN. Also, Micro segmentation shall be part of solution architecture which enables the fine-grained security policies to be assigned to data center applications down to workload level.
- V. MSI must ensure that virtual machines are having private IP network assigned to VM.
- VI. MSI must ensure that all the managed hosted VMs are in same network segment (VLAN) even if they are spread across DC-DR
- VII. In case of scalability like horizontal scalability, the MSI should ensure that additional require network is provisioned automatically of same network segment.
- VIII. MSI must ensure that the public network provisioned for VMs is redundant at every point.
- IX. MSI must ensure that VMs are accessible from BSCL private network if private links P2P/MPLS is used.
- X. MSI must ensure that there is access to VMs if there is a requirement to access it using IPSEC/SSL or any other type of VPN.
- XI. MSI should ensure that VM network is IPv4 and IPV6 compatible with segregated ports.
- XII. MSI should have provision of dedicated virtual links for data replication between their multiple datacenter in order to provide secure data replication for DR services.
- XIII. MSI should ensure use of appropriate load balancers for network request distribution across multiple VMs.
- XIV. MSI shall propose the system which has the capacity planning built into the system which provides BSCL the transparent view of the system resources used and required for future expansion.
- XV. MSI shall provide the capabilities to assign role-based access and ability to templatelize the VM, Application based on the workload.
- XVI. MSI shall propose the system which has ability to define redundancy level for each workload across the cluster.

- XVII. Reduction in data center footprint over traditional siloes architecture for power, cooling and space savings.
- XVIII. MSI shall require while architecting the solution which works on the software defined data center conceptualization inside the firewall & further workloads which cannot be virtualized on bare metal or physical server that shall be used for the software defined storage pool.
 - XIX. MSI is required to locate all hardware/software and related items as per design offered for smart city infrastructure including SLA monitoring and Help desk management, in above data Centre complying with standard guidelines as per Telecommunications Infrastructure UPTIME/TIA-942.
 - XX. Data Centre shall be available for 24 x 365 operation.
- XXI. Smart city infrastructure shall have built in redundancy and high availability in computing and storage to ensure that there is no single point of failure.
- XXII. Minimum Guiding factors for selection of Data Centre: Following are benchmark requirements which should act as guiding factors for MSI to select and propose locations for Data Centre
- XXIII. Video feeds shall be stored on SAN Storage for all cameras for 24 hours (Video storage required to be stored on Centralized Primary storage for 15 days & 30 Days on Secondary Storage at Data Center).
 - a. Primary Storage capacity for 15 Days, bidder to calculate the capacity.
 - b. Secondary Storage capacity for 30 Days, (these days inclusive of 15 days of primary storage Data along with the archival storage capacity).
 - c. Total of 30 days storage of all the CCTV camera feeds on Primary Storage to Secondary LTO Storage.
 - d. Flagged data (critical incidents) will be stored for approximately 365 days, permanent storage envisaged on Disk / Tapes.
- XXIV. The bidder shall get the security audited by third party expert periodically (once in a year) and as and when there is significant upgradation of systems which include hardware, software and network resources to ensure and guarantee security of the Data Centre. The audit shall bring out any security lapses in the system and establish that the system is working as desired by the State

5.1.2 Databases

Any commercially available database shall be provided along with license and support & upgrade costs.

S. No.	Minimum Requirement	
1.	The Proposed Databases should be compatible with the various smart city applications	
	proposed to be hosted with in BSCL DC.	
2.	Database License should be un-restricted, to prevent any non-compliance in an event of	
	customization & integration	
3.	Databases shall support multi hardware and Operating System platform.	
	Database shall provide standard access Tool for administering the database. The tool	
4.	should be able to monitor, maintain and manage the database instance, objects, and	
	packages.	

5.1.3 Functional & Technical Requirements for Intranet Router & Internet Router

5.1.3.1 Functional Requirement

The proposed solution should provide with multiple design models to address a variety of WAN technologies and resiliency options along with SDWAN capabilities. The solution can be deployed over combinations of private (MPLS) and public (Broadband-ADSL, 4G, LTE, E1/T1) networks and supports flexible topologies including full-mesh, hub & spoke and hybrid topologies per VPN with following feature set in mind. However ISP can offer any connectivity mode eg Broadband-ADSL, 4G, LTE, E1/T1, the router should be able to connect to it via Ethernet 1G or 10G link :

- The router shall facilitate all applications like voice, video and data to run over a converged IP infrastructure along with hardware assisted IPSEC support over Internet & Intranet router and Network Address Translation (NAT) capability from day 1. The router should also support hitless interface protection, In-band and out-band management, Software rollback feature, Graceful Restart, non-stop routing for OSPF, BGP, LDP, MP-BGP etc. The platform shall have modular software that will run service & features as processes having full isolation from each other. Note : NAT is required from Day 1 on Internet Router and IPSEC support is required on both the Routers.
- The Router should have individual dedicated control plane processor and data plane processor module. Data plane Processor module should be independent of the control plane Processor. Control plane Processor should have support for internal memory to support multiple software images for backup purposes and future scalability. The router processor architecture must be multi-processor based and should support hardware accelerated, parallelized and programmable IP forwarding and switching.
- The router shall meet the following requirements for security:
 - Firewall service support in hardware on all interfaces for enhanced security to protect the backbone from malicious activities over Internet and Intranet Router.

- Access Control List to filter traffic based on Source & Destination IP Subnet, Source & Destination Port, Protocol Type (IP, UDP, TCP, ICMP etc) and Port Range etc. Router should support deep and stateful packet inspection to recognize a wide variety of applications
- It should also perform traffic Classification using various parameters like source physical interfaces, source/destination IP subnet, protocol types (IP/TCP/UDP), source/destination ports, IP Precedence, 802.1p, DSCP and by some well-known application types through Application Recognition techniques.
- The Router shall support Strict Priority Queue or Low Latency Queue and have hierarchical QOS (Inbound and Outbound).
- The back-plane architecture of the router must be modular and redundant. The back-plane bandwidth must be 20 Gbps from day one with minimum scalability upto 30 Gbps with minimum routing performance of 20 mpps from day one scalable upto 30 mpps, with minimum three (3) open slots.
- The Router should be minimum EAL2/Applicable Protection Profile (NDPP) certified under the Common Criteria Evaluation Program and IPv6 certified.

#	Parameter	Minimum Specifications
	Make:	
	Model:	
1.	Architecture	Router should have redundant controller cards and should support stateful switchover, non-stop forwarding, Non-stop routing and Graceful restart. Router should be CE2.0 certified Router shall support MEF for Ethernet based services like PW, VPLS or ATOM. Router shall support sync any configurations from previous modules to new modules with hot-swap event occurred The router should have redundant control & data plane. The router shall support following type of interfaces – 10GE, 1GE
		interfaces, 10G,
		All the Ports and card on Router should be hot swappable and field
		replacement of port or card should not require to bring down the chassis.
2.	Performance	Router shall support 60 Mpps forwarding performance for IPv4 & IPv6
		performance

5.1.3.2 Technical Requirement for Intranet Router

#	Parameter	Minimum Specifications
		The router should support 20Gbps per slot throughput.
		Router shall support 16000 Mac addresses
		Router shall support 700,000 IPv4 routes
		router shall support 4000 queues and 128 MPLS VPN's
		Router shall support aggregation of links. Minimum 8 links should be
		supported as part of single aggregation
		Router shall support IPSLA or equivalent and Y.1731 for performance
		monitoring
		Router should support Redundant Power Supply and should also support
		Online insertion and removal of same.
		Fan tray should be hot-swappable and should be a Field Replaceable Unit
2	High	(FRU). The node can run indefinitely with a single fan failure. Shall Support
5.	Availability	hot-swappable for all modules. And secure normal operations when hot-
		swap event occurred
		Router shall support MPLS-TE with FRR for sub 50 msec protection.
		Router must support Traffic Engineering for node and link protection.
		Router shall support IPV4 and IPV6, IGMP V2/V3, MLD, IGMP and PIM, 6PE
		and 6VPE mode for IPV6 transport over IPV4, ECMP, LDP, BGP Prefix
		independent control (EDGE and Core) for IPV4 and IPV6, BGP, ISIS, OSPFv2
		and V3, RSVP, VRRP and Traffic Engineering
1	Protocol	Router should support high availability for all BFD, BGP, OSPF and IS-IS and
ч.	Support	no packet loss during controller switch over.
		Router should support RFC 3107 of Carrying Label Information in BGP-4
		The Router should support Point to Point and Point to Multipoint LSP for
		Unicast and Multicast traffic.
		Router shall support layer3 and layer2 MPLS VPN.
		Router shall support HQOS on all kind of interface in both ingress and
5.		egress direction. Similar QOS shall be supported for all type of interface
		including Bundled interfaces.
	QoS Features	Shall support Ingress classification, marking and policing on physical
		interfaces and logical interfaces using source/destination IP subnet,
		protocol types (IP/TCP/UDP), source/destination ports, IP Precedence,
		MPLS EXP, DSCP,802.1p

#	Parameter	Minimum Specifications
		Shall support Strict Priority Queuing or Low Latency Queuing to support
		real-time application like Voice and Video with minimum delay and jitter.
		Congestion Management: WRED, Priority queuing, Class-based weighted
		fair queuing
		Support Access Control List to filter traffic based on Source & Destination
	Socurity 9	IP Subnet, Source& Destination Port, Protocol Type (IP, UDP, TCP, ICMP
6.	Security &	etc.) and Port Range etc. Should Support per-user Authentication,
	Management	Authorization, and Accounting through RADIUS or TACACS and
		SNMPv1/v2/V3
	Operating	
7.	Environmental	0ºC to 40ºC operating temperature and 10 to 90%, non-condensing
	Requirements	
	Interface	The proposed router should support the following from day1: - 4 x10G SFP+
0		ports supplied with 2 x10G single mode transceiver, 2 x10G multi-mode
0.		transceiver, 8x1G SFP ports supplied with 4x1G single mode transceiver,
		4x1G multi-mode transceiver
9.	Certifications/	The proposed router should be EAL2/ NDPP certified or equivalent as per
	OEM Criteria	industry standards at the time of delivery. The router should be IPv6 ready
		from day-1.

5.1.3.3 Technical Requirement for Internet Router

#	Parameter	Minimum Specifications
	Make:	
	Model:	
	Architecture	The Router should have individual dedicated control plane processor and
		data plane processor module. Data plane Processor module should be
		independent of the control plane Processor. Control plane Processor should
1.		have support for internal memory to support multiple software images for
2.		backup purposes and future scalability. The router processor architecture
		must be multi-processor based and should support hardware accelerated,
		parallelized and programmable IP forwarding and switching.
		The router shall facilitate all applications like voice, video and data to run
		over a converged IP infrastructure along with hardware assisted IPSEC
		support over Internet Router and Network Address Translation (NAT)

#	Parameter	Minimum Specifications
		capability from day 1. The router should also support interface protection,
		In-band and out-band management, Software rollback feature, Graceful
		Restart, non-stop routing for OSPF, BGP, LDP, MP-BGP etc. The platform
		shall have modular software that will run service & features as processes
		having full isolation from each other
		The router shall provide sub-second IGP convergence, NSF/SSO/NSR, TE
2		FRR, VRRP and ISSU for high availability. The router shall support fast BGP
5.		route convergence for IP and MPLS VPN routes with no dependency of the
		BGP routing table size.
		The router line card must support following interface: Fast Ethernet, Gigabit
4.		Ethernet, Channelized, 10G Ethernet, Ports. Support for these port
		requirements can be considered optional for Internet routers
		Backplane Architecture: The back-plane architecture of the router must be
		modular should have and redundant control plane. The back-plane
5.	Performance	bandwidth must be 20 Gbps from day one with minimum scalability up to
		30 Gbps with minimum routing performance of 20 mpps from day one (1)
		scalable up to 30 mpps, with minimum three (3) open slots.
		The Router should have individual dedicated control plane processor and
		data plane processor module. Data plane Processor module should be
		independent of the control plane Processor. Control plane Processor should
6.		have support for internal memory to support multiple software images for
		backup purposes and future scalability. The router processor architecture
		must be multi-processor based and should support hardware accelerated,
		IP forwarding and switching.
		The router should support the IPv4 and IPv6 DUAL-stack in hardware and
7		software. The router should support minimum 450k IPv4, IPv6 routes from
7.		day one (1) & scalable to minimum 1MN IPv4, IPv6 unicast routes, should
		have min 12K Multicast routes & 500 IGMP groups from day one.
		The router shall have RIPv1, RIPv2, RIPng, BGP, OSPFv2 & v3, Policy Based
	Protocol Support	Routing for both IPv4 & IPv6, IP Multicast Routing Protocols to facilitate
8.		applications such as streaming, webcast, command & control including PIM
		SM, PIM SSM, GRE (Generic Routing Encapsulation) Tunneling with 1000
		tunnels enabled from day one

#	Parameter	Minimum Specifications
		Router should support following MPLS features – LDP, Layer 2 VPN such as
		EoMPLS with LDP signaling, Route Reflector (RR), Traffic Engineering with
		RSVP-TE, Fast Reroute Link Node & Path protection enabled from day one.
		Support for these features can be considered optional for Internet routers
0		The Router shall support Strict Priority Queue or Low Latency Queue and
9.		have hierarchical QOS (Inbound and Outbound).
	QoS Features	The router shall perform traffic Classification using various parameters like
10.		source physical interfaces, source/destination IP subnet, protocol types
		(IP/TCP/UDP), source/destination ports, IP Precedence, 802.1p, DSCP
		The router should have support for hardware enabled Network Address
11		Translation (NAT) from day 1 and Port Address Translation (PAT). The router
11.		shall support NAT6to4 function. Mention the number of sessions that it can
		support. The router shall support vrf aware NAT function.
		The router shall meet the following requirements for security: Access
10		Control List to filter traffic based on Source & Destination IP Subnet, Source
12.		& Destination Port, Protocol Type (IP, UDP, TCP, ICMP etc) and Port Range
	Socurity	etc
	Feature	The router shall support firewall service in hardware on all interfaces for
		enhanced security to protect the backbone from malicious activities. The
13.		firewall performance shall be at least 5 Gbps (internal/external). In case of
		external firewall, bidder should propose the firewall with necessary 10G
		interface and redundant power supply.
		Router should have at least 1 Gbps of IPSEC throughput from day one. In
1/		case of external VPN box, bidder should propose the hardware with
14.		necessary 10G interface and redundant power supply. The proposed router
		should have embedded support for 2000 IPsec tunnels from day one.
		The router must support management through SNMPv1/v2/v3, support
	Management	RADIUS and TACACS. The router must role based access to the system for
15		configuration. The router shall be provided with IETF standards based
		feature so that granular traffic analysis can be performed for advanced
		auditing, usage analysis, capacity planning or generating security telemetry
		events, also the router shall have SLA monitoring tools to measure state of

#	Parameter	Minimum Specifications
		the network in real time. The SLA operations shall provide information on
		TCP/UDP delay, jitter, application response time, Packet Loss etc.
16.	Interface	Router should be provided with 6 x 1 GE port with required transceivers as
	Requirements:	per solution & min 4 x 10 gig interface
17.	Compliance/	The Router should be minimum EAL2 / Applicable Protection Profile (NDPP)
	Certifications	certified under the Common Criteria Evaluation Program

5.1.4 Functional & Technical Requirements for Interconnecting (POE) Switch

#	Minimum Specifications		
	Make:		
	Model:		
1	19" Rack Mountable stackable switch with min 24 Nos. 10/100/1000 copper input POE (15.4W)		
1.	ports and additional support of 4x10 G SFP, support for /internal redundant power supply.		
2	Switch should support for minimum 96 Gbps of forwarding throughput & minimum 70 mpps		
2.	forwarding rate		
2	The switch should support dedicated stacking port separate from uplink ports with 80 Gbps of		
5.	stacking bandwidth to put minimum 8 switches into a single stack group.		
4.	Switch should have static, default IP routing enabled from day one.		
-	Switch shall have IEEE 802.3ad Link Aggregation Control Protocol (LACP) with up to 8 links		
5.	(ports) per trunk.		
6	It shall have IEEE 802.1s Multiple Spanning Tree Protocol and provide legacy support for IEEE		
0.	802.1d STP and IEEE 802.1w RSTP or equivalent technology and static routes.		
7	Switch should have feature to protect access ports using port security, TACACS/TACACS+,		
/.	Radius, storm control, Access Control List both ports, VLAN based.		
Q	Switch should have queuing as per IEEE 802.1P standard on all ports with mechanism for traffic		
0.	shaping and rate limiting features for specified Host, network, Applications etc.		
9.	Should have Power supply 230 Volt 50Hz input		
10	The switch should support IPv6 Guard, IPv6 RA-Guard, IPv6 DHCP- Guard, Source-Guard		
10.	features		
11	Switch should support automated image installation, configuration & automatic configuration		
11.	of per port QoS to reduce switch provisioning time & effort.		
12.	Must have SNMP v1, v2, v3 from day one		

#	Minimum Specifications
13.	Should have CLI or GUI based management console port
14.	The switch should support IEEE 802.3az from day-1
15.	The switch should be IPv6 ready
16	The proposed switch should be EAL2/ NDPP certified by common Criteria body at the time of
-0.	delivery

5.1.5 Functional & Technical Requirements for Core/ Spine Switch

#	Parameter	Minimum Specifications
	Make:	
	Model:	
		The core/ spine layer switches should have hardware level redundancy
1.		(1+1) in terms of data plane and control plane. Issues with any of the plane
		should not impact the functioning of the switch.
		The switch should have redundant CPUs working in active-active or active-
2.		standby mode. CPU fail over/ change over should not disrupt/ impact/
		degrade the functioning the switch.
		The Switch should support non-blocking Layer 2 switching and Layer 3
3.		routing. Switch with different modules should function line rate and
	General	should not have any port with oversubscription ratio applied
	Requirement	Switch should support in line hot insertion and removal of different parts
1		like modules, power supplies, fan tray etc. This should not require
4.		rebooting of the switch or create disruption in the working/functionality
		of the switch
5.		Switch should support the complete STACK of IP V4 and IP V6 services.
6.		Switch and optics must be from the same OEM
		Switch should support non-blocking, wire speed performance per line card
7.		and a minimum throughput of 3 Tbps per line card, the chassis should have
		minimum six I/O slots
8.		Switch should have the following interfaces:
	Hardware and	Minimum 30 nos. of line rate and Non - Blocking 40/100G ports fully
9.	Interface	populated with 100G Bidi transceivers
10	Requirement	Switch should have adequate power supplies for the complete system
10.		usage, providing N+1 redundancy

#	Parameter	Minimum Specifications
		Switch should support IEEE Link Aggregation and Ethernet Bonding
		functionality to group multiple ports for redundancy
11		The switch should support 500K IPv4 routes or above. Licenses if any for
11.		the same shall be quoted along with the switch.
12	Performance	The switch should support hardware-based load balancing at wire speed
12.	Requirement	using LACP and multi chassis ether channel/LAG
12		Switch should support total aggregate minimum 16 Tbps minimum of
15.		switching capacity
14.		Switch should support VXLAN (RFC7348) and EVPN control plane
15.		Switch should support Open Flow/Open Day light/Open Stack controller
16		Switch must support VXLAN Switching/Bridging and VXLAN Routing
10.		without any performance degradation
17.		Switch should support minimum 250,000 no. of MAC addresses
18.		Switch should support Jumbo Frames up to 9K Bytes on 100G Ports
	Layer2 Features	Support for broadcast, multicast and unknown unicast storm control to
19.		prevent degradation of switch performance from storm due to network
		attacks and vulnerabilities
20.		Switch should support Segment Routing/MPLS
21.		Switch should support Policy Based Routing
22.		Switch should provide multicast traffic reachable using:
23.	Laver3 Features	a. PIM-SM
24.		b. PIM-SSM
25.		c. Support RFC 3618 Multicast Source Discovery Protocol (MSDP)
26.		d. IGMP V.1, V.2 and V.3
27.		Switch should support Multicast routing
28.	Availability	Switch should support for BFD For Fast Failure Detection
29.	Quality of Service	Quality of Service Switch should have a minimum buffer of 100 Mb
30.		Switch should support for Role Based access control (RBAC) for restricting
		host level network access as per policy defined
31.	Security	Switch should support for external database for AAA using:
32.		a. TACACS+
33.		b. RADIUS

#	Parameter	Minimum Specifications
34.		Switch should support MAC ACLs
35.		Should support Standard & Extended ACLs using L2, L3 and L4 fields
		Switch should support for predefined and customized execution of script
36.		for device mange for automatic and scheduled system status update for
		monitoring and management
37.	Manageability	Switch should provide different privilege for login in to the system for
		monitoring and management
38.		All relevant licenses for all the above features and scale should be quoted
		along with switch
39.	Compliance/	The proposed switch should be EAL2/ NDPP or higher certified by
	Certification	common Criteria body

5.1.6 Functional & Technical Requirements for TOR/ Leaf Switch

5.1.6.1 Leaf Fibre

#	Parameter	Minimum Specifications
	Make:	
	Model:	
1.		The Switch should support line rate & non-blocking Layer 2 switching and Layer 3 routing
2	Solution	There switch should not have any single point of failure like power
	Requirement	supplies and fans etc should have 1:1/N+1 level of redundancy
3.		Switch and optics must be from the same OEM
4.		Switch should support the complete STACK of IP V4 and IP V6 services.
5.		Switch should have the following interfaces:
	Hardware and	a. 48 x 1G/10G/25G Multi Mode Fiber Interface
	Interface	b. 6 x 100GbE QSFP ports fully populated with 100G Bidi transreceiver
6.	Requirement	Switch should support native 25G ports
7.	. nequirement	Switch should support 25G SR optics with OR without the use of DAC cables (with integrated optics)
8.		The switch should support 100,000 IPv4 routes or above
9	Performance	The switch should support hardware based load balancing at wire speed
J.	Requirement	using LACP and multi chassis ether channel/LAG
10.		Switch should support minimum 3.6 Tbps of switching capacity

#	Parameter	Minimum Specifications
11.	Advance	Switch should support VXLAN (RFC7348) and EVPN control plane
12	Features	Switch must support VXLAN Switching/Bridging without any performance
12.	reatures	degradation
13.		Switch should support minimum 92,000 no. of MAC addresses
14.		Switch should support Jumbo Frames up to 9K Bytes on all Ports
		Support for broadcast, multicast and unknown unicast storm control to
15.		prevent degradation of switch performance from storm due to network
		attacks and vulnerabilities
16.		Switch should support Policy Based Routing
17.	Layer2 Features	Switch should provide multicast traffic reachable using:
		a. PIM-SM
		b. PIM-SSM
		c. Support RFC 3618 Multicast Source Discovery Protocol (MSDP)
		d. IGMP V.1, V.2 and V.3
18.		Switch should support Multicast routing
19.		Switch should support for BFD For Fast Failure Detection
20.	Quality of Service	Switch should have a minimum buffer of 12 Mb
21		Switch should support control plane i.e. processor and memory Protection
21.		from unnecessary or DoS traffic by control plane protection policy
22.		Switch should support for external database for AAA using:
23.		a. TACACS+
24.	Security	b. RADIUS
25		Switch should support for Role Based access control (RBAC) for restricting
23.		host level network access as per policy defined
26.		Switch should support MAC ACLs
27.		Should support Standard & Extended ACLs using L2, L3 and L4 fields
28.		Switch should support WRED
29.		Switch should support for predefined and customized execution of script
	Manageability	for device mange for automatic and scheduled system status update for
30.	managedomity	monitoring and management
		Switch should support Real time Packet Capture using Wireshark in real
31.		time for traffic analysis and fault finding

#	Parameter	Minimum Specifications
		All relevant licenses for all the above features and scale should be quoted
		along with switch

5.1.6.2 Leaf Copper

#	Parameter	Minimum Specifications
	Make:	
	Model:	
		The Switch should support line rate & non-blocking Layer 2 switching and
1.		Layer 3 routing
2	Solution	There switch should not have any single point of failure like power
2.	Requirement	supplies and fans etc should have 1:1/N+1 level of redundancy
3.		Switch and optics must be from the same OEM
4.		Switch should support the complete STACK of IP V4 and IP V6 services.
5.		Switch should have the following interfaces:
	Hardware and	a. 48 x 1/10 Gbps (RJ 45 Interface)
	Interface	b. 6 x 40 G QSFP ports fully populated with 40G Bidi transceivers
6	Requirement	Switch should support IEEE Link Aggregation and Ethernet Bonding
0.		functionality to group multiple ports for redundancy
7.		The switch should support 100,000 IPv4 routes or above
8	Performance	The switch should support hardware-based load balancing at wire speed
0.	Requirement	using LACP and multi chassis ether channel/LAG
9.		Switch should support minimum 1.4Tbps of switching capacity
10.		Switch should support VXLAN (RFC7348) and EVPN control plane
11	Advance Features	Switch must support VXLAN Switching/Bridging without any performance
		degradation
12.		Switch should support minimum 92,000 no. of MAC addresses
13.		Switch should support Jumbo Frames up to 9K Bytes on all Ports
	Layer2 Features	Support for broadcast, multicast and unknown unicast storm control to
14.		prevent degradation of switch performance from storm due to network
		attacks and vulnerabilities
15.		Switch should support Policy Based Routing
16.	Layer3 Features	Switch should provide multicast traffic reachable using:
		a. PIM-SM

#	Parameter	Minimum Specifications
		b. PIM-SSM
		c. Support RFC 3618 Multicast Source Discovery Protocol (MSDP)
		d. IGMP V.1, V.2 and V.3
17.		Switch should support Multicast routing
18.		Switch should support for BFD For Fast Failure Detection
19.	Quality of Service	Switch should have a minimum buffer of 12 Mb
20		Switch should support control plane i.e. processor and memory Protection
20.		from unnecessary or DoS traffic by control plane protection policy
21.	•	Switch should support for external database for AAA using:
22.	•	a. TACACS+
23.	Security	b. RADIUS
24.		Switch should support for Role Based access control (RBAC) for restricting
		host level network access as per policy defined
25.		Switch should support MAC ACLs
26.		Should support Standard & Extended ACLs using L2, L3 and L4 fields
27.		Switch should support WRED
	•	Switch should support for predefined and customized execution of script
28.	Managaability	for device mange for automatic and scheduled system status update for
	wanageability	monitoring and management
20		All relevant licenses for all the above features and scale should be quoted
29.		along with switch

5.1.7 Functional & Technical Requirement for SAN Switch

#	Minimum Specifications
	Make:
	Model:
1.	The fiber channel switch must be rack-mountable. Thereafter, all reference to the 'switch' shall
	pertain to the 'fiber channel switch'
2.	The switch to be configured with minimum of 48 ports 16 Gbps FC configuration backward
	compatible to 4/8.
3.	All 48 x FC ports for device connectivity should be 4/8/16 Gbps auto-sensing Fiber Channel
	ports.

#	Minimum Specifications	
4.	The switch must have hot-swappable redundant power supply & fan module without resetting	
	the switch, or affecting the operations of the switch.	
5.	5. The switch must be able to support non-disruptive software upgrade.	
6.	The switch must be able to support stateful process restart.	
The switch must be capable of creating multiple hardware-based isolated Virtual Fabr		
7	T11) instances. Each Virtual Fabric instance within the switch should be capable of being zoned	
/.	like a typical SAN and maintains its own fabric services, zoning database, Name Servers and	
	FSPF processes etc. for added scalability and resilience.	
8.	The switch must support up to 32 Virtual Fabric Instances.	
9	The switch must be capable of supporting hardware-based routing between Virtual Fabric	
5.	instances.	
10	The switch must support graceful process restart and shutdown of a Virtual Fabric instance	
10.	without impacting the operations of other Virtual Fabric instances.	
11.	The switch shall support hot-swappable Small Form Factor Pluggable (SFP) LC typed	
	transceivers.	
12.	The switch must support hardware ACL-based Port Security, Virtual SANs (VSANs), and Port	
	Zoning.	
13.	The switch must support Smart Zoning such that the entries in the TCAM is significantly	
	reduced and therefore increasing the overall scalability of the SAN Fabric.	
14.	The switch must support Power on Auto Provisioning (POAP) and Quick Configuration Wizard	
	for simplified operations.	
15.	Inter-switch links must support the transport of multiple Virtual Fabrics between	
16.	. switches, whilst preserving the security between Virtual Fabrics.	
17.	7. The switch must support routing between Virtual Fabric instance in hardware.	
18. The switch shall support FC-SP for host-to-switch and switch-to-switch authentic		
19. The switch must be able to load balance traffic through an aggregated link with Sou		
20.	ID and Destination ID. The support for load balancing utilizing the Exchange ID must also be	
	supported.	
21.	The switch must be equipped with congestion control mechanisms such that it is able to	
	throttle back traffic away from a congested link.	
22.	The switch must be capable of discovering neighboring switches and identify the neighboring	
	Fiber Channel or Ethernet switches.	
23.	The switch should support IPv6. It should support native switch based RESTful APIs	

#	Minimum Specifications	
24.	The bidder must provide at least 2 of these switches	
25.	The interface requirement mentioned here is the minimum. If the solution requires a greater	
	number of interfaces (considering 100% redundancy) then the same should be quoted	

5.1.8 Functional & Technical Requirements for Internet Firewall/ Intranet Firewall

#	Minimum Requirement		
	Make:		
	Model:		
	Firewall appliance should be supplied with at least 10 x 1GE RJ-45 interfaces and 16 x 10G		
1.	SFP+SR interfaces, 4 x40/100GE QSFP+ slots		
	(SFP Transceivers to be populated as per solution requirement		
2.	NGFW Throughput should be at least 22 Gbps		
3.	Firewall should have IPSec throughput of 20 Gbps		
4.	Firewall should support 450,000 new sessions per second		
5.	Firewall should support 40 Million concurrent sessions		
6.	The Firewall solution should support NAT64, DNS64 & DHCPv6		
	The proposed system shall be able to operate on either Transparent (bridge) mode to minimize		
7	interruption to existing network infrastructure or NAT/Route mode. Both modes can also be		
/.	available concurrently using Virtual Contexts. Minimum 10 Virtual Firewall licenses to be		
	provided with the solution		
	The physical interface shall be capable of link aggregation, otherwise known as the IEEE		
Q	802.3ad standard, allows the grouping of interfaces into a larger bandwidth 'trunk'. It also		
0.	allows for high availability (HA) by automatically redirecting traffic from a failed link in a trunk		
	to the remaining links in that trunk.		
9.	The proposed system should have integrated Traffic Shaping functionality.		
10	The Firewall should have integrated SSL VPN solution to cater to 1000 SSL VPN concurrent		
10.	users.		
11	The Firewall, IPSEC VPN, SSL VPN modules shall belong to product family which minimally		
11.	attain Internet Computer Security Association (ICSA) Certification.		
12.	The proposed system should support		
	a. IPSEC VPN		
	b. PPTP VPN		
	c. L2TP VPN		
	·		

#	Minimum Requirement	
	d. SSL VPN	
13.	. Proposed Solution shall have IPS	
14.	The device support inbuilt hardware VPN acceleration	
	NGFW should have a configurable actions like terminate a TCP session by issuing TCP Reset	
15.	packets to each end of the connection, or silently drop traffic in addition to sending a alert and	
	logging the incident	
16.	HTTP, HTTPS, SMTP, SMTPs, POP3, POP3s, IMAP, FTP etc	
17	The proposed system should be able to block or allow oversize file based on configurable	
17.	thresholds for each protocol types and per firewall policy.	
10	The NGFW solution should be able to integrate with the proposed on-premise Anti-APT	
10.	solution to scan for zero day malwares from Day 1	
	Application Control	
10	The proposed system shall have the ability to detect, log and take action against network traffic	
19.	based on over 2500 application signatures	
20.	The application signatures shall be manual or automatically updated	
21	The administrator shall be able to define application control list based on selectable application	
21.	group and/or list and its corresponding actions	
	High Availability	
22	The proposed system shall have built-in high availability (HA) features without extra cost/	
22.	license or hardware component	
23	The device shall support stateful session maintenance in the event of a fail-over to a standby	
25.	unit.	
24.	High Availability Configurations should support Active/ Active or Active/ Passive	
	Logging & reporting	
	A dedicated appliance / VM to be proposed with the solution for logging, analysis, and	
25.	reporting into a single system, delivering increased knowledge of security events throughout	
	the network for centralized security event analysis, forensic research and reporting	
5.1.9	9 Functional & Technical Requirements for SIEM	

Parameter and Minimum Specification Make: Model:

#	Parameter and Minimum Specification	
	Next generation platform should encompass log, packet and end point data with added context	
1.	and threat Intelligence. Should provide complete network visibility through deep packet	
	inspection high speed packet capture and analysis.	
2.	SIEM for Logs and deep packet inspection should be preferably from same OEM.	
3.	The solution should be a form factor with following components:	
	a. Management & Reporting	
	b. Normalization and Indexing	
	c. Correlation Engine	
	d. Data Management	
4	There should be no limitation on number of devices to be supported. Any addition in no. of	
	devices should have no cost impact on department.	
	The SIEM & Log Monitoring solution should be from a different OEM than the Prevention	
5.	Security solutions like F/W, IPS, HIPS, AV, DLP, IDAM and Encryption solution. Redundancy	
	should be maintained at Log collection Layer.	
	The solution should provide an integrated SOC dashboard and Incident analysis system that	
6	could provide a single view into all the analysis performed across all the different data sources	
0.	including but not limited to logs and packets. The Tool should have role based access control	
	mechanism and handle the entire security incident lifecycle.	
	Real time contextual information should be used at collection/normalization layer and also be	
	available at correlation layer where any events are matched during correlation rule processing.	
7.	In addition solution must provide contextual Hub at investigation layer for all relevant	
	contextual awareness data regarding alerts/incidents available for any information asset like	
	IP/Device etc.	
	All logs that are collected should be studied for completeness of information required,	
8.	reporting, analysis and requisite data enhancement, normalization should be performed to	
	meet the reporting and analysis needs.	
	A single log appliance should support minimum sustained 20,000 EPS and packet appliance	
9.	should support upto 1GBPS line rate with multiple ingress interfaces for capturing from	
	multiple network interfaces.	
10	Correlation Engine appliance should be consolidated in a purpose build appliance and should	
10.	handle 100,000 EPS.	
11	The solution should be storing both raw logs as well as normalized logs. The same should be	
	made available for analysis and reporting. Solution should be sized to provide online storage	

#	Parameter and Minimum Specification	
	for 1 year at central site. Both raw logs and normalized logs should be made available with	
	minimum 90 TB of storage provided by OEM. Proposed Solution may be from same or third	
	party but shall be integrated fully.	
12	The solution should incorporate and correlate information that enables the Information	
12.	Security Team to quickly prioritize it's response to help ensure effective incident handling.	
13	The monitoring should be cross device and cross vendor and be both out of the box and	
15.	scalable to cover additional devices and applications as required.	
14	Appliance should have minimum 128 GB RAM to provide optimal performance and should	
14.	provide at least 4 network interfaces onboard.	
15	Should be managed and monitored from SIEM unified console for Correlation, Alerting,	
13.	retrospective Analysis, root cause analysis of incidents and Administration	
16.	Should store RAW packet DATA and normalized packet data with minimum 30 Tb Storage	
	Should be able to provide complete packet-by-packet details pertaining to one or more session	
17.	of interest including Session replay, page reconstruction, image views, artefact & raw packet	
	and object extractions.	
18.	Should be able to filter the captured packets based on layer-2 to layer-7 header information	
19.	Should provide comprehensive deep packet inspection (DPI) to classify protocols & application	
20	The proposed solution must be able to provide the complete platform to perform Network	
20.	forensics solution	
21.	The solution must be able to detect malicious payload in network traffic	
	Detect and reconstruct files back to its original type	
	Detect hidden or embedded files	
	Detect and flag out renamed files	
22	The solution must have the ability to capture network traffic and import PCAP files using the	
22.	same infrastructure	
	The solution should be proposed with End Point detection and response (EDR) solution for at-	
23.	least 200 agents. Solution should have EDR supporting all leading OS like windows, Linux, Mac	
	OS. Whole Solution Should meet requirement	
	The solution should have a dedicated EDR agent which can run scan(s) to identify and collect	
24	suspicious running processes, autoruns, files, drivers, libraries, cron, initd, daemon and system	
24.	information on Win/Linux/Mac OS endpoints. The EDR Agent should be separate from	
	Antivirus solution and should not be from AV OEM. Solution should meet RFP Requirement	

5.1.10 Functional & Technical Requirements for HIPS

#	HIPS - Minimum Requirement	
	Make:	
	Model:	
1	Should have at least inbuilt 10000 signatures/Filters pertaining to security and applications	
1.	apart from user define signatures/filters	
2.	Proposed solution should not be declared end of sale and end of support for coming 5 years.	
3	Proposed solution should protect against distributed DoS attack and should have the ability	
5.	to lock down a computer (prevent all communication) except with management server.	
4.	It should provide automatic recommendations against existing vulnerabilities	
5	Solution should support any pre-defined lists of critical system files for various operating	
5.	systems and/or applications (web servers, DNS, etc.) and support custom rules as well.	
6.	Solution should have feature to take backup of infected files and restoring the same.	
	Host IPS should be capable of recommending rules based on vulnerabilities with the help of	
7.	virtual patching and should have capabilities to schedule recommendation scan and entire	
	features of solution should be agentless.	
8	Host based IPS should support virtual patching both known and unknown vulnerabilities until	
0.	the next scheduled maintenance window.	
	Should provide automatic recommendations against existing vulnerabilities, dynamically	
9.	tuning IDS/IPS sensors (Selecting rules, configuring policies, updating policies) provide	
	automatic recommendation of removing assigned policies if vulnerability no longer exists	
10	Solution should have Security Profiles allows Integrity Monitoring rules to be configured for	
10.	groups of systems, or individual systems.	
11	Should have pre and post execution machine Learning and should have Ransom ware	
11.	Protection in Behavior Monitoring	
	Host IPS should be capable of recommending rules based on vulnerabilities with the help of	
12.	virtual patching and should have capabilities to schedule recommendation scan and entire	
	features of solution should be agentless.	
13	HIPS Solution Should not has the need to provision HIPS Rules from the Policy Server as the	
13.	Rules should be automatically provisioned and de provisioned	
14.	The proposed solution should support to monitor traffic from multiple segments.	
15	The proposed solution should have capabilities to configure files, IP, URLs and Domains to	
13.	Black list or white list.	

#	HIPS - Minimum Requirement	
16.	The Proposed solution should provide correlated threat data such as: IP addresses, DNS	
	domain names, URLs, Filenames, Process names, Windows Registry entries, File hashes,	
	Malware detections and Malware families through a dashboard	
17.	The proposed solution must be able to provide intelligence feed for malware information,	
	threat profile and containment remediation recommendations where applicable.	
18.	The proposed solution should have a built-in document vulnerabilities detection engine to	
	assure analysis precision and analysis efficiency.	
19.	The Proposed solution should monitor Inter-VLAN traffic on a Port Mirror Session.	

5.1.11 APT

#	Minimum Requirement	
	Make:	
	Model:	
4	The solution should be able to communicate bi-directionally with the proposed UTM and	
1.	NGFW solution for automatic blocking/threat update	
2	The solution should support deep packet inspection of SSL encrypted traffic (including HTTPS)	
2.	for both incoming and outgoing	
2	The solution should provide detection, analysis and remediation capability against APT & SSL	
з.	based APT attacks.	
л	The solution must employ an on premise (not on cloud) analysis engine using virtual execution	
4.	to detect zero day and unknown threats and must not be signature based.	
	The proposed solution should be able to detect and prevent advanced Malware, Zero-day	
5.	attack, spear phishing attack, drive by download, watering hole and targeted Advanced	
	Persistent Threat without relying on just Signature database.	
	The proposed solution should perform dynamic real-time analysis of advanced malware to	
6.	confirm true zero-day and targeted attacks. No file should be sent to third party systems or	
	cloud infrastructure system for analysis and detection of Malware	
7	The proposed solution should automatically detect and confirm multistage zeroday malware	
7.	and targeted attacks without prior knowledge of the malware.	
	The proposed solution should utilize a state-full attack analysis to detect the entire infection	
8.	lifecycle, and trace the stage-by-stage analysis of an advanced attack, from system exploitation	
	to outbound malware communication protocols leading to data exfiltration.	
0	The proposed solution should analyze advanced malware against a cross-matrix of different	
9.	operating systems and various versions of pre-defined applications.	

	Minimum Requirement	
The solution must support pre-popu	llated Licensed copies of Operating systems and	
10. applications/softwares (like Microsoft	Office). There should be no requirement for the	
customer to buy additional license.		
11. The system should be able to support fil	e sizes upto 1 Gb or more	
The proposed solution should have the a	bility to analyse, detect and block malware in common	
file formats including but not limited	to executables, JAVA, PDF, MS Office documents,	
common multimedia contents such as JF	EG/GIF/BMP/WMF and ZIP/ RAR/ 7ZIP/ TNEF archives	
to prevent advanced Malware and Zero	day attacks.	
The proposed solution should capture	and store packet captures of traffic relevant to the	
analysis of detected threats.		
The proposed solution should have th	e ability to display the geo-location of the remote	
command and control server(s) when po	ossible.	
The proposed solution should have the	e ability to report the Source IP, Destination IP, C&C	
15. Servers, URL, BOT name, Malware class,	executable run, used protocols and infection severity	
of the attack.		
The proposed solution should be able t	o send both summary notifications and detailed per-	
event notifications utilizing the protocol	s (SMTP, or SNMP).	
The proposed solution should have th	e ability to be deployed in out-of-band mode (also	
SPAN/TAP) & inline mode		
The proposed solution should be capab	le to block inbound malicious exploits delivered via a	
18. web channel and outbound call-back co	mmunications when deployed in inline, or out-of-band	
mode.		
The proposed solution should be able	to analyse email attachments and malicious links for	
static and dynamic analysis		
The proposed solution should support S	MB / CIFS / NFS protocol for sharing and transferring	
files		
The proposed solution should provide vi	sibility into scan histories of each file scanned that are	
aborted, completed, or in progress.		
22. The solution should provide reports in (The solution should provide reports in (but not limited to) PDF/ CSV formats.	
The solution should have anti-evasion	capabilities to prevent malwares detection of being	
run/executed in the virtualized environr	nent.	
The solution should protect the endpoin	ts against advanced threats including zero-day attacks,	
which target application vulnerabilities	hat have yet to be discovered or patched.	

#	Minimum Requirement	
25	The solution should protect the endpoint by monitoring the host memory to detect and block	
25.	various memory techniques like return-oriented programing, heap spraying, etc.	
26.	The endpoint solution should be able to prevent attacks from known and unknown malwares	
27	The endpoint solution should protect against drive-by download attacks and provide shield to	
27.	web browsers, Java/Flash plug-ins, Microsoft Office applications, and PDF readers	
28.	The solution should support for SIEM log integration.	
20	The solution should be able to schedule reports and also provide the flexibility to generate on-	
25.	demand reports like daily/weekly/monthly/ yearly/specific range (day and time) etc.	
30.	Minimum number of Interfaces - 4x GE RJ45 ports + 2 x GE SFP slots	
31.	Number of VM's should be atleast 24	
22	It should support Sandbox Analysis for multiple operating systems like WinXP, Win7, Win8,	
52.	Win10	
22	The APT should be able to process minimum of 460 files/hour or 3,30,000 files/month (either	
55.	web or mail or both) on the VM sandboxing and should have 4 Gbps of sniffer throughput.	
34.	High Availability & Maximum Scalability	
35.	The solution should have dual AC power supply fully populated (within box) from day one	

5.1.12 Functional & Technical Requirements for WAF

#	Minimum Requirement
Make:	
Model	
	Proposed Solution should be deployed in HA (High Availability with standard VRRP) mode
1	and protect the web applications from attacks. WAF solution should filter the HTTP/S traffic
1.	based on the rules set defined. Proposed WAF should be able to address top 10 OWASP
	vulnerabilities.
	Proposed solution shall prevent the following attacks (but not limited to): Brute force,
2	Access to predictable resource locations, Unauthorized navigation, HTTP request format
Ζ.	and limitation violations (size, unknown method, etc.) and File upload violations with
	inbuilt AV
3.	Solution should be able to inspect web application output and respond (allow, block, mask
	and/or alert) based on the active policy or rules, and log actions taken.
4.	Support dynamic source IP blocking and should be able to block attacks based on IP source.

#	Minimum Requirement
5.	Support automatic updates (if required), ensuring complete protection against the latest
	application threats.
6.	Should have positive security model with behavior learning capabilities to detect and
	prevent anomaly in application traffic and unknown attacks. Behavioral learning should be
	based on true behavior algorithms, and not just static signatures.
	Appliance Should have min 8-10Gig ports, 128GB RAM and storage capability of 1 TB. The
7.	solution Should have dedicated hardware SSL card and should support 50K SSL TPS (2K) /
	35 K ECC TPS.
	Proposed solution should have integrated Redundant power supply. The device should
8.	have capability to run and install CentOS and Ubuntu open standard OS on the same
	appliance
9.	Web application firewall should be ICSA certified
10	The WAF solution should have deployment options – Reverse proxy, Transparent Proxy,
10.	Sniffer, Bridge and forensic mode by analyzing web server logs file.
	The solution should integrate OEM own web vulnerability systems scanner for fastest time
11.	for 0-day vulnerability mitigation by automatically creating virtual patching policies
	foremost found vulnerability. The engine should have ability to review source code.
12	The WAF vendor should have their own Cloud based web vulnerability scanning system or
12.	on-premise scanner to integrate with WAF
12	The solution should provide application side protection, browser side protection like DOM
15.	XSS, machine learning like Hidden Markov Model.
14.	The solution should BOTS protection by detecting client activity like mouse click etc.
15	The system should have and integrate with IP reputation feed provided by Threat
15.	Intelligence.
16	The proposed solution should provide flexible correlation and event management and dash
10.	board management. Multi-level aggregation, attack chain correlation, sorting and filtering.
	Proposed solution should have strong protection mechanism with positive security model
17.	that has capability to generate protection rules and should be able to provide quick
	protection (immediately for known attacks)
5.1.13	Functional & Technical Requirements for Email Security Solution

#	Minimum Requirement
Make:	
Mode	el:

#	Minimum Requirement
1.	Solution should be an integrated virtual appliance solution for Anti-SPAM, Antivirus, Content
	Filtering for SMTP channel with min below parameters
	Email Routing (messages/ hour)- 250K
	 AntiSpam (messages/ hour) - 200K
	 AntiSpam + Antivirus (message/ hour) -250K
	Protected Email Domains -400
	Antispam, Antivirus, Authentication, and Content Profiles (per Domain / per System)
	- 50/200
2	The solution shall support understanding of basic file types using "true type" file matching
2.	instead of just relying on file extensions
3.	Solution shall be capable to detect and stop targeted (spear) phishing-type attacks and
0.	solution shall support DKIM
	Solution shall support detection and quarantine of malware/exploitable emails/content
	from Microsoft Office, adobe PDF and other documents format attachments and should
4.	support inbound and outbound rules with predefined data classifiers such as PII , HIPPA ,
	PCI-DSS, Aadhaar card, Indian Names etc to prevent such data going out from the
	organization via email
5.	Solution shall support exception rules for encrypted and un-scan able files
6.	Solution shall support customized Content Filtering rules to block content in the message
	body and within attachments. Rules can also be created to block certain attachment names,
	messages from specified senders, and messages of a certain size. File rules can be used to
	block files based on file types.

5.1.14 Functional & Technical Requirements for Anti-DDoS

#	Minimum Specifications
	Make:
	Model:
1.	The Anti DDoS module is expected to constantly monitor the behavior of the application
	visitors and prevent common application layer attacks.
2.	The proposed solution should detect and mitigate both traditional network- layer DDoS
	attacks and more advanced application layer attacks.
3.	The proposed solution should have the capability to be configured in detect as well as
	protect mode.

#	Minimum Specifications
4.	The proposed solution should prevent suspicious outbound traffic for threats and blocking
	malicious traffic.
5.	The proposed solution must support the ability to blacklist a host, domain, URL
6.	The proposed solution must provide the ability to block bot -originated traffic according to
	system- supplied signatures
7.	The Solution must have 50K SSL TPS for RSA 2K key, 35K SSL TPS for ECDSA P25 with 25 Gbps
	SSL Throughput
8.	The DDoS solution should be integrated with Link Load Balancer.
9.	Devices should be proposed in high availability using standard VRRP Protocol

5.1.15 Functional & Technical Requirements for Centralized Anti-virus Solution

#	Minimum Requirement
Make:	
Mode	l:
	Endpoint solution should have capability of AV, Vulnerability protection, HIPS, Firewall,
1.	Device control and pre and post machine learning execution.
2	Endpoint vulnerability protection should scan the machine and provide CVE number
2.	visibility and accordingly create rule for virtual patch against vulnerability.
2	Behavior monitoring along with ransom ware protection engine, ransom ware engine
5.	should have feature to take backup of ransom ware encrypted files and restoring the same.
	Solution should have capability to submit unknown files to on-premise sandboxing for
4.	simulation and create IOC's on real time basis as per sandboxing analysis and revert back to
	Endpoint security solution to block and clean threats and on-premise sandboxing solution
	should support customizable Windows 7,8,10 and Microsoft 2008, 2012 & Mac operating
	environments for Sandboxing with at least 50 virtual instances.
5.	Should be capable of recommending rules based on vulnerabilities on endpoint and create
	dynamic rules based on System posture and endpoint posture.
6.	Solution should be APT ready, capable of submitting to Sandbox for analysis and should be
	enabled from day 1
7.	Should have Unknown Virus Detection & Repair. Should have behavioral & Heuristic
	scanning to protect from unknown viruses. The Endpoint security solution should have
L	

#	Minimum Requirement
	capability of AV, Vulnerability protection, HIPS, Firewall, Device control with pre and post
	machine learning execution for malware analysis.
	Must have the capability to detect and clean Virus and also perform different Scan Actions
8.	based on the virus type (Trojan/ Worm, Joke, Hoax, Virus, other). Endpoint security solution
	should provide vulnerability protection.
0	The solution must support IPv6 and must be capable of blocking and detecting of IPv6
9.	attacks.
	Should have centralized management console to give administrators transparent access to
10.	all clients on the network and also provide automatic deployment of security policies, AV
	signatures, and software updates on every client.
	Should support Active Directory integration and also have security compliance to leverage
11.	Microsoft Active Directory services to determine the security status of the computers in the
	network and also have logical group based on IP addresses (Subnets).
12	Establish separate configuration for internally versus externally located machines (Policy
12.	action based on location awareness)
12	Must provide the flexibility to create firewall rules to filter connections by IP address, port
15.	number, or protocol, and then apply the rules to different groups of users

5.1.16 Functional & Technical Requirements for DLP

#	Item Description
	Make:
	Model:
	The solution should cover both Active and passive FTP including fully correlating
1.	transferred file data with control information and have the ability to monitor popular IM
	protocols (AIM, Yahoo, MSN, IRC) and properly classify tunneled IM traffic (HTTP)
	The solution must have Identity and Role Based policy capabilities that integrate with
2	AD/LDAP/HR database. The solution should be capable of "Segmentation of Duty" (SoD)
2.	based Enforcement of Information Security and the solution should enforce "Automatic
	Access Control" on Data and Information
3.	The solution must be able to apply different policies to different employee groups. The
	solution should have a comprehensive Information Classification methodology that would
	be readily deployable. The solution MUST use automated policy mechanism and should
	have built-in Automated Policy Synthesis mechanism. The solution should be able to
	monitor and prevent Advanced Persistent Threats (APT)

#	Item Description
	The solution should have Built-in Ontologies on International PII and PCI- DSS capabilities
4.	and has the ability to add or customized new Ontologies to cater to specific Government
	or Defense parameters. The solution should have rule or policy-based capabilities such as
	assigning access rights, restricting where users can store sensitive data, and so forth
	The solution should have Ability to detect and protect new or unseen documents, which
5	content is similar to the data categorization, which has been taught via data categorization.
5.	The solution should have Ability to detect scanned documents, which contains sensitive
	data in text form
6	Support centralized administration. Ability to support network, storage and endpoint DLP
0.	from single console and the DLP should be from different than Web Security proxy solution.
	The end point solution should inspect data leaks from all portable storage and to keep track
	of what data users are taking from and to their work computers on any kind of portable
7.	storage device. The end point solution must monitor and control various storage devices
	including USB flash 2 drives, CD/DVD, external HDD, card readers, Zip drives, digital
	cameras, smartphones, PDA, MP3 players, Bluetooth devices etc.
	End point DLP agent should support network offline mode to access a specific device when
8.	a client computer is disconnected from a network and the endpoint solution should
	encrypt information copied to removable media
	The solution should be able to classify unstructured data, namely
	word/excel/PowerPoint/pdf documents and MS Outlook emails. The solution should be
9.	able to label the documents in headers/footers with a pre-selection capability for either
	header or footer or both. The solutions should be able to insert metadata tags in the
	documents and emails which can be read by DLP Solutions
	The solution should be able to uniquely tag each classified document. The solution should
10.	be able to track initial classification and reclassification events at both document and
	central logging level. The solution should trigger classification for document on Save, Save
	As, print etc. and should be configurable using a management mechanism
	The solution shall ensure the enforcement of classification and should not allow user to
11.	bypass classification option in the said document's types using MS and Open Office and MS
	Outlook. The solution should have capability to detect differential classification between
	an email and it's attachments and block the email from being sent
12.	The solution should have some guidance mechanism while user selects a classification
	level, to inform the users what is the context of a said classification level as per

#	Item Description
	organization's policy. The solution should enable the classification of Word, Excel and
	PowerPoint documents from within Microsoft Office Proposed DLP should have its data
	classification solution.
	The solution should be able to identify information like Aadhaar, Passport numbers, credit
	card information for automated classification thru either inbuilt capability or should have
13.	capability to define regular expressions. The solution should suggest a classification based
	in content, but should allow user to change the classification if required by taking a
	justification for the same and recording it in logs.
14.	The solution should support the ability to warn or prevent users from sending password-
	protected Microsoft Office documents via email. (The metadata in password-protected
	Office documents is encrypted, so this capability provides an alternative way to enforce
	policy.) The solution should provide a pre-built starter set of reports for the reporting
	database (in Excel) and Views and documentation to enable customers to write their own
	reports.

5.1.17 Functional & Technical Requirements for IDAM

#	Minimum Requirement
Make	
Model	
1	Solution should provide the ability to make real-time course-grained authorization
1.	decisions such as a whether to grant access to an application
	Solution should allow access and authorization permission criteria to be linked to role
2.	definitions rather than to individual user accounts so that these decisions are driven by a
	user's membership of a role
2	Solution should respond to requests from applications for authorization decisions, based
5.	on user role membership and other user properties
Л	Solution should able to join together access rules and roles with specific access actions to
4.	form access policies that can be applied to specific users or groups of users
5.	Solution should support the implementation of Role Based Access Controls (RBAC) for
	controlling access to functions across all applications
6.	Solution should support nested roles and the dynamic assignment of roles (based on user
	attributes)
7.	Solution should perform extensive audit and logging capabilities

#	Minimum Requirement
8.	Solution should produce log data files in a format that can be viewed and manipulated
	using 3rd party reporting tools
9.	Solution should provide operational and user activity reports provided out of the box
10.	Solution should provide an interface to develop customized reports
11.	Solution should offer an intuitive and user-friendly GUI to design and modify workflows
12.	Solution should provide reconciliation to enforce data integrity/consistency between
	connected systems.
13.	The proposed solution should support logs forwarding to security information and event
	management tool
14.	Solution should allow users can reset or change forgotten passwords and access or unlock
	locked accounts
15.	The platform should provide administrators with multiple password policy capabilities
	including: Required Characters, Restricted Characters, Max/ Min Alpha/ Numeric
	Characters, Max/Min Length, Password History, Password Age, Min/ Max upper and
	lowercase characters, Max Repeated Characters, Require Passwords to Start with a Letter,
	Prohibit use of User Name, E-Mail, or Login ID, Password Expiration and Password Warning
	notices.
16.	The system shall provide comprehensive reporting such as —who has access to what ,
	—who approved what \parallel , —orphaned accounts found \parallel and these reports should be
	available online or can be exported for distribution.
17.	The Solution should support integration with applications for SSO and multi-factor
	authentication at least based on SAML 2.0, HTTP headers and simple HTML form posting
	with credential replay for legacy/closed applications with integration with multiple
	enterprise directories and should support different multi-factor authentication methods,
	such as: numeric token, simple approve/deny prompts in mobile devices, fingerprint on
	mobile devices, voice, hard and certificate based tokens and any combination of them.
18.	Solution should include a method create/manage policy using simple UI ad wizards.
19.	Solution should be integra table with a desktop MS AD Kerberos authentication to provide
	a full SSO experience.
20.	Proposed two-factor authentication system shall ensure remote user-identification.
21.	The proposed PUM solution should be a single software-based solution including all the
	modules like DB, Cluster, OS, App Server. There shouldn't be any dependency on 3rd Party
	OEM.
5.1.18 Application & Data Security

#	Minimum Requirement		
Ma	lake:		
Мо	Model		
	Proposed solution should be scalable, centralized enterprise class Application layer Data		
	security platform solution. This solution should protect Data at Rest, use and on move along		
	with management of encryption keys in FIPS 140-2 level 3 HSM appliance across the entire		
1	lifecycle including secure key generation, storage and backup, key distribution, key		
1.	deactivation, deletion and key rotation. If Solution is staless (No key management required) in		
	that case S.I. may propose Software which may perform Format preserving encryption,		
	Dynamic Masking, Tokenization as Software and HW required for same and no HSM and		
	certifications for same required in that case		
	The solution should be a single platform that will help achieve Data privacy compliance. The		
	solution should provide integrated Tokenization and Format Preserving Encryption (FPE)		
2.	capabilities. Solution Should allow Key Caching, Automated and Scheduled Key rotation and		
	key Versioning in key management appliance to keep keys safe always in key management		
	appliance.		
	The solution should support Java, Web Services APIs (SOAP and REST), OASIS Key Management		
3.	Interoperability Protocol (KMIP) standard to offer centralized services for tokenization,		
	encryption and masking. In case of stateless solution key management not required		
Д	Key Manager should support both virtual and Hardware form factor. In case of Stateless any		
	master key sever in HA to be placed		
5	The platform should support both Static and Dynamic masking of Data along with Encryptions		
	or Tokenization based on requirements.		
6.	Proposed solution should provide High Availability (HA)		
	The solution should support the Application encryption, either software or hardware based,		
7.	Database column level encryption, File and storage level encryption solutions. It must encrypt		
	data at use, motion and rest.		
	Proposed platform should support out of the box below methods also:		
	Data Masking		
8.	Data Encryption		
	Data Tokenization		
	Data Format Preserving Encryption		
9.	The solution should support logging and detailed event reporting.		

#	Minimum Requirement		
10.	The platform should provide capability to transparently support commercial off the shelf		
	(COTS) and proprietary applications without the need to change application code based as an		
	option for Tokenization & FPE.		
11.	Proposed tool should support dual 10 Gig Port for Physical Appliance and capable of managing		
	up to 1 million Keys. In case of stateless architecture no key manager to be proposed		
12	The proposed encryption solution should work without schema changes in the databases		
12.	where private data may reside		
	The Proposed solution platform should also cover tokenization, and file encryption. The Key		
12	management should be consistent across. Proposed solution should not have database of keys		
15.	and keys should be generated on the fly. Proposed solution may have HSM to fulfill the		
	requirement.		
11	The solution should be FIPS 140-2 level 3 & NIST compliant. Key Management appliance should		
14.	have safety and environment certifications such as FCC, CE, UL, CE		
	The key rollover is automated in proposed solution. The public keys should be rolled over		
15.	frequently for data capture using public key methods. In stateless architecture key generation		
	must be on the fly on demand.		
	The solution should support offline applications encrypt data without needing to go online to		
16.	fetch keys without impacting application design. It must also support applications operate on		
	encrypted data without change or with very minimal changes		

5.1.19 Functional & Technical Requirements for AAA

#	Minimum Requirement		
Make:	Make:		
Model:	Model:		
	The Solution should provide a highly powerful and flexible attribute-based access control		
1.	solution that combines authentication, authorization, and accounting (AAA); profiling;		
	posture/health check; BYOD, and guest management services on a single platform.		
2	Solution should include all required licenses to perform above mentioned capabilities for		
2.	100 endpoints from day one		
3	It should allow enterprises to authenticate and authorize users and endpoints via wired,		
5.	wireless, and VPN with consistent policy throughout the enterprise		
	Solution should enable administrators to centrally configure and manage profiler, posture,		
4.	guest, authentication, and authorization services in a single web-based GUI console,		
	greatly simplifying administration by providing consistency in managing all these services.		

#	Minimum Requirement			
5	Provides complete guest lifecycle management by empowering sponsors to on-board			
5.	guests			
	Should help organization to identify the number of endpoints that have a specified			
6.	application installed and these applications should be classified into minimum 10			
	categories			
7.	Solution should be supporting 100 endpoints from day one			
8.	Proposed solution should configured in Active/Standby			
٩	Should support consistent policy in centralized and distributed deployments that allows			
5.	services to be delivered where ever required			
	Solution should deliver customizable self-service portals as well as the ability to host			
10	custom web pages to ease device and guest on-boarding, automate endpoint secure access			
10.	and service provisioning, and enhance the overall end-user experience inside business-			
	defined workflows			
11	Should enforces security policies by blocking, isolating, and repairing non-compliant			
	machines in a quarantine area without requiring administrator attention			
	Should support Identity source sequences which defines the order in which the solution			
	will look for user credentials in the different databases. Solution should support the			
12.	following databases:			
	Internal Users, Internal Endpoints, Active Directory, LDAP, RSA, RADIUS Token Servers,			
	Certificate Authentication Profiles			
13.	Allows Organization to configure the AD and LDAP server with IPv4 or IPv6 address			
14.	Should utilizes standard RADIUS protocol for authentication, authorization, and accounting			
	(AAA).			
	Supports a wide range of authentication protocols, including PAP, MS-CHAP, Extensible			
15.	Authentication Protocol (EAP)-MD5, Protected EAP (PEAP) and EAP-Transport Layer			
	Security (TLS)."			
16.	solution should support TACACS+ to simplify device administration and enhance security			
	through flexible, granular control of access to network devices			
	TACACS+ device administration should support:			
17.	1. Role-based access control			
	2. Flow-based user experience			
	3. Per Command level authorization with detailed logs for auditing			

#	Minimum Requirement		
18	solution should support capability to customize TACACS+ Services by specifying customer		
10.	TACACS+ port number		
	solution should support capability to create different network device groups so that		
	administrator can create:		
19.	1. Different policy sets for IOS/OS or wireless controller OS		
	2. Different for firewall		
	3. Differentiate base on location of device		
20	solution should be able to create TACACS+ profile like Monitor, Privilege level, default, etc		
20.	to control the initial login session of device administrator.		
	solution should be able to create TACACS+ authorization policy for device administrator		
21	containing specific lists of commands a device admin can execute. Command sets should		
21.	support; exact match, case sensitive, (any character), * (matches any), etc and support		
	stacking as well		
22.	solution must support RADIUS/ TACACS+ in IPv6 network		
	Offers a rules-based, attribute-driven policy model for creating flexible and business-		
	relevant access control policies. Provides the ability to create fine-grained policies by		
22	pulling attributes from predefined dictionaries that include information about user and		
23.	endpoint identity, posture validation, authentication protocols, profiling identity, or other		
	external attribute sources. Attributes can also be created dynamically and saved for later		
	use		
24	Provides a wide range of access control mechanisms, including downloadable access		
24.	control lists (dACLs), VLAN assignments, URL redirect		
	Solution should allow end users to interact with a self-service portal for device on-		
25	boarding, providing a registration vehicle for all types of devices as well as automatic		
23.	supplicant provisioning and certificate enrollment for standard PC and mobile computing		
	platforms.		
26	Solution should be able to integrate with MDM vendors like: Airwatch, Good, Mobileiron,		
20.	Zenprise etc.		
	Should support full guest lifecycle management, whereby guest users can access the		
27.	network for a limited time, either through administrator sponsorship or by self-signing via		
	a guest portal. Should include guest portal customize from day one		
20	Solution should have capability to establish user identity, location, and access history,		
20.	which can be used for compliance and reporting.		

#	Minimum Requirement		
	Solution should have capability to collect endpoint attribute data via passive network		
29.	telemetry, querying the actual endpoints, or alternatively from the infrastructure via		
	device sensors on switches.		
20	Allows organization to get finer granularity while identifying devices on network with		
30.	Active Endpoint Scanning		
	Solution should have profiling capabilities integrated into the solution in order to detect		
	headless host. The profiling features leverage the existing infrastructure for device		
	discovery. Should support the use of attributes from the following sources or sensors:		
	* Profiling using MAC OUIs		
21	* Profiling using DHCP information		
31.	* Profiling using RADIUS information		
	* Profiling using HTTP information		
	* Profiling using DNS information / Nessus		
	* Profiling using NetFlow information / Onguard Agent		
	* Profiling using SPAN/Mirrored traffic		
22	Should have predefined device templates for a wide range of endpoints, such as IP phones,		
52.	printers, IP cameras, smartphones, and tablets.		
33	Solution should support receiving updated endpoint profiling policies and the updated OUI		
55.	database as a feed from the OEM database.		
	Solution should support the following endpoint checks for compliance for windows		
	endpoints:		
	Check process, registry, file & application		
3/	Check operating system/service packs/hotfixes		
54.	Check firewall product is running		
	check for Antivirus installation/Version/ Antivirus Definition Date		
	check for Antispyware installation/Version/ Antispyware Definition Date		
	Check for windows update running & configuration		
25	Should be a persistent client-based agent or clientless to validate that an endpoint is		
55.	conforming to a company's posture policies.		
20	Client based agent should support deploying in stealth mode to monitor and enforce		
30.	posture policies		
27	Allows administrators to quickly take corrective action (Quarantine, Un-Quarantine, or		
37.	Shutdown) on risk-compromised endpoints within the network.		

#	Minimum Requirement	
38.	Should support integration through syslog.	
39	Should allow to create read-only administrative users who can view the configurations on	
55.	GUI, but cannot create, update, or delete data	
40.	Should allow viewing the summary of the reports that are exported by the users in the last	
	48 hours along with the status.	
41.	Should support troubleshooting & Monitoring Tools	
	Includes a built-in web console for monitoring, reporting, and troubleshooting to assist	
42.	nelp-desk and network operators in quickly identifying and resolving issues. Offers	
	comprehensive historical and real-time reporting for all services, logging of all activities,	
	and real-time dashboard metrics of all users and endpoints connecting to the network.	

Note : NAC Stands Deleted from Scope

5.1.20 Functional & Technical Requirements for Server Load Balancer

#	Minimum Requirement		
Make:			
Model:			
	The Load Balancer device should be a dedicated Solution with the following features:		
	• Should support multiple virtual network functions in which each VNF has a		
	dedicated resource allotted to it like CPU, RAM, Hard Disk, SSL cores and can run		
	3rd party and open source VNFs for future scalability.		
	• The Solution shall deliver the high availability required by modern data centers. It		
	should support Active/Passive or Active / Active HA configurations using standard		
1.	VRRP protocol.		
	• The Load Balancer shall automatically synchronize configurations between the		
	pair and automatically failover if any fault is detected with the primary unit.		
	• The device should support upto 16 virtual instances. Should have internal		
	redundant Power supply with 2 TB usable hard disk, 64 GB RAM and capability to		
	host other 3rd party and open source virtual network functions like SSL VPN, web		
	application firewall, Ubuntu, CentOS etc.		
2	The Load Balancer shall support offloading of SSL connections and should deliver 45 Gbps		
2.	of SSL throughput on 2048 key.		
2	Proposed device should have minimum 8 x 10G SFP+ ports prepopulated and upto 2 x 40		
ى. ا	QSFP ports		

#	Minimum Requirement	
Л	Proposed device should support upto 16 virtual instances with capability to run multiple	
	virtual network functions like Linux-CentOS/ Ubuntu etc. in same appliance	
5.	The server load balancer should deliver minimum 3 Million concurrent sessions	
6	The server load balancer should cater up to 50,000 SSL transactions per second on 2K key	
0.	RSA and upto 35K TPS (ECDSA-SHA256)	
	Local Application Switching, Server load Balancing, HTTP, TCP Multiplexing, HTTP Pooling,	
	HTTP Pipelining, Compression, Caching, TCP Optimization, Filter-based Load Balancing,	
7.	Transparent Deployments, Content-based Load Balancing, Persistency, HTTP Content	
	Modifications, Band Width Management (BWM), Support for connection pooling to TCP	
	request, Support for distributed denial-of-service (DDoS) protection	
	The solution should support XML-RPC for integration with 3rd party management and	
	monitoring. Should also support SAA, SAML, Hardware binding and AAA support along	
Q	with SSO. Solution must support machine authentication based on combination of HDD	
0.	ID, CPU info and OS related parameters i.e. mac address to provide secure access to	
	corporate	
	resources.	
٥	Should have secure access solutions for mobile PDAs, Android, Windows and iOS based	
J.	smart phones and tablets with machine authentication	

5.1.21 Functional & Technical Requirements for Link Load Balancer

Minimum Requirement

Make:

Model:

The proposed dedicated Hardware device should support minimum 20 WAN links for inbound/outbound traffic load balancing & redundancy. WAN Links must support IPv4 or IPv6 addressing or both simultaneously. Proposed device should be next generation
 Hyperconverged multi- tenanted Network Function Appliance with support upto 16 virtual instances. Should have internal redundant Power supply with 2 TB usable hard disk, 64 GB RAM and have capability to host 3rd party and open source virtual network Functions like WAN Optimization, CentOS, Ubuntu etc. on the same appliance

Appliance should support minimum 4 x 10GB SFP+ ports
 The solution should support Static NAT, port-based NAT and advanced NAT for transparent use
 of multiple WAN/ Internet links. Should support inbound load balancing and persistency features including RTS (return to sender) and IPFlow persistency.

#	Minimum Requirement		
4.	Should support minimum 2 Million concurrent connections & 500,000 Connections per second		
	Traffic load balancing using e-Policies or equivalent should support algorithms including round		
5.	robin, least connections, shortest response, persistence IP, hash IP, hash IP and port,		
	consistent hash IP and SNMP		
6	The solution should support user-defined IP and Service Group functions for configuring		
0.	firewall, bandwidth management and routing policies.		
	Should support XML-RPC for integration with 3rd party management and monitoring. Should		
7	also support SAA, SAML, Hardware binding and AAA support along with SSO. Solution must		
7.	support machine authentication based on combination of HDD ID, CPU info and OS related		
	parameters i.e. mac address to provide secure access to corporate resources.		
	The solution should support Multi-homing function for inbound IPv4 and/or IPv6 traffic Load		
	Balancing and fault tolerance across up to 20 WAN links by enabling DNS relay or DNS		
8.	authoritative server function. The device should support functionality to optimize WAN		
	bandwidth using technologies like Byte-level caching, TCP fast start, TCP Window management		
	etc.		
	Should have IPV6 support with IPv6 to IP4 and IPv4 to IPv6 translation and full IPv6 support.		
9.	also, should have IPV6 support with DNS 6 to DNS 4 & DNS 4 to DNS 6 translation-based health		
	check for intelligent traffic routing and failover		
10.	The solution should support DHCP and DHCPv6 server function		
	The Should provide comprehensive and reliable support for high availability with Active- active		
11.	& active standby unit redundancy mode. Should support both device level and VA level High		
	availability		
12.	The solution should support standard VRRP for HA interconnection over network.		

5.1.22 Functional & Technical Requirements for Blade Chassis

#	Parameter	Minimum Specifications
	Make:	
	Model:	
1.		Blade chassis shall be 19" Electronic Industries Alliance Standard Width
		rack mountable and provide appropriate rack mount kit
		The enclosure Should support full height/width and half height/width
		blades in the same enclosure, occupying a max of 10U rack height, it should
		support minimum 8 blade servers

#	Parameter	Minimum Specifications
		The enclosure should be populated fully with power supplies of the highest
		capacity & energy efficiency of platinum rating.
	Power	The power subsystem should support N + N, N+1 power redundancy
		(where N is greater than 1) for a fully populated chassis with all servers
		configured with the highest CPU configuration (150 W and above),
	Cooling	Each blade enclosure should have a cooling subsystem consisting of
		redundant hot pluggable fans or blowers enabled with technologies for
		improved power consumption and acoustics
		Enclosure should support all Intel Xeon Scalable processors based 2 CPU
2		and 4 CPU blades
2.	Blade Support	Should support built-in management software in redundancy
		Should provide single management console for all the blade servers across
		multiple chassis.
	Chassia	The chassis should be provided with redundant modules for connectivity.
	Chassis	The Chassis should support Hot Pluggable & fully Redundant Management
	connectivity	Modules
	Converged Module	Chassis should have sufficient number of redundant converged/FCoE
		modules to provide a minimum FCOE uplink bandwidth of 10Gbps per
		blade server and 5 Gbps sustained per blade server (with 1 module failure)
		for a fully populated chassis for converged Traffic.
2		Chassis should support aggregation of multiple enclosures to consolidate
э.		data centre network connections, reduce hardware and to scale network
		bandwidth across multiple enclosures (minimum 4 enclosures). All the
		modules/switches for chassis interconnectivity should be in redundancy.
		The chassis aggregation switches should provide a minimum 60 Gbps
		Ethernet & 96 Gbps FC uplink bandwidth for external connectivity to LAN
		and SAN switch
		The total solution should be deployed in More than two chassis so as to
		have chassis level redundancy
	Chassis	Blade chassis management solution may be provided internal / external to
4.	Management	the chassis and must provide single console for managing minimum up to
	software	4 chassis for all associated components like Blade Servers, IO Modules,

#	Parameter	Minimum Specifications
		Power supplies, Fans. Licenses to support the features to be supplied for
		fully populated chassis.
		Centralized Redundant Management solution should be provided so that
		management of all blade servers across multiple chassis within Data Center
		can be done from single console. If the management system runs as a
		virtual machine, then all hardware and software licenses to enable this
		should be included
		Should support auto-discovery of resources within an enclosure and on
		multiple connected enclosures.
		The offered Management software should be capable of policy-based
		management using service profiles / templates. The management tool
		should be able to provide global resource pooling and policy management
		to enable policy-based automation. Server management system should
		provide an alert in case the system is not part of OEM Hardware
		Compatibility list & should provide anti counterfeit
		The management software should be used to create resource pools and
		have the blade resources assigned to the respective resource pools & re-
		assign resources to effectively utilize infrastructure
		Role Based Access Control with at least 5 users to define roles and
		privileges and remote management capabilities including remote KVM
		should be included
		Any other intermediate switch/modules if required should be included in
		solution with 1:1 non-blocking architecture." to ensure seamless packet
		flow from chassis without any bottle neck

5.1.23 Functional & Technical Requirements for Blade Server

#	Parameter	Minimum Specifications
	CPU	Each blade shall have two numbers of latest Intel Xeon Scalable Processors
1.		(Intel [®] Xeon [®] 6000 processor family or higher) with Min. 10 cores per
		processor each having Min. 2.0 GHz processor speed.
2.	Motherboard	Latest chipset compatible with the offered processors.
3.	Memory	Should have at least 24 DIMM slots per blade of DDR4 2666 MHz memory.
		RAM should be configured with 8 GB Per core

#	Parameter	Minimum Specifications
4	Memory	Advanced ECC with multi-bit error protection, online mirror memory
	Protection	
5.	Storage	Min 2 * 1.2 TB GB hot plug SFF SAS drives (10K RPM) or higher.
6	Storage	Integrated or addon PCIe 3.0 12Gb/s SAS Raid Controller with RAID
0.	Controller	0/1/1+0
	Networking	The server should provide a aggregated Bandwidth of minimum 40 Gbps
7.	features	bandwidth with Converged network adapter ports across single or more
		cards.
8.	Interfaces	Minimum of 1* internal USB 3.0 port ,1* internal SD card slot
٩	Bus Slots	Minimum of 2 Nos of PCIe 3.0 based slots supporting Converged/
5.		Ethernet/Fibre Channel adapters
10.	Redundancy	The blades to be provided with port level / card level redundancy
	Operating System and Virtualization Support	Microsoft Windows Server
11.		Red Hat Enterprise Linux (RHEL),
		VMware
		SUSE Linux Enterprise Server (SLES)

Note : Minimum Server Quantity – MSI shall deliver minimum 650 Core in the form of Blade Server, distributed in minimum two Blade Chassis. However, Bidder has to size as per their solution requirement to accommodate all the applications and shall quote the price considering whole solution.

5.1.24 Functional & Technical Requirements for Virtualization Software

#	Minimum Requirement
	Make:
	Model:
1	Virtualization software shall allow heterogeneous support for guest Operating systems like
1.	Windows client, Windows Server, Linux (at least Red Hat, SUSE, Ubuntu, CentOS x86)
2	Live migration of VM disk from one storage array to another without any VM downtime.
2.	Support this migration from one storage protocol to another eg: FC, NFS, iSCSI, DAS.
2	Proactive High availability capability that utilizes server health information and migrates
5.	VMs from degraded hosts before problem occurs
Λ	Migration of VMs in case one server fails all the Virtual machines running on that server
4.	shall be able to migrate to another physical server running same virtualization software.

#	Minimum Requirement
	Zero data loss and continuous availability for the applications running in virtual machines
5.	in the event of physical host failure, without the cost and complexity of traditional
	hardware or software clustering solutions.
6	Add CPU, Memory & devices to virtual machines on the fly when needed, without
0.	disruption or downtime of working VMs
	Create a cluster out of multiple storage datastores and automate load balancing by using
7.	storage characteristics to determine the best place for a virtual machine's data to reside,
	both when it is created and when it is used over time.
	Should provide quick reboot and reduce patching and upgrade times by rebooting the
8.	hypervisor without rebooting the physical host, skipping time-consuming hardware
	initialization
	The solution shall provide a single pane of glass for automated provisioning with model-
9.	based orchestration of compute, network, storage, applications and custom services
	through a unified multi-tenant IT service catalog
10	Support for persistent memory, exposing it as block storage or as memory, to enhance
10.	performance for new as well as existing apps
11	Integration of 3rd party endpoint security to secure the virtual machines with offloaded
	antivirus, antimalware, with/without the need for agents inside the virtual machines.
	Support boot from iSCSI, FCoE, and Fibre Channel SAN. Integration with Storage API's
12.	providing integration with supported third-party data protection, multi-pathing and disk
	array solutions.
	Span across a virtual datacenter and multiple hosts should be able to connect to it. This will
13.	simplify and enhance virtual-machine networking in virtualized environments and enables
	those environments to use third-party distributed virtual switches.
	The solution should be quoted with a software that continuously analyzes workload
14.	consumption, costs and compliance constraints and automatically allocates resources in
	real-time.
	Efficient array-agnostic replication of virtual machine data over the LAN or WAN. This
15.	Replication should simplify management enabling replication at the virtual machine level
	and enabling RPOs as low as 5-15 minutes.
	Virtualization software should provide secure boot for protection for both the hypervisor
16.	and guest operating system by ensuring images have not been tampered with and
	preventing loading of unauthorized components

#	Minimum Requirement
17	The solution shall support provisioning across multi-vendor, multi-hypervisor, physical x86,
17.	virtual and public cloud environments
	It should include proactive smart alerts with self-learning performance analytics
10	Capabilities with Customizable Dashboards, Reports and Views to provide real-time insight
10.	into infrastructure behavior, upcoming problems, and opportunities for efficiency
	improvements.
	Capacity analytics which can identify over-provisioned resources so they can be right-sized
	and "What If" scenarios to eliminate the need for spreadsheets, scripts and rules of thumb
19.	to provide automated root cause analysis. As well as Realtime, and integrated dashboards
	of performance and capacity to enable a proactive management approach and help ensure
	SLAs are met
	Automated workflow triggers which would let admins associate workflows created in
20	Orchestrator layer with Operations alerts. For example, these workflows can automatically
20.	delete old VM snapshots when available capacity falls below a critical threshold or add
	resources when workload demands are rising above normal.
	The solutions should provide Monitoring of OS level resources (CPU, disk, memory,
21	network) for any OS and physical hardware resources of the hosts. These monitoring
21.	capabilities combined with analytics should extend operational visibility and proactive
	management capabilities across OS.
	The network and security solution should be embedded in the kernel of the host
22.	architecture to protect east-west traffic by leveraging VM based attributes like VM names,
	Security tags, OS type, logical switches etc.
23	Direct OEM 24x7x365 days with unlimited incident support via web, telephone and email
25.	with 30mins or less response time including the unlimited upgrades and updates.

5.1.25 Functional & Technical Requirements Storage

SAN Storage for all cameras for 24 hours (Video storage required to be stored on Centralized Primary storage for 15 days & 30 Days on Secondary Storage at Data Centre).

- a. Primary Storage capacity for 15 Days, bidder to calculate the capacity.
- b. Secondary Storage capacity for 30 Days for 80% Camera proposed in scope and Secondary Storage capacity for 90 Days for rest 20% Camera proposed in scope (these days inclusive of 15 days of primary storage Data along with the archival storage capacity).
- c. Total of 30 days storage of all the CCTV camera feeds on Primary Storage to Secondary Storage.

- d. 10% Flagged data (critical incidents) will be stored for approximately 365 days, permanent storage envisaged on Disk.
- e. Both the offered Storage shall be in the same shared storage area network to meet the Capacity & Throughput criteria, primary storage shall be in the single Global Name Space /Storage Pool/Storage system along with the Secondary Storage, for the seamless Data transfer between primary & Secondary through VMS server. MSI need ensure seamless integration all component.
- f. Secondary Storage should have the capabilities to work in the same Storage area network system. Secondary Storage shall support Data movement solution to move the data Automatically & instantly from Primary Storage to Secondary Storage with or without using any third-party Backup / Archival Software/VMS. Bidder has to check & confirm the compatibility between Primary & Secondary Archival Storage
- g. VMS shall be able to read, access & retrieve the data directly on the Primary Storage and Secondary storage for the entire retention cycle. Data Retrieval process shall be running in the back ground. Video Data Archive & Retrieval shall be handled at the VMS /Storage system level for Primary & Secondary Storage for the complete capacity.
- h. It shall allow online expansion and retirement of storage capacity and disk array swap-outs without taking it off line. This includes adding addition disks to existing storage arrays, adding incremental or new storage arrays, and/or the removal of older arrays in replacement of new storage subsystems regardless of capacity,

Storage feeds-

- a. 30 days storage of video feeds
- b. Viewing & Storing at 25 FPS
- c. 365 days storage for flagged data
- d. Specific data as notified by the department will be stored for long term records

#	Parameters	Minimum Specifications
	Make:	
	Model:	
1.	High Availability and Storage Processors	 The Proposed Storage Array should be a Block Storage System with concurrent support for, iSCSI and Fibre Channel protocols configured with dual redundant Active-Active Controllers Should scale up to 8 or more controller in a single storage system without federation of arrays or cluster of arrays to deliver seamless scalability.

#	Parameters	Minimum Specifications	
		• The Proposed Solution should be based on real time optimized operating	
		system. (It should not be a general-purpose OS).	
		Must provide five 9s availability (99.999%)	
2.	Memory and HDD Support	 The controllers should have 256GB memory spread across dual controllers and scale upto 1TB DRAM cache. Please note system memory will not considered as cache. The Storage System should support the latest SSD, SAS and NLSAS Drives 	
3.	Host Connectivity and Storage Backend Disk Connectivity	 The offered Storage System shall be supplied with at least 4nos of 10Ge Optical Ports plus 8nos x 16Gbps FC ports across dual Controllers for Host Connectivity. The array proposed should have a minimum of 8nos x 12Gbps 2.0 SAS backend architecture. It should support additional 8*16FC ports and 8*10Gbit ports for future expansion. 	
4.	Total Aggregate Storage Bandwidth	• The Proposed Storage System should ensure a minimum total aggregate bandwidth of 4000Mbps on a 90% Write & 10% Read Video Management Application Workload.	
5.	RAID Support	• Storage System to be configured with RAID6 protection and Global Hot Spares. The Storage System should support RAID5 protection too.	
6.	The Proposed Storage System should be configured with Minimum 75Usable. The usable capacity is defined as the Net storage capacity availatefor the application stack, after deducting the penalties imposed by storeinfrastructure requirements, disk and array formatting, RAID penalties, HStorageOS and file system formatting including overheads or any other penalticapacityRequirementsbe of the Highest Capacity offered by the Vendor. The Storage System shotbe capable of growing further up to 3PB capacity for the above said capafor future growth by adding controllers and disks as required. However,MSI should work upon the primary storage requirement for the entire scof work and scalability support for contract period.		
7.	Storage Software Licenses	All the standard Storage Software Licenses should be enabled from day 1 for the compliant solution requirement like Storage Management software for Block & vVOLs, Performance Optimization, Thin provisioning	

#	Parameters	Minimum Specifications
8.	Server	Latest Windows Server OS platform including support past generation like
	Operating	2008, 2012 atc. Microsoft Hyper V. Novell Suse Enterprise Linux. Oracle Lin
	System	Padlat Enterprise Linux, 8, v86 \/Ausere® v6nbare
	Support	Redhat Enterprise Linux, & x86 Viviware° vsphere

5.1.26 Functional & Technical Requirements Secondary Storage

Archival shall be provisioned Instant & automatically from Primary Storage to Secondary Storage for the entire Retention period. Integration shall be required between Primary & Secondary Storage for Archiving & Restoration to access complete Data set.

Parameter	Minimum Requirement
Make:	
Model:	
	Movement of the data from Primary storage to the secondary storage
Data Movement	shall be transparent to the application / VMS servers can be either
	achieved by VMS or by Storage
	• Min. 1000TB usable capacity needs to be configured with double
	disk failure protection from Day 1.
	• Secondary Storage to store CCTV Video data for 30 days capacity
	for 80% Camera proposed in scope and 90 days capacity for rest
Capacity	20% Camera proposed in scope, to meet the archival requirement
Сарасцу	from Primary to Secondary Storage for different types of Retention
	on video Data.
	• 30 and 90 days of Archival Storage Capacity on Secondary Storage
	(these days inclusive of 15 days of primary storage Data copy $\&$
	rest is Archival from Primary Storage)
OS & Clustering	The storage array should support industry leading Operating System
Support	platforms
	Offered Storage system shall be supplied with minimum of Dual
Front-ond Ports	16Gbps FC ports and Dual 10Gbps ISCSI ports per controller.
	• The array must have at least 64 GB cache memory/flash cache per
	controller.
Architactura	The storage array should support dual, redundant, hot-pluggable,
Architecture	active-active array controllers for high performance and reliability
	Parameter Make: Model: Data Movement Capacity Capacity OS & Clustering Support Front-end Ports Architecture

#	Parameter	Minimum Requirement
6.	No Single point of Failure	Offered Storage Array shall be configurable in a No Single Point of configuration including Array Controller card, Cache memory, FAN, Power supply etc.
7.	Raid Support	Offered Storage Subsystem shall support Raid 0, 1, 1+0, 5 and Raid 6
8.	Point in time and clone copy	Offered Storage array shall be configured with array-based Snapshot and clone functionality.
9	Load Balancing &	Multi-path and load balancing software shall be provided, if vendor
5.	Multi-path	does not support MPIO functionality of Operating system.
10.	Min. Storage Solution requirement	 Storage Solution must be flexible to address unstructured data (such as video files, image etc). Storage Solution shall have options to create multiple copies on the secondary storage. Storage Solution shall have option to integrate with the Object storage if required in future, either native or with use of additional software/ hardware Any servers /software / hardware required to integrate the primary & secondary storage shall be provided in HA.

5.1.27 Functional & Technical Requirements for Backup & Replication Solution

#	Minimum Requirement
	Make:
	Model:
1	Proposed backup solution should be able to run on various industry leading server platforms,
1.	operating systems
2	Proposed solution should support global and inline data duplication using automated variable
۷.	block length deduplication technology.
	Proposed solution should be offered with protocols like VTL, OST, CIFS and NFS. All of the
3.	protocols should be available to use concurrently with global deduplication for data ingested
	across all of them.
	Proposed solution should support most industry leading backup software like Networker,
1	Netbackup, Commvault, Veeam, Veritas and Data Protector etc., and should Support
4.	deduplication at backup server/ host / application level so that only changed blocks travel
	through network to backup device.

#	Minimum Requirement
	Proposed solution should be sized appropriately for backup of front end data XX TB (XX% DB
	and XX% File System) data as per below backup policies
	a. Daily Incremental Backup – retained for 4 weeks in the backup solution.
	b. Weekly Full Backup for all data types – retained for 3 months in the backup solution.
5	c. Monthly Full Backups – Retained for 12 Months in the same backup solution.
5.	d. Yearly Full Backups - Retained for 5/7 years in the same backup solution.
	The Purpose built backup solution should be quoted with adequate capacity with 10% YoY data
	growth and 2% daily change rate for the contract period. Any additional backup storage
	capacity or any other component required as per sizing needs to be done by the MSI during
	the contract period.
6	Proposed solution should have the capability to tier backup data in deduplicated format to an
0.	external cloud storage (on premise / public cloud).
7	Proposed solution should have the ability to perform different backup, restore, replication jobs
7.	simultaneously
	Proposed solution should support different retentions for primary and DR backup storage and
8.	should support instant copy creation on remote site for better DR readiness with support for
	transmitting only deduplicated unique data in encrypted format to remote sites.
	Proposed solution should support retention lock (WORM) feature which ensures that no data
9.	is deleted accidently and support for point-in-time copies of a LUN or volumes with minimal
	performance impact.
10	Proposed solution should support bi-directional, many-to-one, one-to-many, and one-to-one
10.	replication.
11	Proposed solution should support 256 bit AES encryption for data at rest and data-in-flight
	during replication. It should offer internal and external key management for encryption.
12.	Proposed solution should support SAS/SATA/NL-SAS/VTL
	Proposed solution should be offered with Multi-Tenancy features which provides a separate
13.	logical space for each tenant user while maintaining a global deduplication across data from
	all tenant users.
14.	Proposed backup software should be available on various OS platforms like Windows, Linux,
	HP-UX, IBM AIX, Solaris etc. The backup server should be compatible to run on both Windows
	and Linux OS platforms
15.	Should able to dynamically break up large save sets into smaller savesets to be backed up in
	parallel to allow backups to complete faster

#	Minimum Requirement
16.	Should have in-built calendar based scheduling system and also support check-point restart
	able backups for file systems. It should support various level of backups including full,
	incremental, differential, synthetic and virtual synthetic backups
17	The proposed backup software should have the capability to enable WORM on the backup sets
17.	from the backup software console on proposed backup solution
	The solution must support client-direct backup feature for file system, applications and
18.	databases to reduce extra hop for backup data at backup/media server to cater stringent
	backup window.
	Bidder should provide of required capacity based licenses from day 1. MSI need to provide
19.	backup solution on the offered IT Infra stack from single OEM for backup software & purpose
	built backup solution.
	Must have Agent/Modules for online backup of applications and databases such as MS SQL,
20	Oracle, Exchange, Lotus, DB2, Informix, Sybase, SharePoint, Meditech and SAP. Must support
20.	NAS and storage array based snapshot backup for off host zero downtime and zero load on the
	primary backup client with wizard based configuration.
	Backup Solution must support multi tenancy feature for creation of distinct data zones where
21.	the end users have access without being able to view data, backups, recoveries, or modify in
	other data zones.
22	The proposed backup software should support restore a single VM, single file from a VM, a
22.	VMDK restore from the same management console for ease of use.
23	The proposed solution should have inbuilt feature for extensive alerting and reporting with
25.	pre-configured and customizable formats.
	The proposed backup software should be able to recreate backed up data from existing
24.	volumes from metadata backups. The solution should offer recovery of specific volumes for
	recovery from metadata in case of a disaster recovery.
	The solution should be capable of integration with active directory infrastructure for ease of
25.	user rights management along with role based access control to regulate the level of
	management.
26.	Software updates and patches: For the contract period.
	Use of Source and Target Based De-duplication for Backups. In order to improve the backup
27.	performance and reduce the solution footprint for storing backup data, the solution proposed
	by the MSI must support inline global de-duplication and must integrate with the backup

Minimum Requirement

software to facilitate client direct backups with source based de-duplication to reduce data transfer over IP and FC Networks.

28. Replication of the Backup Data. The backup solution at DC shall allow automated scheduled replication to remote site (DR) for facilitating Disaster Recovery copy of backup data at DC.

5.1.28 Functional & Technical Requirements for Enterprise Management System

#	Minimum Specifications
	Make:
	Model:
	The EMS shall support single pane / dashboard for the purposes of the NOC with real time
	monitoring & visibility across multiple areas of the environment for monitoring. The EMS
	solution shall integrate network, server and database performance information and alarms
1.	in a single console and provide a unified reporting interface for network components. Login
	to all these components should be seamless there should not be individual login to these
	components. Once Authenticated user can access any component without the use of third
	party SSO.
	The EMS shall be capable of providing early warning signals to the NOC on the performance
2	issues, and future infrastructure capacity augmentation. The alarms should contain
Ζ.	meaningful message text, instruction text, operator / automatic actions / linked graphs,
	duplicate message suppression.
	The EMS solution shall help the NOC to quickly triage the root cause for a network problem
3.	or service availability and provide actionable information to the respective teams for a quick
	resolution to the problem before end users get impacted.
	The alerting mechanism should be configurable to suppress events at the agent or managed
4.	node level itself and be configurable to suppress events for key systems/devices that are
	down for routine maintenance or planned outage.
	The EMS solution shall offer service driven operations management of the IT environment to
5.	manage distributed, heterogeneous systems from a single management station. The solution
	shall provide comprehensive and end-to-end management of all the components for each
	service including all the hardware devices, Network, Systems and Application infrastructure.
6.	The EMS solution will also let the Data Center management team to monitor and request
	reports for SLA requirements as agreed upon for various services both on availability &
	performance.
<u> </u>	

#	Minimum Specifications
7.	The EMS solution will provide comprehensive server monitoring capabilities to understand
	the processes & services running on a machine and resource utilization impact's performance
	such as a Database service, web server, application server etc.
	The solution should provide seamless integration between discovery, monitoring and service
	desk tools which will help in automated ticket logging in service desk for all the critical events
8.	occurring in centralized monitoring console and to keep an updated CMDB. It shall also
	provide flexibility of logging, viewing, updating and closing incident manually via web
	interface.
	The proposed helpdesk system shall support ITIL processes like request management,
	incident, problem management, knowledge, SLM, configuration management and change
9.	order management with out-of-the-box templates for various ITIL service support processes.
	The proposed helpdesk system shall support tracking of SLA (service level agreements) for
	call requests within the help desk through service types.
	The EMS solution shall be able to accurately measure the KPIs / SLAs agreed upon by Data
	Center management team and report them on pre-communicated intervals to the key
10.	stakeholders for analysis. The SLA & KPI details should be obtained directly from application
	& platform owners and agreed upon by the management team as well. For continued
	improvement, these SLAs/KPIs might need to be updated from time to time to reflect the
	maturity of environment after agreement with Data Center management team.
	MSI shall use Industry standard EMS tools recognized by analysts (like Gartner, Forrester etc.)
	to report desired SLA's for availability & performance of Various IT Components including
11.	Networks, Systems and OS, Helpdesk.
	The proposed solution must be featured in Gartner/IDC reports. Documentary proof must be
	submitted at the time of submission
	The EMS solution tools must be open to integration not only among themselves but also with
12.	other technologies being utilized, such as the Single pane view dashboard for the NOC & other
	SLA & Reporting technologies being utilized by different applications.
	Network monitoring
	The EMS solution shall be capable of supporting multiple types of discovery like IP range
13.	discovery – including built-in support for IPv6, Seed router-based discovery and discovery
	whenever new devices are added with capability to exclude specific devices.
14.	The solution shall support exclusion of specific IP addresses or IP address ranges as per
	discovery requirements.

#	Minimum Specifications
15.	The solution shall provide discovery & inventory of physical network devices like Layer-2 &
	Layer-3 switches, Routers and other IP devices and shall provide mapping of LAN $\&$ WAN
	connectivity.
16	The solution shall be able to identify and model the ICT asset and its properties in the solution
10.	when discovered.
17	The solution shall determine device availability and shall exclude outages from the availability
17.	calculation with an option to indicate the reason as applicable.
18.	The solution shall provide out of the box root cause analysis for any observed fault or outage.
	The solution shall include the ability to monitor and visualize a virtualized system
19.	infrastructure by discovering and monitoring virtual machines and providing ability to depict
	the logical relationships between virtual servers and virtual machines.
20	The solution shall have the ability to collect data from the virtual systems without solely
20.	relying on SNMP.
21	The solution shall support an architecture that can be extended to support multiple
21.	virtualization platforms and technologies.
22	The solution shall support SNMPv3-based network discovery and management out-of-box
22.	without the need for any external third-party modules.
	The solution shall have all the capabilities of a Network Management System which shall
23.	provide Real time network monitoring and Measurement offer end-to- end network
	performance & availability to define service levels and further improve upon them."
24	The solution shall provide a live exceptions list displaying the various health and threshold
24.	exceptions that are occurring in the managed infrastructure.
25	The solution shall have the capability to configure different polling speeds for different
25.	devices in the managed infrastructure.
26	The solution shall use intelligent alarm algorithms to learn the behavior of the network
20.	infrastructure components over a period of time and report in case of any unusual activity.
	The solution shall provide a detailed asset report, organized by vendor name and device,
27.	listing all ports for all devices. The solution shall provide sufficient reports that identify
	unused ports in the managed network infrastructure that can be reclaimed and reallocated.
	The solution shall also intelligently determine which ports are operationally dormant.
28.	This central console shall also provide all required network performance reports (including
	latency, threshold violations, packet errors, availability, bandwidth utilization etc.) for the

#	Minimum Specifications
	network infrastructure. The proposed system shall identify over-and under-utilized links and
	assist in maximizing the utilization of current resources
	The proposed system shall enable complete customization flexibility of performance reports
29	for network devices and monitored servers. Bandwidth Monitoring Reports (Usage history
23.	based on hours minutes days, Top talkers/Listeners/users/hosts report, Interface level
	reports).
30	The proposed system shall provide an integrated performance view for all the managed
50.	systems and networks along with the various threshold violations alarms in them.
	The proposed system shall provide the following reports as part of the base performance
	monitoring product out-of-the-box to help network operators quickly identify device
31.	problems quickly. for routers: Backplane Utilization, Buffer Create Failures, Buffer Hits, Buffer
	Misses, Buffer Utilization, CPU Utilization, Fan Status, Free Memory, Memory Utilization,
	Packets by Protocol, and Packets out.
	The proposed system shall be able to auto-calculate resource utilization baselines for the
32.	entire managed systems and networks and allow user to set corresponding upper and lower
	threshold limits.
33.	The solution should be made available in a High Availability setup & should be able to stably
	support at least 2500 network devices & switches in the environment.
34.	Bandwidth Monitoring (Network flow analysis, NetFlow collector, Sflow, Jflow collector, Real
	time monitoring and Bandwidth Utilization)
35.	Users, applications, and protocols which are consuming the most bandwidth.
	Service monitoring & reporting
	The solution shall include a service management system which shall provide a detailed service
36.	dashboard view indicating the health of each of the departments / offices in the organization
	and the health of the services they rely on as well as the SLAs.
	The MSI is obliged to regularly monitor the SLAs and KPIs as set out in "Service Level
	Management" documents agreed upon. In case of degradation in actual performance, this
37.	shall be escalated by the Supplier to the right level in the organization and follow up until
	resolution as per agreed SLAs. The Supplier shall keep management informed about such
	escalations at mutually agreed time intervals and maintain a log of all escalations and
	messages or actions related to the escalations.
38.	The solution shall provide an outage summary that gives a high-level health indication for
	each service as well as the details and root cause of any outage.

#	Minimum Specifications
39.	The solution shall manage IT resources in terms of the business services they support, specify
	and monitor service obligations, and associate users/Departments/ Organizations with the
	services they rely on and related Service/Operational Level Agreements. Service definitions
	should be as deemed suitable for the management.
	The Service Level Agreements (SLAs) definition facility shall support defining a set of one or
40.	more service that specify the Service obligations stipulated in an SLA contract for a particular
	time period (weekly, monthly, and so on).
	The solution shall provide the capability to designate planned maintenance periods for
11	services and take into consideration maintenance periods defined at the IT resources level.
41.	In addition, the capability to exempt any service outage from impacting an applicable SLA
	shall be available.
	The solution shall provide reports which include service availability (including Mean Time to
42.	Repair (MTTR), Mean Time between Failure (MTBF), and Maximum Outage Time thresholds)
	and the other that monitors service transaction response time.
	The solution shall provide a historical reporting facility that shall allow for the generation of
43.	on-demand and scheduled reports of Service-related metrics with capabilities for
	customization of the report presentation.
	System Monitoring
11	The solution shall present a centralized management console & dashboard across both
	physical and virtual systems.
	The solution shall be able to monitor various operating system parameters such as
45.	processors, memory, files, processes, file systems, etc. where applicable, using agents on the
	servers to be monitored if needed.
	It shall be possible to configure the operating system monitoring agents to monitor based on
46.	user-defined thresholds for warning/critical states and escalate events to event console of
	enterprise management system.
	It shall also be able to monitor various operating system parameters depending on the
47.	operating system being monitored yet offer a similar interface for viewing the agents and
	setting thresholds.
18	The solution shall support monitoring Processors, File Systems, Log Files, System Processes,
40.	and Memory etc.

#	Minimum Specifications	
49.	The tool shall provide Process and NT Service Monitoring wherein if critical application	
	processes or services fail, administrators are immediately alerted and processes and services	
	can be automatically re-started	
	The tool shall be able to provide Log File Monitoring which enables administrator to watch	
50.	system logs and text log files by specifying messages to watch for. When matching messages	
	gets logged, the proposed tool shall notify administrators and enable them to take applicable	
	actions.	
	The performance management system shall integrate network, server & database	
51.	performance management systems and provide the unified view of the performance state in	
	a single console.	
52	It shall be able to automate monitoring, data collection and analysis of performance from	
52.	single point.	
	It shall also provide the ability to set thresholds and send notifications when an event occurs,	
53.	enabling database administrators (DBAs) or application owners to quickly trace and resolve	
	performance-related bottlenecks.	
	Asset Discovery	
54.	The Discovery should work without requiring agent installation (that is, agent-less discovery)	
	while discovery Layers 2 through Layers 7 of OSI model	
55.	The Solution should use Industry-standard protocols such as WMI, SNMP, JMX, SSH to	
	perform discovery without requiring the installation of an agent	
56.	The Solution should have ability to modify out-of-box discovery scripts, create customized	
	discovery scripts	
57.	The Solution should Detect, collect and maintain information about Managed Servers,	
	including packaged, unpackaged software, runtime state, host/guest relationships and more.	
	The solution shall include Service Asset and Configuration Management capabilities to fulfill	
	the following requirements:	
	a. Develop, Implement and Maintain Asset Management Processes and Tools	
58.	b. Maintain Asset records relating to the Services in online asset inventory, Configuration	
50.	and management system (CMDB).	
	c. Provide, develop, implement and maintain online Asset and Configuration Management	
	tools that support automatic discovery and facilitate effective deployment and re-use of	
	Assets and provide a common view of information.	

#	Minimum Specifications	
	d. Develop, implement and maintain forms, processes and Tools related to Asset and	ł
	Configuration Management and compliance to support tracking Changes across m	ulti
	provider Environment (add/modify/delete).	
	e. Provide a gap analysis of in-service and out of Service Assets and resources that ca	annot
	be found using a network discovery tool and document their status and Availabilit	y for
	re-deployment.	
	f. Establish, update, and maintain CIs in the Asset and Configuration Management	
	database (CMDB)	
	g. Manage every asset from requisition through retirement and the facility to track	
	changes by maintaining history of an asset	
	The CI level of Asset information shall include at the minimum:	
	1. Manufacturer	
	2. Model	
	3. Serial number	
	4. Asset identification number	
	5. Asset location	
	6. Maintenance information and history including the age of the Asset	
59	7. Ownership information (provider/lease /purchase)	
55.	8. Warranty information	
	9. End of Support Information	
	10. End of Life Information	
	11. Service tag descriptions (both on CI and CI group level), including the possibility to	tag
	which application/usage an Asset is used for	
	12. Inter-relationships and dependencies between Assets and applications/Services, w	vith
	necessary CI level of details to conduct Impact Assessment and analysis	
	13. Other information as mutually agreed	
	The solution shall support the functionality to:	
	 Add, modify, and delete access to appropriate fields within CMDB. 	
60	• Maintain assets and relationship, contact and escalation information to e	ensure
00.	Application supportability.	
	Propose Hardware and Software procurement and management model	ls and
	methodologies.	

#	Minimum Specifications
	Manage (full Lifecycle) and make recommendations working with the representatives
	for lease and maintenance agreements.
	• Perform monthly physical Asset audit, in accordance with the Asset Management
	Services, to validate that Data in the database is accurate and current and that the
	Information is provided as defined.
	Establish CMDB process interfaces across all associated Cross-Functional processes
	and IT functions.
	Align CMDB updates process with Service Introduction and Change Management for
	removal, addition or updating of CMDB data
	Ability to provide inventory of hardware and software applications on end-user desktops,
61.	including information on processor, memory, OS, mouse, keyboard, etc. through agents
	installed on them
	Ability to have reporting capabilities; provide predefined reports and ability to create
62.	customized reports on data in the inventory database. Report results could be displayed as
	lists or graphs
63	Ability to provide the facility to collect custom information from desktops and ability to
05.	recognize custom applications on desktops
	Facility for the administrator to register a new application to the detectable application list
64.	using certain identification criteria. Shall enable the new application to be detected
	automatically next time the inventory is scanned
	Ability to support dynamic grouping of enabling assets to be grouped dynamically based on
65.	some pre-defined criteria e.g. a group shall be able to display how many and which computers
00.	has a specific application installed. As and when a new computer gets the new application
	installed it shall dynamically add to the group
	Ability to use the query tool to identify specific instances of concern like policy violation
	(presence of prohibited programs / games and old versions, etc.), inventory changes (memory
66.	change, etc.) and accordingly it could perform several actions as reply. These actions could
	be (a) sending a mail, (b) writing to files, sound an alarm (c) message to scroll on monitor
	screen if the administrator, etc.
67.	Assets must be identified and tracked location; user/department wise.
68.	Server details must be managed in the System to ensure stakeholder management.
69.	Proactive asset manager must be enabled to notify the stakeholder when the warranty of the
	asset expires as this helps the asset team to proactively manage end of life assets effectively.

#	Minimum Specifications
70.	Manage contract service levels in the system to track the End of Life Assets
71.	Vendor details must be maintained in the system to map the assets.
72.	The solution should be made available in a High Availability setup & should be able to stably
	support upward of 2500 network connected smart assets including cameras, sensors, displays
	etc. in the environment.
	Network Automation
	The solution should include network automation capabilities to push configurations to
73	network devices and keep track of changes to the devices. Be able to monitor compliance &
75.	enforce change control policies within the diverse infrastructure by providing data & tools to
	run compliance reports, track & remediate violations, and view history of changes.
	The solution should be able to administer configuration changes to network elements by
	providing toolkits to automate the following administrative tasks of effecting configuration
	changes to network elements:
74	a. Capture running configuration (real time or scheduled)
74.	b. Capture start-up configuration
	c. Upload configuration
	d. Write start-up configuration
	e. Upload firmware
	The solution should Identify which devices are inactive or out of compliance. Capture a
75.	snapshot of the current state of the network, including topology and virtual LAN (VLAN)
	information. Identify the hosts connected to specific switches or interfaces by MAC address.
	The solution should in real time, detect software configuration information changes made
	across a multi- vendor device network, regardless of how each change is made and also
	support configuration deployment/rollback and configuration templates. store a complete
76.	audit trail of configuration changes, (hardware, and software,) made to network devices,
	including critical change information thereby enable comparison of current device
	configuration against a previously captured configuration as well as compare the current
	configuration against any user-defined standard baseline configuration policy.
	The solution should automate routine configuration tasks for updates, such as password or
77	community string changes. Set up a schedule of automatic captures and policies to ensure
//.	reliable device configurations. Detect performance problems by verifying device
	configurations.

#	Minimum Specifications	
78	The solution should have pre-defined & customizable reports on device compliance, track &	
/0.	remediate compliance violations, and history of configuration changes.	
	ITSM	
79	The Solution should have OGC Gold level or Pink Elephant certifications for ITILv3 in at least	
/ 5.	5+ processes.	
	The Solution should have the complete ITIL process flow for Incident, problem and Change,	
	Service Desk, SLM and knowledge Management etc. compliant to the latest ITIL 2011	
	standards.	
80	The solution should support capability to receive, manage and respond to issues, requests,	
80.	Incidents, Problems etc. communicated within the ITSM tools.	
	The solution should provision the administrator to create new or modify existing workflows.	
	For integrations with other EMS/NMS tools, various options for integration should be	
	provided - APIs, web services, SDKs.	
	The solution should allow for, at the minimum, for the following capabilities:	
	• The flexibility of logging incidents via various means - be it manual or automatic via	
	integration within the EMS solution.	
	It should allow detailed multiple levels/tiers of categorization on the type of incident	
	being logged.	
81.	• It should provide classification to differentiate the criticality of the incident via the	
	priority levels, severity levels and impact levels.	
	• The MSI shall recommend, document (textual and graphical as appropriate) and	
	implement best practices for Incident Management via the solution.	
	• Maintain contact, escalation and notification requirements (e.g. email, phone,	
	including Alerts) for Incidents.	
	The solution shall provide cross functional coordination required for incidents and major	
	incidents such as automated integration to the Event, Problem, technical and functional	
82.	change, Configuration. The solution should support Incident & problem driven change-	
	release deployment activities	
	The solution should allow SLA to be associated with a ticket based on priority, severity,	
	incident type, requestor, asset, location or group individually as well as collectively.	
83.	The solution should deliver service level information and alerts directly to IT Operations and	
	Service Support consoles.	

#	Minimum Specifications	
84.	 The solution shall record, document and track all Changes regarding Equipment and Software within the CMDB maintained The solution shall contain Audit trail of any and all Changes including authorization, type of Change and status The solution should manage communication, coordination, Monitoring and scheduling of Changes in computing environment with the stakeholders. It should allow Involvement of CAB and change managers to provide authorization for change requests. Maintain all Configuration Data of the change management system Maintain Post Implementation Review for the Normal and Emergency Changes The solution should support Change Impact and change collision detection based on affected CIs from CMDB. The solution should provide for Change Calendar with periodical views for change tracking. 	
85.	 The solution shall provide for following Problem Management capabilities: Record, document and track all problems Maintain RCA and solutioning details to avoid the recurring incidents Ability to create change request for the problem ticket Auto Assignment of problem based on the category Ability to create knowledge from the problem The workflows should be able to perform notification via email to the problem managers and problem analysts 	
86.	The solution shall allow for request management with following capabilities: Monitor the status of Service Requests including approvals and changes to delivery dates Maintain appropriate controls to ensure the necessary approval of requests such that only authorized individuals are able to place Service Requests.	
87.	The solution should support developing, supporting and update Knowledge Management (KMDB) to gather, analyze, store and share knowledge.	
88. The solution should support reporting on the process flow to allow ma understand how organization is performing in terms of process adherence.		
89.	The helpdesk solution should have Mobile app & Chat-like functionality so that End User Support Engineers and Management should be capable to log, update and view tickets fro Mobile application	

#	Minimum Specifications	
	ITSM-CMDB	
	The Configuration Management Database should support multiple datasets with federation	
	and reconciliation facilities so as to get data from Automated discovery solution.	
	Federation of external data sources should be possible with ability to store common	
	attributes inside CMDB and getting other attributes from external data sources in real time.	
00	The solution should provide for best in class integration capabilities with CMDB The solution	
90.	should Provide a single shared view of services supporting Service Design, Transition and	
	Operations stages of the lifecycle.	
	The solution Should automatically create Service models to describe how IT infrastructure	
	supports business services. Maintain vendor details when the incidents requires vendor	
	involvement for the closure	
	The solution should Provide a Service catalogue so as to establish a framework for Service	
91.	definitions based on IT and business alignment. The solution Should Provide Service	
	blueprints to describe functional and deployment models for the Service definitions.	
	Integration	
	The proposed network management system shall integrate with the helpdesk system by	
92.	updating the Asset with CI information to support viewing history or open issues in helpdesk	
	on the particular managed asset and associate an SLA to the ticket in the helpdesk.	
	The proposed network management system shall attach an asset identifier when submitting	
03	a helpdesk ticket. In case the asset is not found in the helpdesk database, it shall be	
55.	automatically created prior to submitting the ticket. NMS console shall show associated	
	helpdesk ticket number for the alarms that generated those tickets.	
	SLA's violation on monitored end user response time shall open a helpdesk incident out of	
94.	the box.	
	Proposed Application Performance Solution shall integrate with Network Fault Monitoring	
95.	Solution to forward Application Performance Threshold violation alarms in proposed	
	Network Fault Manager Console.	
	The proposed Fault Management Solution shall support integration with Proposed help desk	
	or trouble ticketing system such that integration shall Associates alarms with Service Desk	
96.	tickets in the following ways:	
	 Manually creates tickets when requested by Fault Management GUI operators 	
	 Automatically creates tickets based on alarm type 	

#	Minimum Specifications	
	 Maintains the consistency of the following information that is shared between 	
	alarm and its associated Service Desk ticket including status of alarms and	
	associated tickets and current assignee assigned to tickets.	
	 Helpdesk ticket number created for associated alarm shall be visible inside Network 	
	Operation Console.	
	The proposed NMS shall provide unified workflow between the fault and performance	
	management systems including bi-directional and context sensitive navigation, such as:	
	 Navigate from the Topology View to At-a-Glance or Trend Reports for any asset 	
97.	 Navigate from the Alarm View to At-a-Glance, Trend or Alarm Detail Reports 	
	 Proposed Performance Management system shall feed in discovery from 	
	 Devices already discovered in Network Management Module without starting 	
	 discovery process again all together in Performance Management Engine. 	
	Application Monitoring	
	The solution shall proactively monitor all user transactions for any web application hosted;	
98.	detect failed transactions; gather evidence necessary for triage and diagnosis of problems	
	that affect user experiences and prevent completion of critical business processes.	
٥٥	The solution shall determine if the cause of performance issues is inside the application, in	
55.	connected back-end systems or at the network layer.	
100	The solution shall be able to obtain request response times based on different call	
100.	parameters.	
101	The solution shall be able to correlate Application changes (code and configuration files) with	
101.	change in Application performance.	
102	The solution shall be able to limit access to data by user roles e.g. Data for an application	
102.	should be visible only to the application's owners	
102	The solution shall give visibility into end user experience for various transactions without the	
103.	need to install agents on end user desktops.	
104	The solution shall act as a passive listener on the network thus inducing zero overhead on the	
104.	network and application layer particularly during peak loads.	
	The solution shall be able to detect user impacting defects and anomalies and reports them	
105.	in real-time such as in case of a Slow Response Time, Partial response, Missing component	
	within transaction, HTTP error codes, web application errors etc.	

#	Minimum Specifications
106.	The solution shall be able to provide trend analysis reports and compare the user experience
	over time by identifying transactions whose performance or count has deteriorated over
	time.
107.	The solution should be made available in a High Availability setup & should be able to stably
	support at least 10 applications with possibility for adding more apps in the future based on
	the citizen requirements.
108.	The solution should be able to automatically build a map of the application flow by
	understanding the different architecture layers like spring framework and build out the layers
	accordingly
109.	The application flow should indicate the sql queries and method calls made by the system
	and indicate the latency and response times for each

Note : MSI responsibility to deliver all integrated modules as mentioned in "Functional & Technical Requirements for Enterprise Management System"

5.1.29 Functional & Technical Requirements for Modular Data Center Infrastructure

The rack is designed to meet the safety requirements of the data centre. Both the front and rear door have comfort handles with different locking options. The rack is suitable for baying option. Cable entry is via the roof plate and via bottom plate without affecting the climatic conditions inside the rack.

#	Minimum Specifications	
Make:	Make:	
Model:	Model:	
1.	General Requirements	
	Modular Rack Data Centre Solution suitable for 80/100 KVA IT load	
	distributed in 6 Server Racks & 2 Network Racks Integrated with Suitable	
1.	redundant Cooling units, Fire detection & Suppression and Monitoring	
	system.	
	All critical components of like Integrated racks, precision cooling units, UPS,	
	monitoring system and rack PDU should be from single OEM. DCIM and CCTV	
	may be from other OEM, who shall be responsible for overall design and	
	optimum functioning of integrated rack infrastructure including UPS. A	
	certificate/ undertaking in this regard shall be submitted from OEM. It is a	
	must requirement for seamless integration and better service support	

#	Minimum Specifications
	The detail specifications of the intelligent integrated/inbuilt infrastructure,
iii	standalone system shall be in adherence to standard Data Centre guidelines
	thus shall be composed of multiple active power and cooling distribution
	paths. All these components should be designed and prefabricated.
	Solution should be modular and scalable. All the critical components should
iv	have redundancy. It shall include internal environmental controls, fire
	detection & suppression, water leak detection, temperature, humidity
	sensors and security devices.
2.	Precision Cooling System
i	Cooling System should be DX (Variable) type In-Row closed loop precision
	cooling system of 80/100 kW capacity with N+1 redundancy of cooling units.
ii.	Inbuilt Humidifier to cater IT load up to 80/100 kW
iii.	Cooling system must provide rated cooling load at 45° C Ambient temperature
	Cooling system should be designed for high sensible heat ratio with variable
iv.	cooling technique to match the low latent load of system and should provide
	effective and uniform distribution of cooling from 1U to 42U.
	Each compressor should be equipped with preset high and low pressure
v.	switches for protection against high condensing and low evaporating
	temperatures.
vi.	Cooling units shall utilize R410a cooling medium.
vii.	Power cable for cooling outdoor unit shall be OEM recommended cable of
	requisite size & length.
viii.	Each cooling unit should have EC direct drive fan modules.
	The cooling units should be powder painted with insulation and protection
ix.	against corrosion. The unit should be front and rear accessible for
	maintenance.
х.	The microprocessor based controllers for cooling units should be networked
	for optimum performance with monitoring of rack temperature.
xi.	The controller should have ability to be monitored over LAN through SNMP or
	HTTP capabilities.
xii.	The cooling system should have condenser and humidifier complete with
	water inlet valve.

#	Minimum Specifications
xiii	Insulated refrigerant piping with stand and accessories from indoor unit to
A	outdoor unit.
	Air Filtration –
	• The filter cells are made of two deep pleated 4" filters rated MERV8
	following ASHRAE 52.2 (45% by ASHRAE 52.1) or G4 following EN779, located
	within the cabinet, and accessible from the rear of the unit. Frame of the filter
xiv.	shall be made of galvanized steel.
	• Optional filters are available: MERV11 following ASHRAE 52.2-1999 (45% by
	ASHRAE 52.1-1992) or F5 following EN779.
	• Clogged filter alarm is available for standard and for optional filter. It sends
	a visual alarm to display.
3.	Integrated Racks
i	42U size 600mm Server Rack with front glass door with comfort handle, lock
1.	insert, Top cover with cutout with cover plate for cable entry - 6 Nos.
	42U size 800mm Network Rack with front glass door with comfort handle, lock
	insert, Top cover with cutout with cover plate for cable entry - 2 Nos.
iii.	42U racks should have load carrying capacity up to 1000 Kgs.
iv	The hot and cold aisle containment shall of min 200mm at front and rear, be
10.	part of integrated rack infrastructure.
v.	Blanking panels for 70% rack space.
vi	Horizontal & vertical cable management system on front and back sides of
	integrated rack infrastructure. Plastic duct for cable routing between racks.
vii.	Thermal shielding & insulation for integrated rack infrastructure.
viii.	Biometric access control system for integrated rack infrastructure front doors.
ix.	LED lights for integrated racks.
х.	Earth Rail and straps for integrated rack infrastructure.
vi	Automatic rear door opening/ ventilation system operation in case of high
XI.	temperature.
4.	Power Distribution System
	Intelligent rack PDU minimum 32A, 230V with PDU level monitoring with 18
i	nos. IEC C13, 4 nos. IEC C19 sockets with power cord plug and socket for PDU
· ·	input - 2 Per Rack. However, PDU Amp rating shall be as per requirement of
	solution.
	1

#	Minimum Specifications
5.	Raw Power Distribution Panel
i	Raw Power Distribution panel should have provision for distribution of
1.	electrical power to UPS, cooling units as per OEM design with spare MCBs.
ii.	Busbar should be copper busbar
iii.	Power rating should be designed considering the load of equipment's.
	DB panel should be mounted on to utility rack only with all internal cabling
iv	integrated into the same. Essential MCB/MCCB should be provided with
10.	electrical system. The panel must have protection against fire hazards and
	should have fire detection and NOVEC 1230 Gas based suppression system.
	Complete single line diagram should be got approved from Engineer- In-
v.	Charge before start of work.
6.	Fire Detection and Suppression System
	Integrated rack solution should have integrated fire detection, VESDA system
1.	and suppression system.
ii.	Fire suppression agent shall be Novec 1230 gas as per NFPA 2001 guidelines.
	The entire enclosed volume of the rack containment should be protected with
	fire detection and suppression system.
	Fire detection and suppression system should be mounted in a separate panel
	near to Smart Racks to avoid consumption of any usable U space an In-rack
iv.	built-in feature of solution. It should have Fire alarm and fire suppression unit
	and the fire suppression agent should be NOVEC 1230 Gas as per NFPA 2001
	guidelines
7.	Access Control System
i	Biometric access control system shall be deployed for access of integrated
1.	rack infrastructure to authorized persons only.
ii.	Record, report and archive each and every activity with log formats.
	Fail safe operation in case of no-power condition and abnormal conditions
	such as fire, loss of access control etc.
	The IP based Access Control System shall be used to serve the objective of
iv.	allowing access to authorized personnel only. The system deployed will be
IV.	based on Biometric Technology. The front rack doors will be provided with
	magnetic locks, and will operate on fail-safe principle through one common
#	Minimum Specifications
------	--
	Biometric access control system. Rear doors will be operated through
	mechanical lock & key mechanism.
	The system would be designed and implemented to provide following
	functionality:
	 Configurable system for user defined access
	• Built-in Real Time Clock (RTC), calendar; complete Database stored locally
	and shall be capable of operating offline on standalone mode
	• Record, report and archive each and every activity (permission granted and
	/ or rejected) with log formats
	• At the biometric reader, user presents the finger to the biometric reader
	which is unique to each employee. The pattern is read and compared with
	stored data to grant / deny access.
٧.	4 nos. full HD CCTV cameras, cameras should support motion detection.
vi.	4 channel DVR (1 TB hard disk space) for recording.
8.	Environmental Controls
i.	Very Early Smoke detectors (VESDA) for integrated racks.
ii.	Water leak detection system for integrated racks.
iii.	Temperature/ Humidity sensor
iv.	Door sensor
V.	Alarm Beacon
vi.	Rodent Repellant system for integrated rack infrastructure
9.	Monitoring System
i	Integrated rack infrastructure shall have IP based monitoring system for all
	the rack parameters with sensors and notification system.
ii.	Email alert notifications based on preset parameters.
	The monitoring unit should be Rack mountable and should not consume more
	than 2U space in the rack.
	The system shall continuously collects critical information from network
	connected devices such as UPS system (Power components for Mains Inputs,
iv.	Output Critical Bus, Battery parameters), Cooling Units , temperature &
	humidity sensors, Door sensors, Water Leak sensor and other dry contact
	monitoring.
10.	Modular UPS System

#	Minimum Specifications
Capacity (in kVA /	90kVA/90 kW (3 x 30kW) 3-Phase Input / 3-Phase Output considering N+1
kW)	redundancy at module level.
Frame	Minimum 150kVA/150KW frame should be there.
	a. True Online configuration double conversion UPS.
	b. Modular & Scalable UPS with hot swappable Power Module of
	Minimum 30 kVA /30kW
	c. Hot swappable Power module shall have its own DSP controller (
	centralized control systems not recommended), and Contains a Full
	rated rectifier, full rated inverter & battery charging circuit
	d. UPS comprises a user replaceable continuous duty bypass static
	switch module
	e. DSP (Digital Signal Processor) / Microprocessor based control , using
Technology and	IGBT devices and high switching frequency PWM.
Capability	f. PFC controlled IGBT rectifier with Active power factor Correction
	(APFC).
	g. Capability to operate in N+1 / N+X and N+N PRS -Parallel Redundant
	Configuration.
	h. Capability of independent or common battery bank operation of the
	UPS when operated in PRS.
	i. UPS should be with Inbuilt switches for Input , Output , Static Bypass
	and Mains Bypass.
	j. UPS should have Sleep Mode feature so that in case of less load,
	extra nos modules should go in OFF (sleep) mode .
Model Name &	
Number	
90kVA/90 kW	Make / Model / Part No must be specified.
(3 x 30kW)	
Input	
Input facility -	(3-phase and sharing neutral with the bypass input)
Phases / Wires	
Nominal Input	380 / 400 / 415V AC
Voltage	

#	Minimum Specifications
Input Voltage	304 - 477 V AC (On Full Load)
Range	
Nominal Input	50 / 60 Hz (Auto selectable)
Frequency	
Input Frequency	45 to 55 Hz
Range	
Input Power	> 0.99 on Full resistive load
Factor	
Input Current	(@ 100 % load <=3 %)
Harmonic	
Distortion (THDi)	
Generator	Compatibility to genset supply required
Compatibility	
Input Protection	Input to Rectifier / Output / Static Bypass/ Manual Bypass (In-built)
(Thru In-built	
Switch Gear	
Output	
Nominal Output	380 / 400 / 415V AC (Selectable)
Voltage	
Output Voltage	+/- 1%
Regulation	
Nominal Output	50 / 60 Hz (Selectable)
Frequency	
Output Frequency	+/- 0.05 Hz (Free Running / Self Clocked Mode)
Regulation	
	+ / - 5 % (Synchronized to Mains Mode, Selectable)
Output Frequency	1 Hz / s
Slew Rate	
Output Wave	Pure sine wave
Form	
Output Voltage	<= 1% (For 100% Linear / Resistive Load)
Distortion (THDu)	<= 4% (For 100% Non-Linear / RCD Load)
Crest Factor	3 : 1 On Full Load

#	Minimum Specifications
Unbalanced load	100% unbalanced load should be allowed
on phases	
Output Protection	Through In-built 3P switch / Isolator
Transient	
Response /	
Recovery	
Transient	+/- 5%
response: Dynamic	
regulation for 0%	
to 90 % step load	
Transfer Time	
Transfer Time	Nil from Mains mode to Battery Mode
(Mode of	Nil from Battery Mode to Mains mode
operation)	
Transfer Time	< 1 ms (Synchronized Mode)
(Inverter to Bypass	< 10 ms (Asynchronized Mode)
/ Bypass to	
Inverter)	
Automatic & Bi-	Should be provided to take care of uninterrupted transfer of load from
directional static	Inverter to bypass (under overload / fault conditions) & automatic retransfer
hy-pass (In-huilt)	from bypass to inverter (on removal of overload / fault conditions). And
	should be user replaceable.
Efficiency	
Overall Efficiency	96%
(AC to AC) - Online	
(Double	
Conversion)	
Inverter Efficiency	> 96% (On Full Load)
(DC to AC) -	
Battery Mode of	
operation	
Eco mode	>98%
efficiency	

#	Minimum Specifications
Overload	
Inverter Overload	110% for 60 minutes ,125% for 10 minutes ,150% for 60 seconds
capacity (Mains	
Mode & Battery	
Mode)	
Display Panel	(In-build LCD Display & LED)
	Input: Voltage (L-L & L-N)/ Current/Frequency/Power factor
Moasuromonts	Bypass: Voltage (L-L & L-N)/ Frequency
$(O_{\rm P} \mid C_{\rm D})$	Output: Voltage (L-L & L-N)/ Current/Frequency/Power factor
	Battery: Voltage / Capacity/Backup time
	Load: In kVA / kW / Percentage/Crest factor
Event Logging &	Events like: Over temperature / DC Bus Fail / Fan Fail / Fuse Fail / Overload /
Statistical Data	Short-circuit / Device Fail / Inverter Fail / Rectifier Fail / Bypass Fail, etc
(On LCD): UPS	Statistical Data: No. of power failures / Transfers to Bypass / Total Running
should capture	time, etc
and display up to	
512 events	
User	Bypass: Voltage / Frequency Range
Programmable	
Parameters &	
Settings (On LCD)	
	Inverter: Voltage / Frequency / Eco Mode / Frequency converter /
	Redundancy selection
	Battery: Type / Banks / Chargers Current / Manual & Automatic Testing
	Alarms: Buzzer & LED Test / Buzzer Mute
	Date & Time Setting
	Password: User / Administrator Setting
	Information: UPS Serial No. / Firmware
	Log & Statistical Data Reset & Firmware upgrade
Indications (LED)	Rectifier Indicator /Battery Indicator /Bypass Indicator /Inverter Indicator/
	Load Indicator / and Status Indicator
Alarms	
Audible Alarms	Mains Failure / Battery Low Alarm / UPS Overload / Fault / Shutdown

#	Minimum Specifications
Battery Backup /	
Battery Bank &	
Charger	
Backup Required	Vendor to specify - 45 mins back up at full load of 80/100 kw
Battery Bank	Vendor to specify - 408 V
Voltage	
Battery Bank V Ah	Vendor to specify -
(Vendor to include	
battery sizing	
calculations with	
tender)	
Batteries Type	Lithium ION battery
Battery Makes	Exide/ Rocket/ Quanta/ Leoch/ OKAYA/ Panasonic/ Amararaja
Minimum Charger	10% of Battery Ah rating offered
Rating (Including	
internal / external)	
Charger type /	Constant Voltage Constant Current Solid state SMPS charger designed for at
Charging Method	least 10% of Battery Ah offered
& Charging	Float Voltage: 2.25 VPC
Voltages	Boost Voltage: 2.32 VPC
Battery recharge	8 to 10 hours to 90% capacity
time (After	
complete	
discharge) to 90%	
capacity	
Battery Protection	External Battery Circuit Breaker
(Vendor to specify	
the rating)	
Battery End Cell	1.7 V / Cell
Voltage	
Interfaces	
Interface to NMS	SNMP Card for connecting the UPS to LAN thru Ethernet port & monitoring
(Network	thru NMS

#	Minimum Specifications
Management	
System) - To be	
quoted as option	
Interface to BMS	ModBus Card for connecting to UPS to BMS thru RS485 & monitoring thru
(Building	BMS
Management	
System) - To be	
quoted as option	
Potential Free	Required
Contact – Relay	
Card	
Restart / Testing	
Capability	
Automatic Postart	UPS should start up automatically on mains resumption after battery low
Automatic Restart	shutdown
	Manual / Scheduled battery test to ensure healthiness of batteries. However
Battery Self Test	in event of weak batteries, test should be aborted and fault reported to the
	user thru replace battery warning
Physical	
Operating	Regular as : 0 to 40 deg C and also mention deration above 40 Deg C.
Temperature	
Storage	-20 to 40 deg C
Temperature	
Operating	0 to 95% RH (Non-condensing)
Humidity	
Operating Altitude	< 1000 m above sea level
Protection Class	IP – 20
Type of Cooling	Forced Air
Noise Level	< 70 dbA at I meter distance
Form Factor	Free Standing Floor Mounted UPS
Reliability	MTBF greater than 100000 hours
Conformity and	
Standards	

#	Minimum Specifications
General and safety	EN50091-1-1/IEC62040-1-1/AS 62040-1-1
requirements for	
UPS used in	
operator access	
areas	
Electromagnetic	EN50091-2/IEC62040-2/AS 62040-2 (C3)
compatibility	
(EMC)	
requirements for	
UPS	
Method of	EN50091-3/IEC62040-3/AS 62040-3 (VFI SS 111)
specifying the	
performance and	
test requirements	
of UPS	
11.	Protective Earthing
i	Supply, installation & testing and commissioning of Chemical Earth pits of
	FAST EARTH ELECTRODE-COPPER with Chamber and cover.
ii	Earthing system shall be in accordance with IS: 3043-1966 Code of Practice for
	Earthing.
	Earthing shall be chemical copper earthing with copper strips upto server &
	battery room
iv.	The resistance of each earth station should not exceed 1 ohm
12.	Fire Rated Door
i.	Door size 1500 x 2100 mm
	Providing of 60 mm thick double leaf nonmetallic asbestos free, fire /smoke
	check door shutters of 2 hour fire rating, as per manufacturers specifications
	with overall size as per site requirement, including door frame of section 140
ii	x 65mm made out of second class Hard wood of Density 650kg./cumtr (
".	Mirandy wood), and shutter comprising of 2 nos.
	calcium silicate board each 12 mm thick, fixed overall hardwood internal
	frame of size 100 x 30mm including sandwiching 25-31mm thick fire resistant
	insulation filler faced with 3mm thick commercial ply on both the faces and

#	Minimum Specifications
	Hard wood lipping all around the shutter with heat activated Intumescent fire
	seal strip of size 10 mm x 4 mm on all sides
	except bottom (for smoke sealing).including provision for hardwares,
	Stainless Steel Dead lock, Door Closer (Heavy Duty), D- type Pull Handle, SS
	Ball Bearing Hinges, fixing as approved. A glass vision panel (wired) 5 mm thick
	of size 200 x 300mm should be included. All shutters shall be mounted on door
	frames with the help of 4 Nos stainless steel ball bearing hinges etc. including
	frame, painting etc.
13.	Electromagnetic Lock for Double Leaf Door
1.	Electromagnetic door closer for double leaf door (IN & OUT).
2	Access control system should have provision of monitoring of Emergency Exit
۷.	door with Alarm generation facility.

Other Requirement:

- 1. OEM or Manufacturer should be ISO 9001: 2000 and ISO 14001 certified.
- 2. The Project Manager proposed from bidder must have a minimum 5 years of experience in executing & managing Data centre projects. (CV along with Client reference to be provided)
- 3. OEM shall be present in IDC (International Data Corporation) Market Space in Top five position for Data Centre Infrastructure Management in last three year report.
- 4. OEM or Manufacturer of the offered goods/ equipment's should be a company registered under the companies Act since last 10 years. Valid company registration certificate should be submitted.

5.1.30 Functional & Technical Requirements for KVM Switch

#	ltem	Minimum Requirement	
Make:			
Model:			
1.	KVM	Keyboard, Video Display Unit and Mouse Unit (KVM) for the IT	
	Requirement	Infrastructure Management at Data Center	
2.	Form Factor	19" rack mountable	
3.	Ports	minimum 8 ports	

#	Item	Minimum Requirement
4.	Server	It should support both USB and PS/2 connections.
	Connections	
5.	Auto-Scan	It should be capable to auto scan servers
6.	Rack Access	It should support local user port for rack access
7	SNMP	The KVM switch should be SNMP enabled. It should be operable from
7.		remote locations
8.	OS Support	It should support multiple operating system
0	Power	It should have dual power with failover and built-in surge protection
5.	Supply	
10	Multi-User	It should support multi-user access and collaboration
10.	support	
11	Cascading	Two Level Cascading on IP model and Chaining on analog model for control
11.		of up to 512 servers
12	Software	KVM access software with 80nodes included in IP Model for advance server
12.		management consolidation (upgradable upto 1024 Nodes)

5.1.31 Functional & Technical Requirements for Online UPS for ICCC

#	Parameter	Minimum Requirement	
Make	Make:		
Mode	Model:		
1.	System	20KVA Online UPS shall have Tower Type in (N+1 Configuration) OR	
	Configuration	Modular design & feature of Hot Swap ability with 20kva module. THDi	
	Configuration	less than 5%. Module shall be with full rated rectifier, inverter & charger.	
2. Technology	Technology	True On-line, double conversion type. Inbuilt Isolation Transformer is	
	Technology	required inbuilt in the UPS Cabinet itself	
3.	Input Source	Mains/Local DG Set Compatibility	
4.	Input Voltage	415 VAC 3 phase, 4 wires	
5	Input Voltage	315 to 475 VAC	
٦.	Tolerance		
6.	Input Frequency	50 Hz	
7.	Input Frequency		
	Tolerance		

#	Parameter	Minimum Requirement	
8.	Input Power Factor	>0.99 (at nominal voltage and full load)	
9.	Total Harmonic Distortion at 100%	< 3% for linear load	
10.	Output Voltage	415 VAC 3 phase, 4 wires	
11.	OutputVoltageL.OutputVoltageRegulationL.Un-balanced load.THDU < 3% between Phase to Neutral for 10		
12.	Output Power Factor	0.8 or higher (for 0 to 40 deg C operation)	
13.	Over Load Rating	125% for 10 minutes 150% for 60 seconds	
14.	Inverter Efficiency	92% or better	
15.	Overall efficiency (without transformer in ckt)	94% (Eco mode efficiency shall be 97%)	
16.	Static Bypass switch	A Built-in static transfer switch shall be provided as an integral part of the UPS. The Static switch shall be a bi-directional naturally committed high-speed static (SCR type) device rated to carry full load current continuously.	
17.	. Manual Bypass switch The UPS should have a Built-in Maintenance Bypass Isolator connect the load to the input AC power source, bypassing the inverter and static transfer switch.		
18.	Battery type	Lithium ION battery	
19.	Battery make	Exide/ Rocket/ Quanta/ Leoch/ OKAYA/ Panasonic	
20.	Backup	Min 60 minutes backup on full load for each UPS	
21.	Battery management	The UPS should have Battery Management feature for: Periodic Battery Test Controlling Charging Time and Current Increase in Battery Life	
		Protection : Battery low Cut-off without draining current	

#	Parameter	Minimum Requirement	
		-Charger capacity shall be min. 10% of the Ah of the battery being offered	
		The UPS should have LCD panel for measuring Output voltages, Output	
	ICD Panel & IED	currents and Frequency, Battery Voltage/Amp, display status of the	
22.	indications	battery capacity and backup time left and event logging (record 500	
	indications	event, built-in SRAM). LED indicators for operation in Normal / Battery /	
		Bypass / Fault	
	Interface	RS232 interface to be provided. Total six programmable dry contact	
	Interface	outputs & two smart slots	
23.	Power	The UPS should have Power management software and interface cable,	
	Management	providing complete power monitoring and control capabilities to system	
	Software	administrators.	
24	SNMP Card	Should come with an SNMP Card for connecting UPS to Ethernet LAN to	
24.	Sivivir Caru	monitor and manage the UPS with a standard Web browser.	
		The UPS should come with hardware/software required to provide	
25.	Synchronization	Synchronization capability between the outputs of two or more	
		independent UPS systems.	
26	Protection(MCP)	Input Protection Circuit Breaker; Bypass Input Protection Circuit Breaker;	
20.	(Web)	Manual Bypass Protection Circuit; Output Protection Circuit Breaker	
	Product (IEC/EN) Standards	- CE Certificate - EN 62040-1-2	
		- EN 62040-2 Class A	
		- IEC 61000-4-2 Level 4	
27.		- IEC 61000-4-3 Level 3	
		- IEC 61000-4-4 Level 4	
		- IEC 61000-4-5 Level 4	
		- IEC 61000-4-6	
28.	Dimension (w x d	To be furnished by the vendor	
20	XII) III IIIII	To be furnished by the yonder	
29.	vveignt - in kg		
	Manufacturer	UNIS. AS PET ISO 9001, 2015	
30.		EIVIS: AS per ISU 14001: 2015	
		NABL Accredited Calibration lab of OEM	
		All Certificate for Indian Operation (please enclose copy of same).	

#	Parameter	Minimum Requirement	
		Manufacturer shall have supplied the same Modular UPS in at least 2	
		smart/safe cities in last 2 years (OEM need to submit undertaking with	
		end user name & details	

5.1.32 Functional & Technical Requirements for DG Set

#	Item	Minimum Requirement	
Make:			
Model			
		a. Auto Starting DG Set mounted on a common base frame with	
		AVM (Anti- Vibration) pads, residential silencer with exhaust	
1	General	piping, complete conforming to ISO 8528 specifications and	
1.	Specifications	CPCB certified for emissions.	
		b. Minimum 250 KVA rating as per the requirement to provide the	
		supply for ICCC and data center	
		Radiator cooled, multi cylinder, 1500 RPM diesel engine, with	
2	Engine	electronic/ manual governor and electrical starting arrangement	
2.	Lingine	complete with battery, conforming to BS 5514/ ISO 3046/ IS 10002	
		High Speed Diesel (HSD)	
3.	Fuel	High Speed Diesel (HSD)	
		Self-exciting, self-regulating type alternator rated at 0.8 PF or better,	
4	Alternator	415 Volts, 3 Phase, 4 wires, 50 cycles/sec, 1500 RPM, conforming to	
	Alternator	IS 4722/ BS 5000, Windings of 100% Copper, class H insulation,	
		Protection as per IP 23.	
		AMF Panel fitted inside the enclosure, with the following: It should	
		have the following meters/indicators:	
		 Incoming and outgoing voltage 	
		Current in all phases	
E	AMF (Auto Main	Frequency	
5.	Failure) Panel	KVA and power factor	
		Time indication for hours/minutes of operation	
		Fuel Level in fuel tank, low fuel indication	
		Emergency Stop button	
		Auto/Manual/Test selector switch	

#	ltem	Minimum Requirement
		MCCB/Circuit breaker for short-circuit and overload
		protection
		Control Fuses
		Earth Terminal
		• Any other switch, instrument, relay etc. essential for
		Automatic functioning of DG set with AMF panel
	Acoustic Enclosure	The DG set shall be provided with acoustic enclosure / canopy to
		reduce the sound level and to house the entire DG set (Engine &
		Alternator set) assembly outside (open-air). The enclosure must be
6.		weather resistant powder coated, with insulation designed to meet
		latest MOEF/CPCB norms for DG sets, capable to withstand climate.
		The enclosure must have ventilation system, doors for easy access
		for maintenance, secure locking arrangements etc.
	Fuel Tank Capacity	It should be sufficient and suitable for containing fuel for minimum
-		12 hours continuous operation, Complete with level indicator, fuel
7.		inlet and outlet, air vent, drain plug, inlet arrangement for direct
		filling and set of fuel hoses for inlet and return.

5.1.33 Functional & Technical Requirement for Fire Proof Enclosure

The overall design of the safe should be suitable for safe storage of computer diskettes, tapes, smart cards and similar devices and other magnetic media, paper documents, etc. the safe should have adequate fire protection.

#	Item	Minimum Requirement				
Make:	Make:					
Model	:					
1.	Capacity	2MX1MX3M				
2.	Temperature to Withstand	1000° C for at least 1 hour				
3.	Internal Temperature	30° C after exposure to high temperature for 1 hour				
4.	Locking	2 IO-lever high security cylindrical / Electronic lock				

5.1.34 Functional & Technical Requirement for Structured Cabling (ICCC & DC)

To supply and installation, commissioning and testing of the following equipment but not limited to

- i. OFC Cabling
- ii. Copper Cabling using Patch Panels and CAT 6 I/O
- iii. Fibre Runner

- iv. Wire basket for Copper
- v. The fibre Runner and wire basket shall connect all the rooms
- vi. The cabling should be structured cabling with all Cat 6 A components and certification should be provided for 20 years performance warranty.
- vii. All the Cabling components (All Copper Cable & its accessories, fibre cable & Its accessories should be from the preferably same OEM)
- viii. MDF Panel / Patching / Cabling / Rack

#	Particulars	Minimum Requirement	
1.	Туре	Unshielded Twisted Pair, Category 6A, TIA / EIA 568-C.2 & ISO/IEC 11801	
2.	Conductors	23 AWG solid bare copper	
3.	Insulation	High Density Polyethylene	
4.	Jacket	Low Smoke Zero Halogen (LSZH)	
5.	Pair Separator	Cross-member (+) fluted Spline	
6.	Frequency	Tested up to Minimum 500 MHz	
7.	Cable Outer Diameter	6.9 +/- 0.4 mm	
8.	Delay Skew	25ns/100m max	
9.	Bend Radius	4 * Cable Diameter	
10.	Impedance	100 Ohms + / - 15 ohms, 1 to 500 MHz	
11.	Fire Rating	IEC 60332-1, IEC 60754, IEC 61034	
12.	Performance characteristics	Performance characteristics to be provided along with bid Attenuation, Pair-to-pair and PS NEXT, ELFEXT and PSELFEXT, Return Loss, ACR and PS ACR	
13	Standard	ANSI/TIA-568 C.2 category 6A, ISO/IEC-11801, Class E/ IEC 61156-5:	
10.	Compliance	category 6A	
14.	Certification	CPR (Class: Dca-S2, d2, a1 and B2ca-S1a, d1, a1), RoHS	
±7.		The copy of certificates shall be submitted during execution Phase.	

5.1.35 Functional & Technical Requirement for Outdoor Cables

Category 6 U/FTP 4 Pair 23 AWG Double Jack Armored External Cable

#	Parameter	Minimum Requirement
Make:	:	
Mode	l:	

#	Parameter	Minimum Requirement
1.	Туре	Shielded Twisted Pair, Category 6, TIA / EIA 568-C.2 & ISO/IEC 11801
2.	Conductors	23 AWG solid bare copper
3.	Insulation	High Density Polyethylene
4.	Inner and Outer Sheath	LSZH
5.	Armoured Material	Steel Wires
6.	Pair Separator	Cross-member (+) fluted Spline
7.	Operating temperature	20 °C to +60 °C Storage Temperature -20 °C to +80 °C
8.	Frequency	tested up to Minimum 250 MHz
9.	Cable Outer Diameter	11.2 +/- 0.4 mm
10.	Delay Skew	45ns MAX.
11.	Bend Radius	4 * Cable Diameter
12.	Impedance	100 Ohms + / - 15 ohms, 1 to 250 MHz
13.	Mutual Capacitance	5.6 nF MAX /100 Mtr
14.	Conductor Resistance	73 Ohms Max / KM nominal
15.	Propagation Delay Skew	45 ns/100 Mtrs. MAX
16.	Max. Tensile strength	110N
17.	Standard	ANSI/TIA-568 C.2 category 6, ISO/IEC-11801, Class E/ IEC 61156-5:
	Compliance	category 6
18.	Application	IEEE 802.af and IEEE 802.3at for PoE

5.1.36 Functional & Technical Requirement for Fibre Cables

#	Parameter	Minimum Requirement
Make:		
Model	:	

#	Parameter	Minimum Requirement	
1	Туре	6/12/24 core OS2 (9/125 micron) Single mode, Loose Tube jelly free,	
1.	Type	Glass yarn strength, Steel tape armour, outdoor optical Fiber cable	
2.	Outer Jacket	HDPE (High Density Polyethylene)	
3	Strength	E-glass (rodent protection and water blocking)	
5.	Members,		
4.	Armouring	Corrugated Steel tape armouring	
5	Loose Tube	Dry Core (Gel free Construction)	
5.	construction		
6	Loose Tube	3 3mm	
0.	Diameter		
7.	Cable Outer	9.3mm	
	Diameter		
8.	Tensile Load	1600N as per IEC 60794-1-2-E1	
9.	Crush Load	3000N as per IEC 60794-1-2-E3	
10.	Colour Code	ANSI/TIA/EIA-598-B	
11.	Max attenuation	<=0.34 dB per km@850 nm,<= 0.20 dB per km@ 1550nm	
12.	Operating	- 20°C to 60°C	
	temperature		
13.	Storage	-40°C to 85°C.	
	temperature		
14.	Weight	75 kg/km (approx.).	
	Standard	ITU-T G.652.D Fiber, ISO/IEC 11801, ISO/IEC24702, ANSIANSI/TIA/EIA	
15.	Compliance	568C.3, IEEE 802.3z Gigabit Ethernet, ROHS compliant Directive	
		2002/95/EC	
16.	Application	Both indoor and outdoor	

5.1.37 Functional & Technical Requirement for Electrical System & Cabling

To supply and installation, testing and commissioning of the following equipment but not limited to

- i. LT panels, SUB Distribution Panel, UPS Input and Output Panel with Switch gear
- ii. Power Cable tray as per requirement
- iii. Conduiting and wiring as per requirement
- iv. Floor PDU as per requirement based on Layout Drawing
- v. LED lighting and Motion detector as per site requirement

All electrical components shall be design manufactured and tested in accordance with relevant Indian Standard IECSs

5.1.38 Functional & Technical Requirement for Electrical & Cabling Cooling System

To supply and installation, testing and commissioning of the following equipment but not limited to

- i. Precision Air Conditioning (Perimeter Cooling)
- ii. Row Based Cooling (Row Cooling) and Containment for Server room
- iii. Both Hot and cold Aisle Containment for Server room. For better PUE, Cooling, Power, DCIM from preferably same OEM for better Integration

5.1.39 Functional & Technical Requirement for Safety and Security System

To supply and installation, testing and commissioning of the following equipment but not limited to

- i. Addressable Fire Detection and Alarm System
- ii. Rodent Repellent System
- iii. Gas Based fire Suppression System
- iv. Portable Fire Extinguishers

5.1.40 Functional & Technical Requirement for Monitoring System

To supply and installation, testing and commissioning of the following equipment but not limited to

i. Building Management System: BMS comprises of a management system for the following

Monitoring and control of utility system

- Monitoring of Electrical System
- External lighting Control
- Under vehicle detection and scanning system
- Fire door monitoring system and Fire pump monitoring
- Elevator level monitoring system
- Water sump Motor control and monitoring
- UPS Monitoring System
- Integration of BAS system
- Attendance and Access control for O&M staffs through Bio-metric system.

Safety and security system

- IP based Addressable Fire alarm panel- Alarm and Detection
- Public Address and Emergency voice communication System
- Smart card-based Access Control system and Flap barrier
- RFID Tag based vehicle barriers. (four wheelers)
- IP based Closed Circuit Surveillance including External Solvency system

- Visitor management system with photo ID and card issue at security gate
- Car calling system
- LHS cables for cable trays
- ii. Flow meter for Diesel unloading
- iii. Diesel Monitoring at day tank level
- iv. Integration with All energy meter, MCCB, ACB, Safety and Security Equipment's, Diesel monitoring, Data centre Temperature and Humidity Monitoring, UPS, PAC, Panel ON/Off/Trip status etc.

5.1.41 Functional & Technical Requirements for Rodent Repellent System

It would consist of:

- Controllers –Be capable of generating variable high frequency electronic signals that are ultrasonic in nature (20 KHz to 50 KHz) and these signals shall be transmitted to the transducers for emission all around.
- Transducers To cover an open area of 300 Sq.ft. minimum with an average ceiling height of 10ft.

1	Operating Frequency	Above 20Khz
2	Power Consumption	15W max
3	Sound Output:	80db to 110db (at 1m)
4	Power output	800mW per transducers

5.1.42 Functional & Technical Requirements for Water Leak Detection System

5.1.42.1 Water Leak Detection Panel

The water Leak detection panel consists of multiple zones. These controllers shall have MODBUS/BAC net output to be integrated with BMS system. The features are as under: -

- Alphanumeric LCD Display with the minimum of 3Lines
- Soft Touch Membrane Keypad
- LED Indication of the events like power, Alarm & Fault
- Password protected event log facility
- Remote monitoring via MODBUS/BAC net protocol
- Configurable sensitivity adjustment
- Dedicated Hooter output for local alarm

5.1.42.2 Water Leak Sensing Cable

• Water leak sensing cable shall be mechanically strong, resistant to corrosion and abrasion.

- It shall be constructed with two sensing wires, an alarm signalling wire and a continuity wire constructed by fluoropolymer carrier.
- It shall have end circuit to detect open circuit fault.

5.1.42.3 Hooter

5.1.43 Functional & Technical Requirements for Smoke Detection System

The system has been designed to sense incipient smoke at a very early stage in all critical rooms, namely:

- Data Centre.
- UPS & Battery Room
- Technical Area
- i. The panels shall be mounted inside the risk protected and there shall be a network of air sampling pipe work.
- The High Sensitivity Smoke detection consist of highly sensitive Laser-based Smoke Detectors with aspirators connected to networks of sampling pipes. The alarms are generated once the laser sensor receives smoke at a pre-determined obscuration level to activate and alert, Fire 1, Fire 2 and alert signal.
- iii. The signal is extended to the Fire Alarm monitor Modules / BMS through Volt free contacts for further investigation.
- iv. When required, it shall be possible to connect an interface card for open Protocol output toBMS system for online Monitoring with Software level integration.
- v. When required, an optional remote Display unit shall be provided to monitor each detector, and a Programmer shall be supplied to configure the system.

5.1.44 Functional & Technical Requirements for Raised Floor

Providing and fixing Access floor systems as per EN 12825 or equivalent standards.

5.1.44.1 System:

- i. Access floor system to be installed at finished floor height of maximum 600 mm from the existing floor level.
- The system will provide for suitable pedestal and under-structure designed to withstand various static loads and rolling loads subjected to it in an office / server / DCS / panel / rack area.
- iii. The entire Access floor system will provide for adequate fire resistance, acoustic barrier and air leakage resistance.

5.1.44.2 Panels:

- i. Panels will be made up of inert material Calcium sulphate. The bottom of the panel shall be of Aluminum foil to create a fire and humidity barrier and this should provide floor's electrical continuity. Panels will remain flat through and stable unaffected by humidity or fluctuation in temperature throughout its normal working life. The Panels will be UL listed/FM/DM approved.
- ii. Panels will provide for impact resistance top surfaces minimal deflection, corrosion resistance properties and shall not be combustible or aid surface spread of flame.
- iii. Panels will be insulated against heat and noise transfer.
- iv. Panels will be 600 x 600mm x 30 mm height fully interchangeable with each other within the range of a specified layout.
- v. Panels shall rest on the grid formed by the stringers which are bolted on to the pedestals.
- vi. Panels shall be finished with anti-static 0.9 mm Laminate and 0.45 mm thick plastic edge material that is self-extinguishing and will be PVC free

5.1.44.3 Panel Loading

- i. Concentrated point load: 450Kgas per European standard EN 12825*.
- ii. Uniformly Distributed Load (UDL): 1200 Kg/M2.

5.1.44.4 Fire Rating:

i. The Panels will confirm to class O and Class 1 Fire Ratings tested as per CIRC 91/61 or BS 476 Part 6 & 7 (60 min).

5.1.44.5 Pedestals:

- Pedestal installed to support the panel will be suitable to achieve a finished floor height of 600mm. Pedestal design will confirm speedy assembly and removal for relocation and maintenance. Pedestal base to be permanently secured to position on the sub-floor.
- ii. Pedestal assembly will provide for easy adjustment of levelling and accurately align panels to ensure lateral restrain. Pedestals will support an axial load of 1500 Kgs, without permanent deflection and an ultimate load of 3000 Kgs. Pedestal head will be designed to avoid any rattle or squeaks.

5.1.44.6 Pedestal Assembly

- The structure is made entirely of galvanized steel consisting of hexagonal shaped, 89 mm diameter, and 1.5 mm thick base plate, with 6 shaped stiffening ribs with niches that improve adhesion and with 5 holes mechanical fastening to the ground.
- ii. The assembly will provide a range of height adjustment up to 25mm, with the help of check nuts.

5.1.44.7 Under structure:

- Under structure system consists of stringers of size 525 x 30x 25 x 0.8 mm thick to form a grid of 600 x 600mm. These stringers are locked into the pedestal head and run both ways.
- ii. The US system will provide adequate solid, rigid and quiet support for access floor panels.
- iii. The US system will provide a minimum clear, uninterrupted height of 600 mm between the bottom of the floor and bottom of the access floor for electrical conducting and wiring.

5.1.44.8 Floor Insulation:

- The floor and ceiling slabs should be heat-insulated, or coated with a heat insulating material to avoid condensation on floors below and above and to reduce the heat transfer in the server/network room area.
- ii. The insulation shall be done with either 16 or 13 mm thick self-adhesive aluminum foil face nitrile rubber. The floor and ceiling shall be coated with epoxy paint.
- iii. The floor insulation should cover for true floor and true ceiling, this will not allow the thermal conductivity.
- iv. The server & other required area should be equipped with raised floor with 600 mm (24 inch) height. Cavity floor shall have false flooring panels of 18 gauges steel 600 x 600 coated with APDCL Page: TSA – 2 50-micron epoxy conductive paint.
- v. Floor shall be finished with 2mm thick antistatic high-pressure laminate with 2mm thick PVC trim edge all-round.
- vi. The interior of the panels shall be filled with non-combustible Cementous compound.
- vii. The raised floor distributed load should not be less than 1200 Kg/Sqm.

5.1.45 Functional & Technical Requirements for False Ceiling

False Ceiling at appropriate height should be installed concealing any cabling tray and electrical lighting wiring in all areas.

5.1.45.1 Server room

- False ceiling shall be provided with Armstrong Lay in (Hot dipped galvanized steel) metal ceiling system 600 x 600 x 5mm with standard perforation of 2.5 mm die (16% open space) and fleece with NRC of 70 & CAC 36 to be laid on Armstrong grid system.
- Armstrong Oral Lay in metal ceiling System consisting of 600x600mm lay in tiles of pre-coated galvanized steel in 0.5 mm thickness in white color with standard perforation of 2.5mm die & open area of 16%.
- iii. The back of the tile should have black acoustical fleece with NRC of 0.70 & CAC 36 to be laid on Armstrong grid systems with 15mm wide T - section flanges Color white having rotary stitching on the Main Runner, 1200 mm & 600 mm Cross Tees, fixed to the structural soffit by

Butterfly clip hangers, suspension wires & anchor fasteners as per the manufacturer's specification.

iv. Suspension wires to be provided at every 600mm c/c with two no's of ties on each anchor fastener, Perimeter trim of Trulok wall angle in white color secured to wall at 450mm maximum centres.

5.1.45.2 Other Areas

- Acoustical false ceiling of mineral fibre Board (600 x 600 x 15mm) of Armstrong (ELIT RH99) of Equipment. Laid on Grid system (Micro lock edge) with 15mm thick T section (White) having main runner 1200mm x 600mm, cross Tee at 295 HT.
- ii. Mineral Fibre Board modular False Ceiling in Armstrong in Board edge Fissured ANF tiles of size 600mX600mmX15mm having Noise reduction Co-efficient 0.5, light reflection over 75%, Relative Humidity 99%, fire performance class0/class1 (BS 476) 24XL Hot Dipped Galvanized Steel Suspension System having rotary stitching on main runner, 1200 mm & 600 mm cross tees with 15mm wide flanges of white color with standard perforation of 2.5mm dia. (16% open space) fleece with NRC of 0.70 & CAC 36, fixed to the structural soffit by Butterfly clip hangers, suspension wires & anchor fasteners as per the manufacturer's specification, Suspension wires to be provided at every 600mm c/c with two no's of ties on each anchor fastener, Perimeter trim of Trulok wall angle in white color secured to wall at 450mm maximum centres.
- The False Ceiling tile should be Dust free type and of Non-combustible material. Each False
 Ceiling tile (preferably 600mm x 600mm) should be individually removable for access to area
 above False Ceiling.
- iv. The false ceiling area should cover with as per layout. The contractor should propose the right quantity.

5.2 Disaster Recovery Centre

MSI has to implement City Data Centre to cater the requirements of Data compute, storage and for city analytics purpose.

MSI has to implement City Data Centre to cater the requirements of Data compute, storage and for city analytics purpose.

- a. BSCL shall provide the location to house the compute and storage infrastructure at the Data Centre facility being built in the premises of the Command and Control Centre.
- b. The DR for the data centre shall be on an Active-Passive mode on from the MeitY empaneled & STQC audited as per Ministry of Electronics and Information Technology (MeitY) as on bid submission date.

- c. CSP should have deployed & running Govt. Community Cloud setup with minimum 2 customer on deployed on the GCC as on date or Public Cloud with MeiTy compliant can also be considered, but data shall be in India only.
- d. Various ICT equipment to be provisioned and maintained by MSI at the Data Centre is given below.
- e. Only the minimum specifications for the active and passive ICT and Non-ICT components are specified.
- f. MSI may propose Data Centre Virtualization solution for price discovery and use all Bareilly smart cities as virtual cloud to share the storage between the cities.
- g. MSI shall peruse the same provide the BOM / BOQ required to meet the performance requirements as per the proposed business needs. MSI may also suggest additional components as per the solution requirements.
- h. The information between the Smart DC and the DR cloud shall be synchronized over the network such that the smart city solutions are high available on the network.
- i. Operational and Uptime Requirements for Data Centre.
- j. Minimum Tier Rating for Data Centre: Tier 3
 - Availability Target (24Hr operation): 99.741%
 - Maximum Downtime Tolerated per Day: 4 minutes
 - Maximum Downtime Tolerated per Week: 27 minutes
 - Maximum Downtime Tolerated per Month: 1 hours 54 minutes
 - Maximum Downtime Tolerated per Quarter: 5 hours 42 minutes
 - Maximum Downtime Tolerated per Year: 22 hours 43 minutes
- k. Operational Compliance Requirements for MSI operations:
 - PCI-DSS
 - ISO 27001
 - ISO 20000
 - Cyber Security Framework for Smart City (MoUHA), CSP Shall have this.

Note: Operational Compliance applicable for Data Centre, ICCC and NOCs

5.2.1 Disaster Recovery DR Cloud

a. MSI shall also be responsible for providing Cloud service with 25% capacity of compute power and 50% of storage, but all the applications should be available in DR except Storage for Video surveillance and ITMS (ANPR, RLVD & SVD) at DR.", RTO –4 hours or less, RPO – 2 hour or less which will be implemented under Bareilly Smart City project for the project duration.

- b. All applications need to have high performance clustering (redundancy) within the Data Centre with automatic fail-over, and redundant data storage in active passive or active-active configuration as per the high availability targets. The data replication should be continuous among all the servers and shared storage should not be used. Active-passive configurations may be permissible for supporting applications.
- c. The proposed DR infrastructure of similar architecture and environment as that of proposed DC solution for the Primary site considering DR to deliver availability and performance as that of production capacity defined with point (a) under this section. The infrastructure provisioned in the DR for BSCL should be that of similar and latest configuration as proposed in DC.
- d. The proposed Cloud Service Provider (CSP) must be an empaneled cloud service provider by Meity (Ministry of Electronics and Information Technology for Public cloud, Virtual Private Cloud and Community Government Cloud.
- e. The Cloud Data Centre Facility must be within India and must be Tier III or above. The DR site within India in a different seismic zone from BSCL current data centre.
- f. DR site to be geographically apart from the primary side (DC)
- g. MSI also need to ensure that the CSPs facilities/services are certified to be compliant to the following standards:
- ISO 27001 Data Center and the cloud services should be certified for the latest version of the standards
- ISO/IEC 27017:2015 Code of practice for information security controls based on ISO/IEC 27002 for cloud services and Information technology
- j. CSP should have a dedicated NOC (Network Operation Centre) and Business continuity plan/location (BCP) in place
- k. CSP platform should support auto scale out functionality for various workloads to reduce business downtime.
- I. The proposed solution should facilitate out-of-the-box, workflow-based switchover and switchback for DR drills for standard applications based on industry best practices.
- m. The proposed solution must offer a workflow-based management& monitoring and Reporting capability for the real time monitoring of a DR solution parameter like RPO (at DB level), RTO, replication status and should provide alerts (including SMS and e-mail alerts) on any deviations. The proposed solution should be able to conduct DR Drills from a centralized location. CSP to ensure RTO 4 hours and RPO 2 hours.

- n. The cloud service provider must have billing model of pay-per-consume where it will charge for amount of computing resources being consumed by application rather than for the allocated resources. MSI shall provide the rate chart of the cloud services to BSCL.
- o. Cloud services should be accessible via Internet, Point to Point / MPLS, Leased
- p. Lines, OFC WAN etc. MSI must provide private connectivity between BSCL's network and Cloud Data Centre Facilities.
- q. MSI shall be fully responsible for upgrades, technological refreshes, security patches, bug fixes and other operational aspects of the infrastructure that is in the scope or purview of MSI.
- r. MSI shall provide interoperability support with regards to available APIs, data portability etc. for BSCL to utilize in case of Change of cloud service provider, migration back to Local Data Centre, burst to a different cloud service provider for a short duration or availing backup services from an alternate Cloud service provider.
- s. MSI is required to prepare and submit along with their technical proposal, the details of methodologies and computations for sizing and capacity of storage, compute, backup, network and security resources.
- t. BSCL shall retain ownership of all virtual machines, templates, clones, and scripts/applications created for BSCL's applications. BSCL shall retain the right to request (or should be able to retrieve) full copies of these virtual machines at any time.
- u. In no circumstances, the data accumulated and processed by Command Control and Communication Centre should be compromised. Hence, provisions will be made to keep all the data stored in this platform highly secured with required multi layered security access control and authorization framework. Further the platform shall provide an open standards-based Integration Bus with API Management, providing full API lifecycle management with governance and security features.
- v. Additional Parameters
- w. MSI should configure, schedule and manage backups of all the data including but not limited to files, folders, images, system state, databases and enterprise applications.
- x. Encryption of all backup files and data and management of encryption keys as a service that can be enabled for Government Departments that require such a service.
- y. MSI should offer dashboard to provide visibility into service via dashboard.
- z. MSI shall not delete any data at the end of the agreement (for a maximum of 45 days beyond the expiry of the Agreement) without the approval of BSCL.
- aa. A High-Level Design (HLD) for cloud deployment should be suggested by the MSI. MSI can suggest security stack & deployment method according to their recommendations;

bb. The CSP must offer 99.95% SLA as per Miety guidelines from the India region.

6 Intelligent Traffic Management System (ITMS)

6.1 Smart Traffic Management Overview

Competent Authority is the nodal agency for regulating and managing the entire road network and traffic signals in the Bareilly City. The scope of implementation is to cover the total of 21 traffic junctions under ITMS and out of them 8 traffic junctions are to be covered under Adaptive Traffic Control System (ATCS). The location of ATCS junctions will be finalized during project implementation phase. (Total 21 nos. of Traffic Junctions locations list enclosed as separate Annexure along with this document).

Under this project, the smooth operation of traffic system and its monitoring will also be done and special arrangement has also been made in the project for emergency vehicles to pass without interruption. Besides, special emphasis has also been made on road safety measures.

Majority of Traffic Junctions in Bareilly City are 4 Arm traffic junctions just like every other Indian City. Note : Road Marking over stop line and Median at mentioned junctions in RFP is in MSI scope for Go Live + 60 Months.

The proposed technical solution should cater to the following challenges:

- 1. No right of way to emergency vehicles like ambulance, police etc.
- 2. VIP movement clearance
- 3. Lack of information on prominent and frequent traffic congestions both location wise and time wise
- 4. Absence of street level public information and communication channel
- 5. Absence of central control mechanism to monitor and regulate the Bareilly City traffic flow Competent Authority intends to implement a Intelligent Traffic Management System within the existing landscape to:
 - 1. Automate the process of traffic management by optimally configuring the traffic junction lights on real time basis
 - 2. Minimize the traffic congestions and waiting time
 - 3. Centrally controlled traffic management system to ensure smooth movement of emergency services like ambulance, police etc.
 - 4. Managed and coordinated VIP movements
 - 5. Availability of traffic data to further analyze and optimize the traffic flow
 - 6. Real Time Incident Message and Advisory Messages to citizens
 - 7. Improved Traffic Regulation

The MSI shall be responsible for Supply, Installation, Implementation and Operation and Maintenance of Bareilly ITMS for a period of Five Years from the date of Go Live of the respective phase independently. The indicative requirement for MSI is broadly categorized into following:

- 1. Adaptive Traffic Control System (ATCS)
- 2. Automatic Number Plate Recognition (ANPR) System
- 3. Red Light Violation Detection (RLVD) System
- 4. Speed violation & Detection at 6 locations

6.1.1 KPIs for Traffic Management

- Improve Journey Time- Improve reliability in journey times between various locations, so that citizens can experience an enhanced quality of road-based transportation, through improving sustainability and efficiency in operation of the road network.
- Increase Signal Efficiency- Reduction in traffic delays, optimized cycle times at intersection to regulate and maintain free flow of traffic to enhance the efficiency of the transport infrastructure.
- Increase Operational Efficiency-Bareilly Traffic Police intends to spend more time on the public facing functions. Thus, Information technology solutions should help in reducing the repetitive paperwork/records and making the back-office functions more efficient.
- Improve Customer Services- The traffic services to the public can be improved through the user-friendly presentation of the traffic information in real time through sharing of all relevant data feeds for public consumption.
- Implement efficient planning, operations and decision-making system for Bareilly for better livability.
- Implement traffic enforcement mechanism for traffic violation, checking and monitoring shall reduce the traffic related offences of Red-Light violations.
- Create a platform for sharing traffic information across the city- Mechanism to broadcast information regarding traffic, parking spaces and other incidents to police and citizens that hamper the traffic movements.
- Website for Traffic rules and regulations, road safety, emergency service, details on traffic police- public interface, Challan notice information, and road safety measures.
- Integrate e-Challan system & Dial 100 system if already exists.

Use existing signals in the ecosystem and add additional components for Intelligent Traffic Management system.

The selected MSI will study and consider the following (but not limited to):

• Volumes of vehicles moving in the road network

- Vehicle type distribution
- Directional distribution
- Physical and visual characteristics of the area
- Travel times, delays between different points of the network
- Emission
- Additional dependencies with respect to the available infrastructure and geometry at the junctions
- Any other relevant data which the bidder anticipates will assist in establishing the benchmarks for the project
- Study existing RTT (Round Trip Time) for existing arterial roads and se goals to reduce RTT at different time of the day

6.2 Functional & Technical Requirement for Adaptive Traffic Control System (ATCS)

The broad scope of work to be covered under ATCS sub module will include the following, but is not limited to:

- Preparation of Functional & technical Architectures as per project blueprint to develop a final BOQ for installation & commissioning of Adaptive Traffic Control systems.
- Installation of controllers, Traffic light aspects, poles, cantilevers, Junction Box and other required accessories at traffic junctions for successful operation of the ATCS.
- Integration of ATCS field infrastructures with the proposed ATCS software application
- Configuration of traffic signal at each of the junction along with development of signal control plan for individual operations, coordinated signal plan for the junction in sync with the area wide signal plan for different operating conditions. The operating conditions may include different peak and off-peak conditions, special events, contingency plans etc.
- i. The system should able to monitor and control traffic signals using a traffic responsive strategy based on real time traffic flows captured.
- ii. All signal controllers under Adaptive Traffic Control System shall be provided with inputs from non- intrusive vehicle detection sensors/ cameras for detecting demand and communications equipment to send the demand data and to receive instructions on the control strategy in near real-time.
- iii. The system should be scalable from 8junctions to 100 junction or more to add more signals whenever required.
- iv. Any existing infrastructure at the junctions that might help in traffic control, where possible, should be integrated with ATCS.

- v. Adaptive traffic signal controller managed through the central traffic control centre at an individual junction or as part of group of traffic junctions along a corridor or a region for controlling the traffic signals deployed
- vi. MSI has to implement all the field infrastructure to support all Traffic for long term sustainability and for all required instruments to support ATCS, not mentioned in RFP is in the scope of MSI's implementation.
- vii. The ATCS communication network shall enable remote monitoring and management of the intersection and provide for transmission of real-time data (i.e. RTC time, stage timing, mode, events, etc.) from the traffic signal controller to the central computer in the Command and Control Centre (ICCC).
- viii. The central computer running the ATCS application shall send optimum signal timings to all intersections in the corridor leveraging the communication network.
- ix. "Real/composite Signal Control Strategy" application already proved globally will be used for optimizing the traffic signal timings.
- x. ATCS should be able to sense the volume of the Traffic automatically at each of the junction movement nodes through the means of camera-based input to the Traffic controller at each junction.
- xi. ATCS should be able to control the Traffic signal to give way to the side of the traffic with high volumes.
- xii. The system should have a provision of a manual override in case of use by the Traffic Police personnel in case of special VIP movement and system failures.
- xiii. The ATCS shall operate in real time with the capacity to calculate the optimal cycle times, effective green time ratios, and change intervals for all system traffic control signal controllers connected to it. These calculations shall be based on assessments carried out by ATCS application software, running on the Central computer based on data gathered by vehicle detectors. Key functionalities of the software application shall include:
 - Propose timing plans to every intersection under the ATCS in every Cycle.
 - Verify the effectiveness of the proposed timing plans in every cycle.
 - Identify Priority routes.
 - Synchronize traffic in the Priority routes.
 - Manage and maintain communication with traffic signal controllers under ATCS.
 - Maintain database for time plan execution and system performance.
 - Maintain error logs and system logs.
 - Generate Reports on request.

- Graphically present signal plan execution and traffic flow at the intersection on desktop.
- Graphically present time-space diagram for selected corridors on desktop.
- Graphically present network status on desktop.
- Make available the network status and report viewing on Web.
- xiv. ATCS shall use standard communication protocols UG405 or NTCIP or HDLC TCP/IP Or Other Standard Protocol. It should also provide the functionality of integration with on-ground hardware of any third-party traffic controller that is UG405 or NTCIP compliant or HDLC TCP/IP or Other Standard Protocol.
- xv. The MSI should provide an automated Fault Monitoring Module to generate reports identifying the faults of the equipment if any on a daily basis. The fault monitoring system shall have as a minimum the following capabilities.
 - Automatic fault detection & reporting
 - Fault Status reports
 - Fault Closure reports
- xvi. The application shall have a dedicated green corridor functionality which shall provide an option to generate the green corridors by selecting a set of junctions (which may be part of different ATCS corridors as well) from the control room.
- xvii. The system shall be designed to provide complete situational awareness to ensure that incident response policies are implemented without technical restrictions

6.2.1 ATCS Application

- The application is at the core of the system and shall be hosted on a server in the control center.
- The ATCS Software shall use network modelling/Algorithm based optimizer for optimizing the traffic signal timings. In addition, it shall also have machine learning based prediction models and artificial intelligence.
- Adaptivity is based on detected traffic densities and patterns, not just on presence of vehicles.
- The ATCS Application should be capable to selecting (Linking) and deselecting (Delinking) the coordination between various junctions based on their congestion level.
- The system shall have true real-time adaptivity.
- Adapts to traffic present at this very instant (not only statistically)
- Supplying of calibrated traffic simulation models for AM peak, PM peak, inter-peak and offpeak for weekday and peak and off-peak for Saturdays and Sundays covering all the ATCS junctions

- The application should allow creation of green corridors to ensure priority movement of Emergency Response vehicles, such as ambulances, fire engines and police vehicles.
- The application shall interface with a popular microscopic traffic flow simulation software for pre and post implementation analysis and an online simulation for study of the proposed ATCS control strategy at various times of the day. The simulation shall be capable of identifying the impact of any anomaly in the system along with the strategy chosen. The simulation model shall assist the traffic engineers/police to identify the best possible strategy in any unusual/unprecedented event.
- The application shall be estimating a comprehensive network state using data from ANPR, GPS or any other such data collected from other third-party sensors/detectors/cameras.
- The application should be capable of running in the following four modes:
 - **Connected signals mode:** This mode should enable traffic police personnel to remotely configure and control the signal timing plans using the ATCS interface available in the CCC.
 - Automatic plan switching mode: The system should be configured to run the most appropriate signal timing plan for a group of junctions from a library of signal plans. The system should automatically select the most appropriate plan for the prevalent traffic conditions based on a set of customizable rules.
 - Optimization mode tactical: Signal timings for a group of junctions should be optimized for pre-defined performance indicators, like delays, travel times etc. Short term prediction models shall forecast the traffic demand for 5, 10 and 15 minutes. The traffic demand shall be input into a traffic online simulation model and the outputs of the simulation model shall be employed to establish performance indicators. The optimization model shall use these performance indicators to determine optimal signal timings.
 - Optimization mode strategic: The system shall have a short-term traffic state prediction model which continually estimates the state of the network, in terms of traffic flows and travel times. The traffic flows and travel times are to be input into an offline microscopic traffic flow simulation model. If significant changes in the network state are observed, traffic engineers shall be able to run simulation models to perform what-if analysis on pre-defined traffic management strategies.

Vehicle priorities to the Emergency & VIP vehicles:

• ATCS system should be capable of route pre-emption capability without any additional preemption hardware. It shall be capable of being applied to a single junction or to a series of

junctions to allow green wave Pre- emption, or special arterial traffic control strategies that might be required. Route Pre-emption shall be capable of being requested from any system workstation by authorized operators.

- ATCS shall be capable of simultaneous two or more pre-emption plans for each emergency. In the event that two or more conflicting route Pre-emption requests are received (i.e., the routes contain the same junction), the first request shall be honored and all subsequent requests for conflicting routes shall be disallowed, with appropriate notification made to the request initiator.
- The Software shall provide for full access and editing capabilities of the Route Pre-emption
 plans from any workstation (provided that the user has an appropriate security access level).
 It shall be possible that, if necessary, the downloaded Route Pre-emption plan may be
 terminated any time before activation or during the operation of any Pre-emption plan via the
 System from any of the workstations with appropriate user security access level.

The ATCS system shall predicts future flows at each junction on the central ATCS server. The prediction function shall use a network model resulting in consistent flows across a group of junctions

The ATCS system shall use Machine Learning based prediction modelling.

The application shall have a Graphical User Interface (GUI) with an underlying GIS map that shall display the network and the traffic signals, traffic cameras/detectors deployed. The GUI shall provide:

- Flexibility to the operators to zoom and navigate with ability to interact with objects on the map.
- Interoperability across multiple platforms.
- Web browser-based access, requiring traffic flow at the intersection on desktop

The GUI shall have the following features:

- User login Operator authentication shall be verified at this screen with login name and password.
- Network Status Display This online display shall indicate with appropriate colour coding on site map whether an intersection under the ATCS is online or off. On double clicking the intersection a link shall be activated for the traffic flow display for the intersection.
- Traffic Flow Display This online display shall indicate the current traffic flow with animated arrows, mode of operation, stage number being executed and elapsed stage time.

- Saturation Snapshot This display shall show the current saturation levels of all intersections in a corridor.
- Reports Printing / Viewing This link shall allow selection, viewing and printing of different reports available under ATCS.
- Time-Space Bareilly The time-space Bareilly shall display the current stages being executed at every intersection in a corridor with immediate previous history.

Junctions shall be plotted proportional to their distance on Y-axis and time elapsed for the stage in seconds on X-axis or vice versa.

ATCS application shall graphically show the execution of the signal plans, in real-time.

The solution should include the following reports/ Logs for Reports Printing / Viewing: This link shall allow selection, viewing and printing of different reports using suitable software available under ATCS

- Stage Timing report The report shall give details of time at which every stage change has taken place. The report shall show the stage sequence, stage timings and stage saturation of all stages of all cycles for a day.
- Cycle Timing report The report shall give details of time at which every cycle has taken place.
- Stage switching report The report shall give details of time at which a stage switching has taken place. The report shall show the stage sequence, stage timings and stage saturation for a day.
- Cycle Time switching report The report shall give details of time at which a cycle switching has taken place.
- Mode switching report The report shall give details of the mode switching taken place on a day.
- Event Report The report shall show events generated by the controller with date and time of event.
- Power on & down: The report shall show time when the master is switched on, and last working time of the master controller.
- Plan Change The report shall show the time of change of plan either through keypad or remotely through a PC or Server.
- Mode Change The report shall show the time when Master controller's operating mode is changed either manually through keypad or a remote server. The typical modes are FIXED, VA, FLASH, LAMP OFF and HURRY CALL.

- Lamp Status Report The report shall show lamp failure report with date and time of failure, colour of the lamp and associated phase.
- Detector Failure Report The report shall show the date and time of detector failure with detector number and associated phase.
- Conflict The report shall show the conflict between lamps (RED, AMBER, GREEN) in the same phase or conflict between lamps with another phase.
- Corridor Performance Report The report shall show the saturation of all the intersections in a corridor for every cycle executed for the corridor and the average corridor saturation for a day.
- Corridor Cycle Time Report The report shall show the Corridor cycle time, Intersection cycle time, Mode of operation and degree of saturation of all the intersections in a corridor for every cycle for a day.

6.2.2 Traffic Signal Controller

- i. The ATCS controller/System should define common inter- green period formed by the clearance Amber and Red extension period. It shall also be possible to program individual inter-green period from 3 Seconds to 10 Seconds.
- ii. Non-intrusive video-based traffic controller/system should be used to analyze the volume of traffic at junction to manage the traffic lights.
- iii. The detector shall be able to detect the presence of vehicles near stop-line in lane based mixed traffic flow conditions.
- iv. A detector that does not change its status at least once during a stage execution, the ATCS application in the control Centre shall be notified at the termination of the associated stage.
- v. The controller/system shall have a facility to list all conflicting phases at an intersection. After configuration, a traffic engineer shall verify that the signal aspects are running as expected, for each and every program coded in the controller, before being put to use.
- vi. Controller/system shall operate on command of Controller/system. The Vehicle detector interface shall support inductive loop/Camera based vehicle detection.
- vii. During power up the controller/System shall initially execute the Flashing Amber / Flashing Red plan for a time period of 3 Seconds to 10 Seconds. The default value of this Starting Amber is 5 Seconds. Facility shall be available to configure the time period of Starting Amber within the given limits at the site.
- viii. Health monitoring should be available for the traffic controller/system and the signal aspects in all modes of operations.
- ix. A hardware failure leading to a conflict condition (due to faulty devices or short circuit in the output) shall force the signal into Flashing Amber/ Flashing Red.
- x. The controller/system shall be able to interface with a wide variety of detectors using an industry standard open collector interface.
- xi. "The signal controller/system shall have a police control panel with:
 - Auto/Manual selection button,
 - Manual advance button,
 - Normal/Flashing mode button, and
 - Junction On/Off button."
- xii. The controller/system shall have the following modes of operation:
 - Fixed time mode the controller/system shall execute a pre- set program, which does not consider the inputs from the traffic detectors.
 - Vehicle actuated mode the controller/system shall execute pre-set programs that do not have fixed green times. The green time for each approach shall be bound by the constraints of minimum green and maximum green times. The actual green time is determined based on the vehicular demand obtained from the traffic detectors.
 - ATCS mode the controller/system shall execute the programs determined by the ATCS application in the control Centre and shall take inputs from traffic detectors to optimally split green times.
- xiii. The controller/system shall either have a fixed operator console or a portable one to allow traffic engineers to program the controller on-site.
- xiv. It should be possible to configure a program and set it remotely from the control Centre.
- xv. Appropriate technology to be used local communication for traffic controller/system
- xvi. The Master Controller/system shall provide dedicated ATCS interface.
- xvii. "The Master Controller/system cabinet shall have provision to install video detection card for vehicle detection through dedicated cameras.
- xviii. The controller/system shall allow interfacing with the ATCS application using an industry standard protocol such as UTMC/UG405 or NTCIP or HDLC TCP/IP or any other equivalent. "

Traffic signal controller in conjunction with an Outstation Transmission Unit (OTU) should be able to run ATCS algorithm having demand actuated dynamic signal timing plan selection. The communication between the controller and the ATCS software shall happen over industry standard UG405 or NTCIP or HDLC- TCP/IP or Equivalent protocols. The following specifications are to be adhered with, either directly or using the OTU:

#	Parameter	Minimum Requirement
1.	Power supply:	230 V AC @ 50 Hz
2.	Communicati on protocol:	UTMC/UG405 or NTCIP or HDLC- TCP/IP or Equivalent
3.	Number of signal groups:	16 minimum
4.	Number of signal head outputs:	32 minimum
5.	Number of phases:	16 minimum
6.	Number of signal plans:	32 minimum
7.	Number of stages/ Phases per	16 minimum
8.	Communicati on with detector	Shall be able to take detailed traffic data from detectors via ethernet over TCP/IP or using RS232 or RS484 port
9.	Interfaces:	Ethernet, RS232, USB
10.	Signal head compatibility:	230 V AC @ 50 Hz or 12/24/48 V DAC
11.	Police Control Panel:	Yes, with min 4 hurry calls and push to change buttons
12.	Temperature:	0°C to 60°C
13.	Communicati on standard:	UTMC/UG405 or NTCIP protocol over TCP/IP or equivalent
	Media	1 x 10/100 Ethernet interface
	interfaces:	2 x USB 2.0 host ports
14.		1 x micro USB 2.0 port
		1 x RS232 port
		1 x KS485 port

#	Parameter	Minimum Requirement	
15.	RAM:	128 MB SDRAM minimum	
16.	storage Capacity:	512 KB RAM minimum	
17.	Timing Resolution:	Minimum 100 msec (input resolution to 10ms)	
18.	Input Pins for detectors: Minimum 16 Open Collector Interface pins		
19.	Cabinet	IP66 or better	

6.2.3 Traffic Signal Aspect

- i. Maximum power consumption for any colour aspect 14 W
- ii. High Intensity Single Source Lights
- iii. Constant Current Power supplies.
- iv. Diameter: 300mm
- v. Uniform appearance light diffusing
- vi. Units operate at 230 V AC @ 50 Hz or 12/24/48 V DC
- vii. Operating temperature: 0°C to 60°C
- viii. LED module ingress: IP 65
- ix. Impact resistance: IR 3
- x. Auto-night dimming feature
- xi. ISO 9001 certified OEM
- xii. UV Stabilized Shield

6.2.4 Countdown Timer

- i. Power Consumption: Maximum 30 Watts per lamp
- ii. Input Power: 230 V AC @ 50 or 12/24 V DC
- iii. Operating temperature: 0°C to 55°C
- iv. Humidity: 0% to 95% Relative
- v. Digit Height: 210 mm at least
- vi. Color: Dual (Green & Red)
- vii. Ingress Protection: IP 65

6.2.5 Traffic Signal and Heads and Poles

i. 300mm RED LED aspect 24 V DC or 230VAC with inbuilt voltage / current regulator 400 mA/12
 Watt Max. including dust and water proof polycarbonate housing and UV Stabilized polycarbonate sheet shall be provided in front of LED housing and clamps

- ii. 300mm AMBER LED aspect 24 V DC or 230VAC with inbuilt voltage / current regulator 400 mA/12 watt Max. including dust and water proof polycarbonate housing and UV Stabilized polycarbonate sheet shall be provided in front of LED housing and clamps
- iii. 300mm GREEN ARROW LED aspect 24 V DC or 230VAC with inbuilt voltage / current regulator
 400 mA/12 watt Max. including dust and water proof polycarbonate housing and UV Stabilized
 polycarbonate sheet shall be provided in front of LED housing and clamps
- iv. 300mm PEDESTRIAN LED aspect 2 in 1 Pedestrian Red Man standing and Pedestrian Green man walking with Multi color Display for pedestrian timing. In 24 V DC or 230VAC with inbuilt voltage.
- v. Standard/Vertical GI Standard/Vertical Signal Pole with support structure
- vi. Traffic signal poles shall be designed to endure a life cycle of 15 years minimum.

6.2.6 Traffic Signal Cabinet and Equipment

Traffic Signal Controller Cabinets shall have space to accommodate traffic signal hardware and other hardware such as network switch & LIU for connecting e.g. red-light enforcement, surveillance cameras, switches, emergency pre- emption equipment, etc.

6.2.7 ATCS Sensor

Bidder Should propose Thermal Camera Traffic detectors as per the BoQ quantity mentioned. Sensor will provide atleast thermal optics that automatically adjust to background thermal changes and it should be able to provide IP video stream. It should be able to detect presence/absence of vehicle near stop line for advanced detection and should have at least 75 mtr or working range. The detector should work at all weather conditions with counting of vehicles at least 90% accuracy, classifications of vehicles with at least four classes and queue lengths at junction.

#	Parameter	Minimum Specifications	
1.	Size	Suitable size as per site requirements to house the field equipment	
2.	Cabinet Material	Powder coated CRCA sheet/ Stainless steel	
3.	Material	Min 1.2mm	
	Thickness		
4.	Number of Locks	Min 2-way lock	
		IP55, Junction Box design should ensure to keep the temperature within	
5	Protection	suitable operating range for equipment's and should also avoid	
5.		intentional water splash and dust intake. Should have built in surge	
		protection.	

6.2.8 Junction Box Requirement

#	Parameter	Minimum Specifications	
6.	Mounting	On Camera Pole / Ground mounted on concrete base	
7.	Form Factor	Rack Mount/ DIN Rail / As Per Solution requirement	
		Rain Canopy, Cable entry with glands and Fans/any other	
		accessories as required for operation of equipment's within	
		junction box.	
		Shall have separate inlet/outlet and lockable doors for:	
8.	Other Features	a. Power Cabinet: This cabinet shall house the electricity meters,	
		Online UPS System and the redundant Power Supply (Battery).	
		b. Control cabinet: This cabinet shall house the controllers for all	
		the field components at that particular location e.g. ANPR, PTZ,	
		RLVD, Fixed cameras, etc.	

6.3 General System Features of Intelligent Traffic Management System (ITMS)

Following are the common features of the Intelligent Traffic Management System

- i. The system should support centralized or decentralized architecture.
- ii. The system should be developed and built on operating system agnostic platform, should work on Commercially Off the Shelf (COTS) servers and storage solutions, and should be database agnostic.
- iii. The system should support virtual computing environment and should support all the industry leading virtualization platforms.
- iv. The system, when deployed in decentralized architecture, should work at the traffic junction level independently, irrespective of the connectivity with the data center. The junction server should synchronize the event data with the event server at the Data Centre as and when the connectivity with the Data Centre is available.
- v. The system should allow the operator to create continuous recording schedule for the camera based on the time of day and day of week. It should be possible to set the camera recording schedule for a single camera or a group of cameras or all cameras.
- vi. The system should allow the operator to set the effective timing of the various applications such as Red Light, ANPR during the day. The system should allow the operator to create a weekly schedule to affect the video analytics.
- vii. The system should have published APIs to interface with external systems such as Command and Control Application, Incident Management System, etc.
- viii. The system should have integration with the eChallan Management System and should offer the functionality to the operator to generate eChallans automatically or manually.

- ix. The system should have the capability to integrate with the VAHAN / SARATHI system to fetch vehicle related details as required and as made available by the VAHAN / SARATHI system.
- x. E-Challan Process need to be automated. System shall generate automatic E-Challan.

6.3.1 Video Management & Operator Functions

- i. The system should have the functionality of creating users with role-based access control.
- ii. Continuous recording of every lane video irrespective of presence of vehicle.
- iii. Such recording schedules can be continuous, event based, schedule based, trigger based etc.
- iv. Archive Search using dates, time, event etc.
- v. High Availability/Redundancy of Recording & Database.
- vi. The system should have virtual matrix functionality to allow viewing of live video in different layouts on operator screen.
- vii. The system should be able to show Live video in multiple matrix layout for all the cameras in the system in real time. At least 1x1, 2x2, 3x3, 1+5, 1+7, 4x4, 1+10, views must be supported.
- viii. The system should allow creation of customized, layered maps using standard picture files and it should be possible to drag and drop the cameras on the map for easy navigation based on the location on the map. It should be possible to select any camera or group of cameras on the map for live viewing or archive viewing.
- ix. The system should show event notification from the cameras on the map itself. The operator should be able to click on the event notification of a particular camera on the map and the system should open the event window on the operator screen.
- x. The system should integrate with open source and free maps such as Google Maps.
- xi. The system should have the functionality to allow the operator continuous monitoring of the operational status and event-triggered alarms from servers, cameras and other devices. The health monitoring of the system should provide a real-time overview of alarm status or technical problems while allowing for immediate visual verification and troubleshooting. The Software should have a "help" option where quick offline support and documentation of the operation of the software shall be available for the operator for any instant help or support
- xii. The operator console should show vital system parameters for components such as Database Server, Media Servers, Local Workstation and Storage System (all available storages). The client should show the parameters such as CPU Core Usage, RAM Utilization and Storage Utilization.
- xiii. The system should have reports such as camera uptime availability, camera recording percentage, recording status, critical events, incident video, etc.

- xiv. The system should provide facility to search for the cases of violations occurred during any specific span of time, and provide a statistical analysis of the number of such incidences occurring during various days of the month, various months of the year in graphical format. A report of all such incidences should be automatically generated by the system in a spreadsheet (.xls format), and can be exported
- xv. The system should allow the users to download multiple segments of the video, which are encrypted with password from single or multiple cameras from the archive with an option to tag each downloaded segment with text messages.
- xvi. The system should allow the operator to configure email account and SMS gateway for sharing various alerts through email and SMS.
- xvii. The system should maintain log of various system generated alerts. The system should also maintain full audit trail in the logs.

6.4 Functional & Technical for Automatic Number Plate Recognition (ANPR) System

Automatic Number Plate Recognition (ANPR) solution is proposed at all the proposed traffic signal locations. The broad scope of work to be covered under this sub module will include the following, but is not limited to:

- Installation of the proposed ANPR system
- ANPR cameras shall provide the feed to the command control center, where the ANPR server shall be located.
- 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.

6.4.1 Automatic Number Plate Recognition (ANPR) Software

- i. The System should automatically detect a vehicle in the camera view using video detection and activate license plate recognition
- ii. The System shall support both on Windows and Linux Operating System.
- iii. The System shall be designed to work for 24x7 unattended operations
- iv. The System shall automatically detect the license plate in the captured video feed in real-time.
- v. The System shall automatically search for similar plates across multiple cameras.

- vi. The system shall perform OCR (optical character recognition) of the license plate characters (English alpha-numeric characters in standard fonts).
- vii. The System shall store JPEG image of vehicle and license plate and enter the license plate number into DBMS database along with date time stamp and site location details.
- viii. The system should be able to handle multiple vehicles simultaneously i.e. if there are more than one vehicle in the camera view the system should be able to detect all of them, extract their license plate numbers and perform OCR on the license plate characters
 - ix. System should be able to detect and recognize the English alphanumeric License plate in standard fonts and formats of all vehicles including cars, HCV, LCV and two wheelers.
 - x. The system shall be robust to variation in License Plates in terms of font, size, contrast and color and should work with good accuracy.

The ANPR should have at least 90% accuracy for High security number plates in daytime and 80% during night-time. Graphical User Interface

The system Graphical User Interface should be following features:

- i. Web based GUI to be accessible from any system
- ii. Auto discovery of ONVIF camera in ANPR application
- iii. Image of the vehicle
- iv. Image of the number plate
- v. Text conversion of number plate after using OCR (Optical Character Recognition) technology
- vi. Date, Time and location of offending vehicle
- vii. Import vehicle database in excel form
- viii. Event/images/chart of ANPR

Alert Generation

- i. The system should have option to input certain license plates according to the hot listed categories like "Wanted", "Suspicious", "Stolen" unauthorized, VIP etc. by authorized personal.
- ii. The system should have Open architecture and easy integration of alerts via http/XML

Vehicle Detection and Video Capture Module

- i. The system should be able to generate automatic alarms to alert the control room personnel for further action, in the event of detection of any vehicle falling in the Hot listed categories
- ii. The system should have Rule based actions for example SMS, Email should be send to authorized personnel on alert

Report

- i. The report should be in Graphical and Tabular form.
- ii. System should able to give camera ID / Camera Location etc on report page
- iii. System should able to give vehicle image with license plate image
- iv. System should able to give OCR Image/License plate Image
- v. System should able to give Watch list ("Wanted", "Suspicious", "Stolen", "Authorized", "Lost") on report page

Vehicle Status Alarm Module

- On successful recognition of the number plate, system should be able generate automatic alarm to alert the control room for vehicles which have been marked as "Wanted", "Suspicious", "Stolen", "Expired". (System should have provision/expansion option to add more categories for future need).
- ii. The Instantaneous and automatic generation of alarms. In case of identity of vehicle in any category which is define by user.

Vehicle Log Module

- The system shall enable easy and quick retrieval of snapshots and other data for post incident analysis and investigations. For example, a database could be searched using criteria like date, time, location and vehicle number
- The system should be able to generate suitable MIS reports that will provide meaningful data to concerned authorities and facilitate optimum utilization of resources. These reports shall include.
- Report of vehicle flow at each of the installed locations for Last Day, Last Week and Last Month.
- Report of vehicles in the detected categories at each of the installed locations for Last Day, Last Week and Last Month.

Vehicle Detection and Video Capture Module

- i. The system shall have Search option to tune the reports based on license plate number, date and time, site location as per the need of the authorities.
- ii. The system shall have option to save custom reports for subsequent use. The system shall have option to export report being viewed to common format for use outside of the ANPRS or exporting into other systems.
- iii. The system should provide advanced and smart searching facility of License plates from the database. There should be an option of searching number plates almost matching with the specific number entered (up to 1- and 2-character distance).

Storage

- i. The System shall store JPEG/MJPEG images of vehicle as well as of thumbnail of the license plate for each vehicle
- ii. The system shall store the vehicle license number into a relational database (MySQL/PostgreSQL) along with date timestamp and site location details. The necessary license/ subscription/support services of the database software should be bundled with the ANPR software.

Vehicle Category Editor

- i. The system should have option to input certain license plates according to category like "Wanted", "Suspicious" "Stolen", "Expired" etc. by Authorized personnel.
- ii. System should have option to specify maximum time to retain vehicle records in specific categories.
- iii. The system should have option to update vehicle status in specific category by authorized personnel. e.g. on retrieval of stolen vehicle, system entry should be changed from "Stolen" to "Retrieved".

Extra Integration and more features

- i. ANPR Application can support More than one IP camera.
- ii. ANPR Application can integrate with Boom barrier, E challan, RLVD, Vahaan app.
- iii. ANPR Application system can alarm can be generated in the form of sound burger or it can be also integrated with any other alerting system.
- iv. Rest based API & SDK Should be available

Users

ANPR application support two types of admin login support

- 1. Regular user
- 2. Admin user

Central Management Module

- i. The Central Management Module shall run on the ANPRS Central Server in control booth.
- ii. It should be possible to view records and edit hotlists from the Central Server.
- iii. ANPR Feed shall be processed at LPU level only. Meanwhile ANPR processed data and feed both need to be considered as a part of the Solution at central level. MSI shall consider Compute for feed and ANPR processed Data both.

6.5 Functional & Technical for Red-Light Violation Detection (RLVD) System

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

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 with concerned authorities.

The system reliably and accurately monitors speed and red-light violations at intersections and roads with traffic lights. Using a sensor, it can measure the movements of all the vehicles long before they reach the stop line at the traffic lights and hence traffic offences are captured even for vehicles traveling parallel to or closely behind one another. All offenses shall be documented by a high-resolution Smart Camera with encryption and data protection, suitable as evidence in court. The RLVD camera can be connected to a sequential sensor enabling the documentation of events leading up to and immediately following the traffic offence. The RLVD camera can be connected to a sequential camera or video camera enabling the documentation of events leading up to and immediately following the traffic offence.

E-Challan System shall generate automatic E-Challan.

6.5.1 Red Light Violation Detection (RLVD) Software

- i. The system should capture the License Plate of the vehicles violating the red light or stop line when the signal is Red.
- ii. The system should have provisions to either detect red light status by taking the signal feed from the traffic signal controller or by video analytics method using an evidence camera. The evidence camera should record the evidence snap showing the violating vehicle and the traffic signal status.
- iii. The system should have the functionality export the violation evidence with water mark and encryption as per the techno-legal requirements.

- iv. The system should synchronize the evidence camera, license plate recognition camera and store the record in database with License plate image, image of the vehicle, and at least five snaps showing clearly that the vehicle is crossing the red light / stop line while the signal is RED.
- v. The system should allow mapping of multiple ANPR cameras to a single evidence camera associated with the traffic junction.
- vi. The system should allow capturing multiple evidence snaps based on the time duration before, during and after the event.
- vii. The system should allow restricting an operator to a single or multiple traffic junction/s and associated cameras.
- viii. The system should have function to forward the generated alerts to designated email and mobile phone number.
- ix. The System should also record the video of all the cameras/selected cameras using a predefined and user configurable schedule. The recorded video can be searched using the following filters:
 - a. Appearance of a particular license plate.
 - b. When the signal is RED
 - c. When the signal is GREEN
 - d. During any given date-time span.
 - e. The system should generate alert when the signal light doesn't change for the preconfigured duration. The system should allow the user to set minimum and maximum time for the signal light status change.

6.5.2 Technical Requirement for ANPR and RLVD Camera

#	Parameter	Minimum Requirement			
Make	Make:				
Mode	l:				
1.	Image sensor and Effective Pixels (Resolution)	1/ 2.8" or better, CMOS Progressive Scan & Minimum 2 MP or higher			
2.	Electronic Shutter	1/5s to 1/20,000s or better			
3.	Focus	Automatic / Manual			
4.	Automatic Gain Control	Automatic / Manual			
5.	Multi Focal	4.7~47mm/ 5 -94mm, also P-IRIS/ DC-IRIS or better (±5 % is allowed)			

#	Parameter	Minimum Requirement
6.	Frame Bate	25 FPS for PAL system and 30 FPS for NTSC system at 1080p
		Resolution
7.	Codec	H.265, H.264, MJEPG or better
8	Minimum Illumination	Colour: 0.001 Lux (F1.6, AGC ON)
0.		0 Lux with IR
٥	Backlight Compensation	Required, Camera should adjust BLC feature automatically
5.	Backlight Compensation	depending on the light condition
10.	ROI	4 or more area
	Video	
11	Day and Night	Automatic ICP Filtor
11.	functionality	
12	IR illuminator	Internal/External Illuminator with visibility should be at least 100
12.	IK IIIUIIIIIIatoi	Meter
		Main Stream:2MP (1920×1080):Max. 30 fps;
13.	Video Resolution	Sub Stream:2MP (1920×1080):Max. 30 fps;
		Third Stream: D1 (720x480) or Better
14.	WDR	Yes ≥120dB
15	Video Streams	Triple Stream, Individually configurable video streams (H.265,
15.		H.264, MJPEG)
	Network & Interface	
16.	Interface	RJ-45 for 10/100 base-T Ethernet
	Notwork Protocols	IPv4, IPv6, HTTP, HTTPS, TCP, RTSP, RTCP, RTP, ICMP, UDP,
17.	support	IGMP, DNS, DHCP, NTP, SNMP, PPPoE, 802.1X, DDNS, SMTP,
	support	ARP, UPnP, FTP
10	Alarm Event	Events / alerts send via FTP, SMTP, HTTP, Pre -Post alarm video
10.		buffering.
19.	Compatible Integration	ONVIF Profile S & G
20.	Security	Password Protection, HTTPS encryption, IEEE 802.1X
21.	Alarm Interface	1 Ch Input / 1 Ch Output
22.	Audio Interface	1 Ch Input / I Ch Output
23.	Audio Codec	G.711/ G.726
24.	On board Storage	Support upto 128 GB or better

#	Parameter	Minimum Requirement	
	General Camera		
	Features		
25	Operational	-20°C to 55 °C	
25.	Temperature		
26.	Casing	IP67 or better rated housing with bracket	
27.	Power	PoE IEEE 802.3af, AC24V/DC12V	
28.	Power Consumption	Max. 21 W	
29.	Certifications	UL/EN.FCC.CE,BIS, ROHS	

6.6 Functional & Technical for Speed Violation Detection (SVD) System

6.6.1 Speed Violation Software

- It should be capable of importing violation data for the Operator for viewing and retrieving the violation images and data for further processing. The program should provide for sort, transfer & print command.
- ii. It should generate the photograph of violations captured by the outstation system which include a wider view covering the violating vehicle with its surrounding and a closer view indicating readable registration number plate patch of the violating vehicle or its web link on notices for court evidence.
- iii. All outstation units should be configurable using the software at the Central Location.
- iv. Violation retrieval could be sorted by date, time, location and vehicle registration number and data structure should be compatible with Traffic Police database and Transport department database structure.
- v. The operator at the back office should be able to get an alarm of any possible fault(s) at the camera site (outstand) (e.g. camera failure, connectivity failure, Camera tampering).
- vi. The automatic number plate recognition Software may be part of the supplied system, or can be provided separately as add on module to be integrated with violation detection. a.) Success rate of ANPR will be taken as 80% or better during the day time and 60% or better during the night time on standard number plates.
- vii. The solution proposed shall seamlessly integrate with the E-Challan system proposed.
- viii. The Speed Violation Application shall be Supported in Windows & Linux OS.

6.6.2 Instant and Average Speed Detection for SVD

The broad scope of work to be covered under this sub module will include the following, but is not limited to:

- Install the Speed Violation and average speed Detection Systems at proposed locations across the city. This system shall capture the infractions of speed violations at these locations. The speed Detection system will be implemented on 6 locations with 2 lane each (Location will be finalize with successful MSI and BSCL during the site survey.
- Design, supply, and install the speed violation detection system. All wiring connections for the system shall be installed with all the necessary equipment for the camera and detection system, including but not limited to: sensors, computers, ancillary camera equipment, camera housings, camera poles, warning signs and shall make the final connections to the camera.
- The solution proposed shall seamlessly integrate with the E-Challan system proposed for future implementation in BSCL.
- Provisioning of the necessary IT infrastructure for analysis, storage & retrieval of the information at ICCC or any other location as specified in the DPR.

Instant Speed violation and detection System (SVD)

#	Minimum Specifications		
1	Traffic violations should be automatically detected by the system. System should provide		
1.	image of over speeding vehicle with control image for speed test.		
2	Complete data for each infraction should be provided: data, time, location, speed, with		
۷.	automatic number plate detection mechanism (to recognize vehicle automatically)		
3.	System should generate automatically the number plate of the Vehicle automatically		
	System can be composite unit with all components inside the IP65 box Or comprised of		
л	camera or other units mounted on poles or gantries with controller and processors at side		
4.	poles to make sure all lanes of the road are covered. Preferred systems will be systems		
	installed at minimum height of 5 meters and above.		
5.	System should work in day and night condition		
6.	Speed should be measured using advanced video based analytics		
7.	System should provide color image at least in daytime		
	Camera Unit: The camera should be IP 66 and Complete camera unit should have CE		
	certificate and test reports for IP 66		
	The box camera should have below specifications		
8.	• 1-1/2.8" progressive scan RGB CMOS or better		
	• 50 H with IR cut filter Colour: 0.15 Lux @ 30 IRE F1.3		
	• 1-1/10000 s as per manufacturer standard for meeting full requirements as per		
	tender specification		

#	Minimum Specifications	
	H.264/H.265 in High and Base profile, MPEG4, MJPEG	
	• Minimum 3 simultaneous Streams in H.265, H.264, 2MP, 25 fps	
	Resolution Minimum 1920 x 1080	
	Certification for box camera UL, CE	
	• Lens: should be minimum 3M, IR corrected 1/ 2.8	
0	Integrated external Infrared capable to take images in night time and detect automatically	
9.	number plate for minimum 20 meters or better.	
10.	Control: speed setup Km/hr, up to 250km/hr ± 3%	
11.	Working temperature -5 to +60 deg.C, 80% and above humidity	
	Processor: minimum local storage 64 Gb, multicore processor	
10	GUI for configuration and diagnostic	
12.	Security: Standard Digital signature on each violation to assure data integrity. Strong	
	encryption on data during local storage and data transfer to back office	
	• BACK office: the system should provide data decryption and storage, automatic	
13.	challan issue possibility with automatic number plate detection with multiple images.	
	No deletion or addition of data without validation, proper password protection	
	Possibility to import data files and infractions should be provided as per BSCL police	
14.	requirement. Violation retrieval should be available for selected location, time and	
	number series	
15	System should be able to recognize automatically the vehicle number plate of vehicle in	
15.	violation the accuracy should be more than 80% in day and 60 % night condition.	
16	The system should have proper communication with control room and should be able to	
10.	provide online infraction reports and live infraction.	
17	Certifications: Speed solution should have certification to generate Challan which cannot	
17.	be challenged in the Indian court and legally acceptable as per Indian Law	
10	Certification should be provided for the system (and not for the sensor only) and Road	
10.	test reports should be tested for speed tests	
10	It is MSI responsibility to propose solution after cross checking the authenticity for speed	
19.	enforcement.	

6.6.3 Communication Network:

Function of the Communication network is for remote monitoring of the intersection and its management. Real time data (like RTC time, stage timing, mode, events, etc.) from the traffic signal controller is required to be sent to the Central Computer in ICCC. Central Computer running the ATCS

application shall calculate and send optimum signal timings to all intersections in the corridor. MSI shall clearly specify the bandwidth requirements and the type of network recommended for the ATCS. The contractor shall specify the networking hardware requirements at the ICCC and remote intersections for establishing the communication network.

7 City Surveillance

Protecting citizens and ensuring public safety is one of the topmost priorities for any Government agency. It requires advanced security solutions to effectively fight threats from activities of terrorism, organized crime, vandalism, burglary, random acts of violence, and all other forms of crime. CCTV based video surveillance is a security enabler to ensure public safety. This includes a combination of various types of cameras with day and night capabilities, along with edge-based video analytics for incident-based monitoring of the key locations of the city.

MSI has to supply, install, commission and maintain the required number of camerasat140 Locations for city surveillance (Location list enclosed with separate annexure along with this document).

MSI Shall carryout a detailed survey of these 140identified locations listed as annexure to assess the type of cameras required at each location/ area.

MSI has to provision the poles, switch, UPS and other equipment for installing the camera. The MSI should do necessary cabling for electrical supply and connectivity required for the field devices meeting International Standards like ISO/IEC-11801 or equivalent for all cables being laid out. MSI will also implement the following software to enable monitoring through the surveillance cameras. To facilitate the VMS system architecture, the MSI shall ensure that sufficient capacity is designed into the data communications & telecommunications infrastructure to deliver the required functionality, along with the ability to allocate and reserve resources (including bandwidth General specifications of all type of cameras.

System shall provide inter-operability of hardware, operating system, software, networking, printing, database connectivity, reporting, and communication protocols. MSI shall prepare the Detailed Report for field level requirements such as e.g. Cameras (types and numbers), Camera Mounting requirements, Power Requirements, Connectivity Requirements etc. for perusal of Competent Authority. Indicative list of the field level hardware to be provided by MSI is as follows:

- i. Cameras (Fixed Bullet Cameras, PTZ Cameras)
- ii. IR Illuminators
- iii. Switches
- iv. Outdoor Cabinets
- v. Pole for cameras / Mast
- vi. Outdoor Junction box
- vii. UPS
- viii. Networking and power cables and other related infrastructure

7.1 KPIs for City Surveillance

Following CCTV Surveillance KPIs are to include the following:

- 1. City Surveillance should cater to an effective Monitoring and Management with appropriate decision support mechanisms.
- 2. City surveillance must ensure a pro-active 24*7 monitoring of PAN city parameter that capture video footages of all junctions across the road network of Bareilly and project the feeds to the proposed Command and Control center without time lag on real time basis.
- City Surveillance System must ensure and provide a secure and safe environment for the citizens with intelligent and effective use of video analytics and integrated platform for all concerned departments.
- 4. The surveillance prime equipment i.e. High Definition Camera units must be located at a suitable position or vehicle wherein the required area is properly captured. The intensity of captured footage should be enough to sustain the clarity as per the required zooming levels. Industry leading practices must be adopted during the implementation phase w.r.t positioning and mounting the cameras, poles and junction boxes.
- The surveillance system shall be to provide proactive security as opposed to reactive security on PAN city basis with a clearly defined objective of each HD camera unit.
- 6. The surveillance System shall provide inter-operability of hardware, operating system, software, networking, printing, database connectivity, reporting, and communication protocols.
- 7. It has to be ensured that the pole is well placed for vibration resistance adhering to the road safety norms. Also, the poles erected to mount cameras are good, both qualitatively and aesthetically.
- 8. Appropriate branding/ color coding of junction boxes should be done, to warn mischief mongers against tampering with the equipment at the junction with the needful operational equipment. Cameras needs to be protected from the on-field challenges of weather, physical damage and theft.
- 9. This City Surveillance software should have the capability to provide various alarms and triggers. The required analytics and related triggers should include, People loitering, Camera Tampering (In case this is an inherent feature of the camera, this may not be provided as a separate line item in VA), Unattended Object, Crowd detection.
- 10. Video Management System must allow users to view a count of analytics events on the video pane while video is being displayed.
- 11. Each intersection should be fitted with outdoor cabinets dimensioned to host all equipment necessary to operate enforcement systems and traffic surveillance systems
- 12. The city surveillance system must ensure real time and event base monitoring of the city, situation/ rule-based alerts including early warnings for prevention and avoidance of unwanted incidents like riots, flooding, etc.

- 13. The system should support automated response based on events including communication of alerts to relevant authorities like Fire, Hospitals, etc. for swift response in case of emergencies.
- 14. The system should have access to historic video data for investigative purposes.
- 15. VMS / NMS shall provide below functionalities

Should be able to monitor and manage the uptime status of cameras and associated network accessories remotely. Should have options for managing SLA based on essential uptime status reports, to ensure maximum availability. The option should have following features

- i. To monitor the uptime status of the cameras from locally and remotely.
- ii. To monitor Down-UP-reboot-not reachable alert of IP Camera/ Workstation/ Router/ Switch/ NVR
- iii. Multilevel escalation of alerts
- iv. Metrics with option to specify threshold
- v. Multiple preconfigured and customizable dash board view.
- vi. Tree structure design with multiple folder drill down option.
- vii. User configurable folder name to specify Name, location etc.,
- viii. Send alert via E-mail / SMS

7.2 Functional & Technical Requirement

7.2.1 Surveillance Cameras

- All the supplied Cameras must be have relevant certificates which are part of technical specification and should be submitted along with the technical bid.
- Except Drone and Body Worn cameras, other cameras shall be from same OEM.
- All cameras should have feature for Bandwidth Compensation & Optimization, it should also support 3rd Party Edge Analytics/VMS Analytics.
- The Camera shall support IEEE 802.1X authentication, Password protection, IP address filtering, HTTPS encryption, User access log
- Ability to support open and published API
- Ability to provide 24/7/365 availability and use.
- All the major components of the CCTV systems shall be latest but field-proven and shall not be End-of-Life / Outdated; the same shall have to be supported by concerned OEM for at-least 5 years' period from the date of supply.
- All the cameras shall have 5 Years OEM warranty and the same shall be submitted on OEM letter head.
- OEM of CCTV shall have local support center in India.
- All the cameras shall have ability to change the GOP/ GOV/IFRAME for Bit rate optimization.

 Intelligent Video : Motion detection, Intrusion Detection, Crossing Line Detection, Object Left, Missing Object, tampering detection, face detection cross counting. Mentioned Intelligent video features shall achieve on the edge or it can be done through VMS software.

7.2.2 Technical Requirement for Outdoor Fixed Bullet Camera

#	Parameter	Minimum Requirement		
Make:				
Model:				
	Image sensor and			
1.	Effective Pixels	1/ 2.8" or better, CMOS Progressive Scan & Minimum 4 MP or higher		
	(Resolution)			
2.	Electronic Shutter	1/5s to 1/20,000s or better		
3.	Focus	Automatic / Manual		
4.	Automatic Gain Control	Automatic / Manual		
5.	Motorized Focal	2.8 to 12 mm Auto focus lens or better		
6.	Frame Rate	4MP (2560 x 1440): Max.25fps or better		
7.	Codec	H.265, H.264, MJEPG or better		
8.	Minimum Illumination	Color 0.01lux @ F1.2(AGC ON) ; B/W 0 lux @ IR ON		
0	Backlight	Required, Camera should adjust BLC feature automatically depending		
9.	Compensation	on the light condition		
10.	ROI	4 or more area		
	Video			
11	Day and Night	Automatic, Color, Mono		
	functionality			
12.	IR illuminator	Internal Illuminator with visibility should be at least 50meter		
		Main Stream: 4MP(2560 x 1440), 2MP(1920 x 1080)		
13.	Video Resolution	Sub Stream: 2MP(1920 x 1080)		
		Third Stream: D1(640 x 480)		
14.	WDR	Yes ≥120dB		
15	Video Streams	Triple Stream, Individually configurable video streams (H.265, H.264,		
10.		MJPEG)		
	Network & Interface			

#	Parameter	Minimum Requirement		
16.	Interface	RJ-45 for 10/100 base-T Ethernet		
17	Network Protocols	IPv4, IPv6, HTTP, HTTPS, TCP, RTSP, RTCP, RTP, ICMP, UDP, IGMP, DNS,		
17.	support	DHCP, NTP, SNMP, PPPoE, 802.1X, DDNS, SMTP, ARP, UPnP, FTP		
10	Alarm Evont	Events / alerts send via FTP, SMTP, HTTP, Pre -Post alarm video		
10.		buffering.		
10	Compatible	ONV/IE profile 5 & G		
19.	Integration	onvir prome 5 & G		
20	Conoral Socurity	IP Address Filtering, Tampering Alarm, Access Policy, RTSP		
20.	General Security	Authentication, User Authentication		
21.	Alarm Interface	1 Ch Input / I Ch Output		
22.	Audio Interface	1 Ch Input / I Ch Output		
23.	Audio Codec	G.711/G.726		
24.	On board Storage	torage 128 GB or Better		
	General Camera Fe	Camera Features		
25	Operational	-20°C to 55°C		
23.	Temperature °C			
26.	Casing	IP66 or better rated housing with bracket		
27.	Power	PoE IEEE 802.3af class0, DC12V		
70	Power	Max. 14 W		
20.	Consumption			
29.	Certifications	UL, CE, FCC		

7.2.3 Outdoor PTZ (Pan Tilt Zoom) Camera

#	Parameter	Minimum Requirement	
Make:			
Model:			
1.	Sensor	1/2.8" CMOS & Minimum 4 MP	
2.	Min. Illumination	Colour: 0.05 lux	
		0 Lux with IR	
3.	Scanning System	Progressive	
4.	S / N Ratio	>50 dB	
5.	IR Distance	Inbuilt / External with adequate coverage in sync with PTZ	
0.		field of view. IR visibility should be minimum 120 meter.	

#	Parameter	Minimum Requirement
6.	IR Intensity	Automatically Adjust
7.	IR on/Off Control	Auto
8.	WDR	120dB or better
	Lens	·
9.	Optical Zoom	30X or better
10.	Focal Length	4.3 to 129 mm, ±5 % Allowed
11.	Focus Control	Auto/Manual
	Pan Tilt Zoom	
12.	Pan/Tilt Range	Pan: 0° ~ 360° endless; Tilt: -15° ~ 90°, auto flip 180°
13.	Manual Control Speed	Pan: 0.1° ~240° /s; Tilt: 0.1° ~160° /s
14.	Preset Speed	Pan: 300° /s; Tilt: 160° /s
15.	Preset	Minimum 128 Preset Points
	Video	
16.	Compression	H.265, H.264, MJPEG
17.	Streaming Capability	Minimum 3 Streams
18.	Resolution	1080 P of Better
	Frame Rate	Main Stream: 4MP (2560 × 1440):Max. 25/30 fps;
19.		Sub Stream:2MP (1920×1080):Max. 25/30 fps;
		Third Stream: D1 (640 × 480): Max. 25/30 fps
20.	Day and Night	Automatic, Color, Mono
21.	EIS	Required
22.	Region of Interest	4 or more area
23.	Digital Zoom	16X or better
	Audio	
24.	Audio Compression	G.711/G.726
25.	Audio Input/ Output	1 Input/ 1 Output
26.	Two Way Audio	Required
	Network	1
27.	Ethernet	RJ-45 (10/100Base-T)
	-	IPv4, IPv6, HTTP, HTTPS, TCP, RTSP,RTCP,RTP, ICMP, UDP,
28.	Protocols	IGMP, DNS, DHCP, NTP, SNMP, PPPoE, 802.1X, DDNS,
		SMTP, ARP, UPnP, FTP

#	Parameter	Minimum Requirement
29.	Compatible Integration	ONVIF Profile S & G
30.	Alarm	1 input / 1output
31.	On board storage	Support upto 128 GB or better
	General	
32.	Power	Hi-PoE, AC 24V/24V DC
33.	Working Temperature	`-20°C to 55 °C
34.	IP Rating	IP 66 or better rated Housing& IK10 Vandal Proof Housing
35.	Mounting Accessories	For pole and surface mount Brackets
36.	Certifications	UL, CE, FCC

7.2.4 Outdoor Fixed Bullet Camera (4K)

#	Parameter	Minimum Requirement
Make:		
Model	:	
1	Image sensor and Effective	1/ 2" or better, CMOS Progressive Scan & Minimum 8 MP
1.	Pixels (Resolution)	or higher
2.	Electronic Shutter	1/5s to 1/20,000s or better
3.	Focus	Automatic / Manual
4.	Automatic Gain Control	Automatic / Manual
5.	Multi Focal	2.8 to 12 mm to 3.9 -10 mm
6.	Frame Rate	8MP (3840 x 2160): Max. 20fps
7.	Codec	H.265, H.264, MJEPG or better
8.	Minimum Illumination	Color 0.01lux @ F1.2(AGC ON) ; B/W 0 lux @ IR ON
9	Backlight Compensation	Required, Camera should adjust BLC feature automatically
5.	bucklight compensation	depending on the light condition
10.	ROI	4 or more area
	Video	
11.	Day and Night functionality	Automatic, Color, Mono
12	IR illuminator	Internal Illuminator with visibility should be at least 50
12.		meter
		Main Stream: 8MP (3840×2160): Min. 20fps; 5MP
13.	Video Resolution	(2592x1944): Max. 30fps
		Sub Stream: 2MP (1920×1080): Max. 30fps

#	Parameter	Minimum Requirement
		Third Stream: D1 (640×480): Max. 30fps
14.	WDR	Yes ≥120dB
15	Video Streams	Triple Stream, Individually configurable video streams
15.	video streams	(H.265, H.264, MJPEG)
	Network & Interface	
16.	Interface	RJ-45 for 10/100 base-T Ethernet
		IPv4, IPv6, HTTP, HTTPS, TCP, RTSP, RTCP, RTP, ICMP, UDP,
17.	Network Protocols support	IGMP, DNS, DHCP, NTP, SNMP, PPPoE, 802.1X, DDNS,
		SMTP, ARP, UPnP, FTP
10	Alarm Event	Events / alerts send via FTP, SMTP, HTTP, Pre -Post alarm
18.	Alarm Event	video buffering.
19.	Compatible Integration	ONVIF profile S & G
	Conoral Security	IP Address Filtering, Tampering Alarm, Access Policy, RTSP
20.	General Security	Authentication, User Authentication
21.	Alarm Interface	1 Ch Input / 1 Ch Output
22.	Audio Interface	1 Ch Input / 1 Ch Output
23.	Audio Codec	G.711/ G.726
24.	Video Interface	1 BNC
25.	On board Storage	Support upto 128 GB or better
	General Camera Features	
26.	Operational Temperature °C	-20°C to 55 °C
27.	Casing	IP66 or better rated housing with bracket
28.	Power	PoE IEEE 802.3af class0, DC12V
29.	Power Consumption	Max. 14 W
30.	Certifications	UL, CE, FCC

7.2.5 Surveillance Camera (with Voice Input)

These surveillance cameras will be installed at sensitive locations at Bareilly which will discussed with successful MSI, BSCL, along with inputs from police department.

#	Parameter	Minimum Requirement
Make:		
Model	:	

#	Parameter	Minimum Requirement	
	Image sensor and		
1.	Effective Pixels	1/ 2.8" or better, CMOS Progressive Scan & Minimum 4 MP or higher	
	(Resolution)		
2.	Electronic Shutter	1/5s to 1/20,000s or better	
3.	Focus	Automatic / Manual	
Λ	Automatic Gain	Automatic / Manual	
4.	Control		
5.	Motorized Focal	2.8 to 12 mm Auto focus lens or better	
6.	Frame Rate	4MP (2560 x 1440): Max.25fps	
7.	Codec	H.265, H.264, MJEPG or better	
8	Minimum		
0.	Illumination		
٩	Backlight	Required, Camera should adjust BLC feature automatically depending	
5.	Compensation	on the light condition	
10.	ROI	4 or more area	
	Video		
11	Day and Night	Automatic, Color, Mono	
	functionality		
12.	IR illuminator	Internal Illuminator with visibility should be at least 50 meter	
		Main Stream: 4MP(2560 x 1440), 2MP(1920 x 1080)	
13.	Video Resolution	Sub Stream: 2MP(1920 x 1080)	
		Third Stream: D1(640×480)	
14.	WDR	Yes≥120dB	
15	Video Streams	Triple Stream, Individually configurable video streams (H.265, H.264,	
15.		MJPEG)	
	Network & Interface		
16.	Interface	RJ-45 for 10/100 base-T Ethernet	
17	Network Protocols	IPv4, IPv6, HTTP, HTTPS, TCP, RTSP, RTCP, RTP, ICMP, UDP, IGMP, DNS,	
17.	support	DHCP, NTP, SNMP, PPPoE, 802.1X, DDNS, SMTP, ARP, UPnP, FTP	
18	Alarm Event	Events / alerts send via FTP, SMTP, HTTP, Pre -Post alarm video	
10.		buffering.	
19.	Compatible	ONVIE profile S. G.	
	Integration		

#	Parameter	Minimum Requirement	
20	Conoral Socurity	IP Address Filtering, Tampering Alarm, Access Policy, RTSP	
20.	General Security	Authentication, User Authentication	
21.	Alarm Interface	1 Ch Input / I Ch Output	
22.	Audio Interface	1 Ch Input / I Ch Output	
23.	Audio Codec	G.711/ G.726	
24.	On board Storage	Supports up to 128 GB or Better	
	General Camera Fe	atures	
25	Operational	-20°C to 55°C	
23.	Temperature °C		
26.	Casing	IP66 or better rated housing with bracket	
27.	Power	PoE IEEE 802.3af class0, DC12V/ AC24V	
28	Power		
20.	Consumption		
29.	Certifications	UL, CE, FCC	

Outdoor High Sensitivity Mic

#	Parameter	Minimum Specification	
	Make:		
	Model:		
1.	Туре	Outdoor Highly Sensitive Pickup	
2.	Pickup Distance	Effective Listening Distance: 0-25 meters (60db)/35 meters(80db)	
2	Transmission	2000M	
5.	Distance	3000IVI	
4	Sound Head	1/2-inch professional measuring level titanium alloy capacitive sound	
4.	Characteristic	head	
5.	SNR	>45dB (Outdoor), >78dB (Indoor)	
6.	Dynamic Range	80dB (1KHz at Max dB SPL)	
7.	Sensitivity	5dB	
8	Max. Sustainable	97dB SDI (1KH7 THD 1%)	
0.	Sound Pressure		
0	Directional	45 Degree Directional	
9.	Characteristic		

#	Parameter	Minimum Specification
10.	Frequency Response	20HZ~20kHz (Speech Band Enhancement Optimization)
11.	Output impedance	600Ω(non-equilibrium)
12.	Output Signal Amplitude	2.5Vpp/-25db
13.	Signal Processing	Professional Hi-fidelity Low Noise Audio Processing, Speech
	Circuit	Enhancement Digital Noise Reduction DSP
14.	Waterproof	Outdoor Waterproof
15.	Numbers of Sound Head	Single
16.	Certification	CE/FCC
17.	Protection Circuit	Lightning Protection, Power Polarity Reversal Protection
18.	Transmission Cable	3 Cores 0.5mm 2 RVVP Shielded Cable
19.	Working Voltage	DC 12V
20.	Working Current	33 mA
21.	Working Temperature	-30°C∼+80°C
22.	Material	Aluminium alloy

7.2.6 Body Worn Camera

#	Parameter	Minimum Specification
	Make:	
	Model:	
		Shall have inbuilt min 2.0" TFT LCD with 16:9/4:3 aspect ratio for
1.	Display	viewing camera video and Configuration of the device. Must be Visible
		under sun light.
2.	CCTV camera	Shall be embedded with wide angle CMOS image sensor of min. 20 MP
2	Compression	H.264 .AVI/MPEG4
5.	technique	
4.	Resolution	Shall support capture at min. 20MP with .jpg format and recording up
		to 1080P resolution with .avi format H.264/H.265

#	Parameter	Minimum Specification
E	Recording Frame	
5.	rate	Min.2560*1440P at 25FPS or better
6.	Recording Angle	Wide Angle 140 degrees
7.	ICR	Shall support auto IR switch function
8.	Night View	Up to 10 Meters with Visible Face Detection
9.	Network Support	3G (WCDMA, TD-SCDMA, EVDO) and 4G (FDD-LTE, TD-LTE)
10	Satellite	Built in GPS/GPSS module
10.	positioning	
11	Transmission	Shall transfer real time video/audio to management system via Wi-fi
11.		802.11a/b/g/n module and 4G module
12.	Storage	Inbuilt Min. 128 GB
12	Audio i/o	Shall support 2-way audio communication, shall also have built in mic
15.		and speaker provision
1/	Interface	Min. One USB 2.0/USB 3.0 port to backup stored files and charging
14.		battery
15.	Battery Capacity	Built-in 2700 mAH Lithium or better
16.	Accessories	USB Cable, Battery Charger to be provided
17	Alarm button	SOS button, in case of danger or emergency, should send alarm signal
17.		using this button
10	Physical button	Button for IP based, Power On/Off, Video recording, Audio recording,
10.	Physical button	Snapshot, Event tag
19.	Protection	Waterproof with IP67 protection
20.	Shock Absorption	upto 2 meters drop
21.	Weight	Should not be more than 220 gm

7.2.7 Drone Based Surveillance System

Drone surveillance enables surreptitiously gathering information about a target as captured from a distance or altitude. Drones combined with computer vision, face recognition, object recognition and other tracking technologies are essentially flying robots. Their naturalization into the environment -- sometimes referred to as ubiquitous robotics -- is enabled by the combination of networking, robotics and artificial intelligence (AI). Drone surveillance provides the security solutions, real-time views anywhere, from almost any angle, no matter how remote the location. Working alongside perimeter sensors and intelligent triggers, drones can be directed toward detected intrusions and "put eyes on" a person of interest, or confirm false alarms caused by curious wildlife. In addition, they fill in the gaps,

and provide a platform for camera- and video-based surveillance in areas where ground-mounted systems are lacking. Advanced AI-capable drones can adapt to their environment and perform many autonomous tasks a subject and filming while they move through an area. Drone Based Surveillance System will focus on following aspects

- i. Event Based Surveillance: It will have focused on the event coverage in the Bareilly City such as religious event, Political event, Public event etc.
- **ii.** Incident Based Surveillance: This will provide more emphasis on the critical incident coverage in the Bareilly City such as crime based, accidental, emergency services etc.

7.2.7.1 Functional & technical Requirement

- i. The Solution should be modular in design.
- ii. The Solution should have high performance in terms of distance (Minimum 4 KM Line of sight)& duration (Minimum 40 minutes) of flight with superior Pay load carrying capacity.
- iii. The System should include
 - a. Fight controller
 - b. HD Transmission system
 - c. Intelligent batteries
 - d. Tracking feature
 - e. Handheld navigation system over and above PC based,
 - f. Video Streaming imaging capability.
- iv. Should have inbuilt SDK kit, Camera and API port for connecting compatible devices and terminals.
- v. The Drone should have failed safe features like Return to home on low battery, communication failure, etc
- vi. Live transmission of HD video feed from drone to command control center.
- vii. Compatibility of using Day and Night camera both, etc
- viii. The propose solution should complied to DGCA (Director General of Civil Aviation) guidelines.DGCA approval shall be in BSCL Scope.
- ix. Drone camera shall have 5 Years OEM warranty and the same shall be submitted on OEM letter head

#	Parameters	Minimum Requirement
	Make:	
	Model:	
1.	Physical Characteristics	Specification/Remarks

#	Parameters	Minimum Requirement
a.	UAV Weight with battery	< 3.5 Kg
	and payload	
b.	UAV Size with propellers	< 1m x 1m
2.	UAV Performance	Specification/Remarks
	Characteristics	
a.	Endurance	Minimum 40 minutes with either payload @ MSL
b.	Range	Minimum 4km LOS (Line-of-sight)
С.	Maximum launch altitude	2000m AMSL (Above Mean Sea Level) or more
d	Maximum operating	400m AGL (Above Ground Level) or more
u.	altitude	
e.	Functional Temperature	0°C to 40°C
	Range	
f.	Wind Resistance	24 knots or more
g.	Aural Signature	Nil aural signature at slant range of 300m
h.	Technical life of UAV	Minimum 500 landings
3.	Operational	Specification/Remarks
5.	Charactoristics	
	Characteristics	
а.	Launch & Recovery	Autonomous Vertical Take-Off & Landing (VTOL)
a.	Launch & Recovery	 Autonomous Vertical Take-Off & Landing (VTOL) Fully autonomous from Take-off to Landing without using
a.	Launch & Recovery	 Autonomous Vertical Take-Off & Landing (VTOL) Fully autonomous from Take-off to Landing without using any R/C controller
a.	Launch & Recovery	 Autonomous Vertical Take-Off & Landing (VTOL) Fully autonomous from Take-off to Landing without using any R/C controller Altitude Hold
a.	Launch & Recovery	 Autonomous Vertical Take-Off & Landing (VTOL) Fully autonomous from Take-off to Landing without using any R/C controller Altitude Hold Hover at a defined waypoint
a. b.	Launch & Recovery Flight Modes	 Autonomous Vertical Take-Off & Landing (VTOL) Fully autonomous from Take-off to Landing without using any R/C controller Altitude Hold Hover at a defined waypoint Autonomous Waypoint Navigation (pre- defined as well as
a. b.	Launch & Recovery Flight Modes	 Autonomous Vertical Take-Off & Landing (VTOL) Fully autonomous from Take-off to Landing without using any R/C controller Altitude Hold Hover at a defined waypoint Autonomous Waypoint Navigation (pre- defined as well as dynamically adjustable waypoints during flight)
a. b.	Launch & Recovery Flight Modes	 Autonomous Vertical Take-Off & Landing (VTOL) Fully autonomous from Take-off to Landing without using any R/C controller Altitude Hold Hover at a defined waypoint Autonomous Waypoint Navigation (pre- defined as well as dynamically adjustable waypoints during flight) Remotely Piloted mode for video based navigation (RPV
a. b.	Launch & Recovery Flight Modes	 Autonomous Vertical Take-Off & Landing (VTOL) Fully autonomous from Take-off to Landing without using any R/C controller Altitude Hold Hover at a defined waypoint Autonomous Waypoint Navigation (pre- defined as well as dynamically adjustable waypoints during flight) Remotely Piloted mode for video based navigation (RPV Mode)
a. b.	Launch & Recovery Flight Modes Deployment Time (from	 Autonomous Vertical Take-Off & Landing (VTOL) Fully autonomous from Take-off to Landing without using any R/C controller Altitude Hold Hover at a defined waypoint Autonomous Waypoint Navigation (pre- defined as well as dynamically adjustable waypoints during flight) Remotely Piloted mode for video based navigation (RPV Mode) <10 minutes
a. b.	Launch & Recovery Flight Modes Deployment Time (from fully packed state to UAV	 Autonomous Vertical Take-Off & Landing (VTOL) Fully autonomous from Take-off to Landing without using any R/C controller Altitude Hold Hover at a defined waypoint Autonomous Waypoint Navigation (pre- defined as well as dynamically adjustable waypoints during flight) Remotely Piloted mode for video based navigation (RPV Mode) < 10 minutes
a. b.	Launch & Recovery Flight Modes Deployment Time (from fully packed state to UAV Take-off)	 Autonomous Vertical Take-Off & Landing (VTOL) Fully autonomous from Take-off to Landing without using any R/C controller Altitude Hold Hover at a defined waypoint Autonomous Waypoint Navigation (pre- defined as well as dynamically adjustable waypoints during flight) Remotely Piloted mode for video based navigation (RPV Mode) < 10 minutes
a. b.	Launch & Recovery Flight Modes Deployment Time (from fully packed state to UAV Take-off) Packing Time (after UAV	Autonomous Vertical Take-Off & Landing (VTOL) • Fully autonomous from Take-off to Landing without using any R/C controller • Altitude Hold • Hover at a defined waypoint • Autonomous Waypoint Navigation (pre- defined as well as dynamically adjustable waypoints during flight) • Remotely Piloted mode for video based navigation (RPV Mode) < 10 minutes
a. b. c. d.	Launch & Recovery Flight Modes Deployment Time (from fully packed state to UAV Take-off) Packing Time (after UAV landing to fully packed	Autonomous Vertical Take-Off & Landing (VTOL) • Fully autonomous from Take-off to Landing without using any R/C controller • Altitude Hold • Hover at a defined waypoint • Autonomous Waypoint Navigation (pre- defined as well as dynamically adjustable waypoints during flight) • Remotely Piloted mode for video based navigation (RPV Mode) < 10 minutes
a. b. c. d.	Launch & Recovery Flight Modes Deployment Time (from fully packed state to UAV Take-off) Packing Time (after UAV landing to fully packed state)	 Autonomous Vertical Take-Off & Landing (VTOL) Fully autonomous from Take-off to Landing without using any R/C controller Altitude Hold Hover at a defined waypoint Autonomous Waypoint Navigation (pre- defined as well as dynamically adjustable waypoints during flight) Remotely Piloted mode for video based navigation (RPV Mode) < 10 minutes

#	Parameters	Minimum Requirement
		Return to Home/Land on low battery
		Multiple GPS on-board for GPS failure redundancy
		High wind indication
		Backpack that houses all the sub-systems which allows the
f.	Packaging and Storage	complete system to be carried and operated on field by the
		crew
g.	Operating Crew	upto 2
4.	Payload Characteristics	Specification/Remarks
		Colour Electro Optic (EO) for day
h.	Payloads	HD Camera Payload
		Thermal Imager (TI) for night (optional)
	Payload Replacement	< 2 minutes (if separate D/N payloads)
1.	Time	
	Payload Freedom (in	Pan: 360 ^o continuous
J.	flight)	• Tilt: 90º
k	Davlight Payload	Resolution: Minimum 1280x720
K.		Zoom: 10x Optical
		Resolution: Minimum 640x480 or better
١.	Night Payload (optional)	• Zoom: 4x Digital
		Modes: White Hot & Black Hot
	Target Detection Slant	Daylight: Minimum 600m
m.	Range (Human Size	• Thermal: Minimum 300m
	Target)	
		Gimbal stabilization of both payloads
n.	Stabilization	Electronic stabilization of video output at all zoom levels
		in real-time
5	Communication Link	Specification/Remarks
5.	Characteristics	
	Communication	Transmit control commands from GCS to UAV
a.	capability	Transmit telemetry data from UAV to GCS
		Transmit day and night video from UAV to GCS
b.	Video Link	Digital and Encrypted

#	Parameters	Minimum Requirement
	Minimum Transmitted	Daylight: 1280x720
с.	Video Resolution at full	• Thermal: 320x240 or 640x480
	operating range	
d.	Frequency Band	2.4GHz band or 5.8GHz band (unlicensed)
-	Number of Channels /	Minimum 4 Channels (User Selectable)
e.	Number of UAVs that can	• Minimum 2 UAVs to be operated in the same vicinity
	be operated in same	
	vicinity	
6.	Ground Control Station	Specification/Remarks
0.	(GCS) Characteristics	
a.	Computing Hardware	Ipad/tablet with drop protection
		Geographic Map along with UAV location, UAV trajectory,
		camera view polygon, waypoints and flight plan
		• Real-time video from the UAV with on-screen display of
		important parameters like UAV co- ordinates, target
b.	GUI Display parameters	(payload) co-ordinates and range from UAV, true North
		indication, Distance from HOME etc.
		Real-time video should be displayed at all times during
		the flight
		Artificial Horizon indicating UAV attitude
		Capability to work with Google Maps and/or other
		available open-source maps. Application should have the
	Maps	capability to download maps automatically after
с.		specifying location GPS co- ordinates
		Capability to integrate geo-referenced raster maps
		provided in at least one of the commonly used digital map
		formats (gif, tiff etc.)
		One-click Take-off/Land/Hover
d.	User Controls	Set altitude of the UAV
		Waypoint navigation
		Dynamic flight plan adjustment
е.		Point payload to ground co-ordinate function

#	Parameters	Minimum Requirement
		RPV Mode which allows UAV to be flown in semi-
		autonomous mode by looking at the on- board video
		Full camera controls
		Pan/Tilt
f.	Joystick Controls	Zoom In/Out
		RPV mode
		Altitude control
		• Video should be recorded in commonly portable video
		format (AVI/MP4 etc.) on the GCS. The UAV should not do
		any on-board recording.
g.	Video	• Video of the full flight should be recorded by default with
		option to turn recording off
		• Capability to take image snapshots with on- screen display
		parameters at any time during flight
	Pre-flight checks	Capability to perform pre-flight checks of the complete system
h.		before every flight for confirming the suitability of
		flightworthiness
-		Essential telemetry data logging
i	Others	• Export of flight path in .kml format for reviewing in Google
1.		Earth
		Port for data/video transfer to external storage devices
7.	General Requirements	Specification/Remarks
	System Configuration	One UAV with 2 Battery (One Active in UAV and One
		Standby for replacement at site)
		One HD Payload
2		One GCS with Communication System
a.		One Field repair kit
		Backpack
		Hard Case
		Battery Charger with case

7.2.8 Ruggedized Switch

#	Parameters	Minimum Requirement
	Make:	
	Model:	
1	Total Ports	Should have 8 Ethernet 10/100/1000 PoE ports and min 3 gig SFP for uplink
1.		out of which 4 ports should be have 4 x High PoE Port
2.	Ring Support	Switch Should support the Ring connectivity in uplink port LLDP, LLDP-MED
3.		Switch Should support the Ring connectivity ITU-T G.8032, IEEE802.1D
		STP/RSTP; 802.1w/MSTP
4.		Switch Should support IEEE802.3ad Link aggregation group (LAG/LACP)
5	PoF Standard	Should support IEEE 802.3at on each 10/100/1000 ports or better. POE
5.		Budget should be min. 150W
6.	Switching	Should have at least 20 Gbps switching capacity
	Capacity	
7.	MAC and VLAN	Should support at least 8K MAC address support and at least 4K VLAN
8.	Protocols	Support 802.1Q VLAN
9.		HTTPS/SSH
10.		DHCP client/Relay/Snooping/Snooping option 82/Relay option 82
11.		SNMP Management
12.		IGMP Snooping
13.		IPv6 protocol support
14	Security	Should have security features mentioned below:
17.	Features	should have security reatures mentioned below.
15.		DHCP Snooping
16.		ARP Inspection
17		Access Control List based on VLAN, CoS, MAC, EtherType, IPv4, IPv6, or
17.		user-define combinations
18.		Support for RADIUS, TACACS+ for authentication
19.		Secure MAC Address
20.		IEEE802.1x port based authentication
21.		IP Source Guard
22.		Support MAC limit
23.	VLAN	Should support VLAN assignment methods mentioned below:

#	Parameters	Minimum Requirement
24.		MAC based VLAN assignment
25.		IP based VLAN assignment
26.		Protocol based VLAN assignment
27.		L2CP handling/L2 protocol transparent transmission
28.	QoS	Support 8 queues per port
29.		Service classification per port
30.		Service classification per VLAN
31.		Service classification per CoS (DSCP)
32.		Scheduling mode
33.		Rate Limiting per port
34.		Bandwidth Limiting per CoS (DSCP)
35.	Multicast	Shall Support IGMP Snooping V1/V2/V3
36.		Shall Support Multicast filtering & unknown multicast discarding
37.		Shall Support MVR
28	Remote	Shall Support remote management through SNMP trans
50.	Management	
39.		Remote management via SNMP v1/v2/v3
40.		Web management and SSL
41.		Remote management via Telnet
42.		Remote management via SSH v1/v2 (IPv4 and IPv6)
43.		Local management via console interface
лл	Industrial	Should have IP-30 industrial rating
	Rating	
45.	Alarm Relay	Should have Alarm Relay for Power/Link Failure - Configurable
	EN/IEC	
46.	Standard	Should support
	Ratings	
47.		EN/IEC 61000-4-2, 61000-4-3, 61000-4-4, 61000-4-6 & RoHS compliance
48	Surge	Should have EN/IEC 61000-4-5 compliance
	Protection	
49	Operating	Should have -10 to 60 degrees C or better
	Temperature	
#	Parameters	Minimum Requirement
-----	------------------	---
	Certification to	
50.	be provided by	Should have UL,CE compliance
	OEM	
51.	Power Supply	Should have two Power Inlets for Source Redundancy
52.		24/48 VDC : from 20 to 57VDC, 6KV Surge protection on copper ports to protect from field surge.
53.	Cables	All necessary data and power cables and industrial grade power adapter to be provided

7.2.9 Video Management System

7.2.9.1 System Architecture

- i. The VMS architecture should comprise of centralized or decentralized architecture. The VMS should have system components such as Management Server to manage the system, Recorder or Media Server to stream and store the video feeds from the cameras and Database Server to store meta data information.
- ii. The VMS should support single site or multi-site deployment scenarios. The VMS should have capability to aggregate videos from multiple sites to the central site for recording or monitoring. The VMS should also have the capability to aggregate the system alerts such as video analytics, user created alerts and system health alerts to the central site.
- iii. The VMS should support single or multiple recorder server deployments. The proposed VMS should support unlimited IP and Analog cameras by augmenting the computing and storage hardware. The proposed VMS should support unlimited number of VMS clients.
- iv. VMS should be open to any IP and Analog cameras integration. It should support both
 Windows or Linux operating systems on server machine.
- v. The VMS software should be third party ONVIF Profile S & G User Level / Contributor level / full member as per ONVIF website
- vi. The VMS should be computing hardware agnostic and should work on Commercially Off the Shelf (COTS) servers and storage solutions.
- vii. The VMS should support 64-bit architecture OS and hardware environments.
- viii. VMS should support SQL/MY SQL Server or database.
- ix. The VMS should support redundancy at each level to avoid single point of failure. The redundancy should be built in to the platform and should offer failover support for Management Servers, Media / Recording Servers, Database Servers and Storage Medium.
- x. VMS should support failover against temporary disconnection.

- xi. The system should provide seamless access to recordings on the failover server for all clients through the same client views once the services are fully started.
- xii. The VMS should support mix of storage technologies such as local / DAS / SAN / NAS storage.Each media server should support such storage locations simultaneously.
- xiii. In case of the failure of the Recording Server, the VMS should automatically assign the cameras on the failed recording server to other standby failover servers on the network.
 Manual intervention of any kind should not be required in such a case.
- xiv. The Media Server should allow recording of camera feeds on network storage. In case the network storage fails, the recording server should start recording on the local storage of the cameras. The camera storage recording should get synchronized with the network storage as and when it is available again.
- xv. The VMS should have published APIs/SDK to interface with external systems such as Command and Control Application, Incident Management System, etc. VMS should have Open Interface to send Analytics event alerts and other Maintenance Alerts (Camera disconnection, Storage Full, DBMS disconnection, etc.) over HTTP protocol to any external application running in a different machine in the same LAN. This is required for integration with command & control software or any other 3rd party incident management system.

7.2.9.2 General VMS Functions

- i. VMS should be able to detect ONVIF compliant IP cameras automatically.
- ii. VMS can be independent of camera and ICCC make
- iii. VMS should support H.265 and H.264/ MJPEG stream for both live view and Recording independently. Compression rate should be manageable H.265 and H.264/MJPEG accepted.
- iv. The VMS should have ONVIF Profile S & G compliance.
- v. The VMS should be able to stream standard RTSP/ H.265/ H.264/ Mpeg4 camera video streams to command and control software on demand basis.
- vi. The VMS should support H.265, H.264, MJPEG CODECs.
- vii. The VMS should manage, display and record multiple video streams from a single IP camera or encoder.
- viii. The VMS should offer desktop client and web client.
- ix. VMS should allow managing initial client logon, system configurations, logging, remote administration of recording servers, devices, security, rules, alerts and logging.
- x. To ensure security and ease of Firewall deployment, only one Server should be allowed to be exposed to Internet for delivering services to all the remote clients sitting on the Internet. The remote clients should access only that server to access the system for all the functionality.

7.2.9.3 Storage & Recording Functions

- The VMS should allow creation of customized recording profile. Such a profile should allow the operator to select multiple available camera streams. It should be possible to assign the recording profile to an individual camera or a group of cameras or all cameras.
- ii. The VMS should allow selection of stream for recording.
- iii. The VMS should support ONVIF Profile G. The VMS should intelligently synchronize the edge recording on the camera with the central recording in case the camera loses the network connection.
- iv. The VMS should allow selection of single or group or all cameras for edge recording.
- v. The VMS should allow the user to mark certain period of video recording as "critical data".
 Such critical data should be retained by the system irrespective of the camera recording storage configuration.
- vi. VMS should allow the users to download multiple segments of the video from single or multiple cameras from the archive with an option to tag each downloaded segment with text messages.
- vii. It should be possible to encrypt the exported video with password protection. The system should keep a record of such exported videos as audit trail . The exported video should be saved in SEF (Secure Export Format)/ any other standard for secure non tamper file system with Password key which can be set to 24 Characters. The Client application should support dual password mode for each user.

* "Secured Export Format": Means system should comply to the secured format. Exported file shall be encrypted / watermarked in case to be used in court of law.

viii. It should be possible to create recording schedules on the fly, and assign any schedule to any camera, any group of cameras or to all the cameras any time. The recording should be controlled on hourly basis. It should be possible to manage recording on per camera basis, each with different video settings (e.g. format, frame rate and resolution).

7.2.9.4 User Management & Administration

- i. The VMS should support multiple directory access protocols such as Microsoft Active Directory or Lightweight Directory Access Protocol (LDAP).
- ii. VMS should allow the user with Administrator privilege to import any Operator's screen on his/her desktop to watch the operator's activity on-line.

7.2.9.5 VMS Client and Operator Functions

i. The VMS desktop client should be able to configure the entire system without any interface / operations required to be performed at the server level.

ii. The VMS , VA Software should have Microsoft/Linux certification from last 3 years for tight integration with operating system.

Note: As per industry best practices, the software must have certification from Operating system/ platform owner for tight integration / future patch updates and upgardes.

- iii. The VMS software should be third party ONVIF Profile S & G User Level / Contributor level / full member as per ONVIF website
- iv. The VMS should allow multi-monitor support for the client workstation.
- v. The VMS should store available screen layouts for each login user. The stored screen layout should be available on any of the operator workstations once the user logs-in.
- vi. It should be possible to select cameras for synchronized and simultaneous archive viewing. It should be possible to record the videos being rendered from these cameras into a single video.
 This operation should be possible in a matrix recording or stitched recording options.
- vii. The VMS desktop client should allow configuration of Video Management Server, Video Recorder Servers, Storage and Video Analytics. There should not be any requirement of logging in to the individual components for any configuration. It should be possible to create Video Analytics rules from the same desktop client.
- viii. The VMS should allow creation of customized, layered maps using standard picture files and it should be possible to drag and drop the cameras on the map for easy navigation based on the location on the map. It should be possible to select any camera or group of cameras on the map for live viewing or archive viewing.
- ix. The VMS should show event notification from the cameras on the map itself. The operator should be able to click on the event notification of a particular camera on the map and the VMS should open the event window on the operator screen.
- x. VMS should integrate with open source and free maps such as Google Maps.
- xi. It should be possible to create a group of relevant cameras for simultaneous viewing. So, in case of an alert in one camera, the VMS should open the event window of the camera and also show live video from other cameras in the group in a synchronized manner. It should also be possible for the operator to view the archive video from all the open cameras simultaneously, in a time synchronized manner.
- The system should have PTZ camera control options within the matrix view of all the cameras.
 The PTZ controls should only be visible for PTZ camera/s. The operator should be able to control the PTZ camera within the matrix view itself.

- xiii. The system should retain the VMS client screen state (including Video Analytics alert window, message window, Video Matrix, etc.) in case of an accidental shut down of the machine and should offer the exact same screen to the operator upon logging back into the system.
- xiv. The VMS should allow creation of events for any camera from the drop down menu. Such an event, when stored, should be searchable based on the camera, time, and event type. It should be possible to write description about the event.
- xv. The VMS should allow sending the event alert to the designated person or a group of designated persons through SMS or Email.
- xvi. VMS should allow transferring the event alert to an administrator or another user registered in the system.
- xvii. The VMS should allow monitoring of archive video of the selected camera under categories such as events, motion or continuous recording. The VMS should also show a report of cameras indicating recording status for the selected duration, critical video data and Incident Video data. VMS should have three detection methods for adverse conditions.
- xviii. VMS should support multi-layer hyperlinked maps in form of JPEG files. Cameras can be dragged and dropped from directory on the map for click-n-view on Client viewer.
- xix. VMS should allow camera clustering based on Locations as well as Groups independently.
- xx. Each operator should be able to monitor one or several clusters of cameras
- xxi. VMS should be able to prevent an operator from viewing/managing one or several clusters
- xxii. VMS should allow managing at least 100 clusters of cameras. Quantity of cameras per cluster should be unlimited.
- xxiii. VMS should allow assigning each camera to one or several clusters simultaneously.
- xxiv. VMS should allow management of following typical camera parameters:
 - Brightness, compression, contrast, include date and time, resolution, rotation
 - Frame per second, bit rate control mode, maximum bit rate, bit rate control priority, target bit rate
 - Camera's Name, Description, Hardware name and Part number, Storage and recording settings, maximum storage limits and database configuration.
 - Archiving settings
 - Pre-set positions in case of a PTZ camera.
- xxv. The total hard drive space used to store the camera's recorded data should be displayed. The storage media could be the local hard drive or SAN / NAS storage.
- xxvi. VMS should provide feature-rich administration client for system configuration and day-today administration of the system.

- xxvii. The Client Viewer should provide a Graphical User Interface (GUI) for the convenient access of live and recorded video as well as camera properties and display quality.
- xxviii. It should be possible to drag and drop cameras from the camera directory to the display screen.
- xxix. The Client Viewer should offer the capability of browsing recordings from cameras on the same panel where other cameras are displayed live. There should be provision to replay multiple such cameras from various timestamps, independent to one another.
- xxx. The Client viewer should have the feature to synchronize replay of selected cameras/all cameras in the view panel.
- xxxi. VMS should select the appropriate video stream from camera for display depending on the display resolution to optimize the network bandwidth.
- xxxii. The Client Viewer should allow digital zooming on live view as well as on replay view on Fixed as well as PTZ Cameras.
- xxxiii. The Client Viewer should support the use of standard PTZ controller or 3-axis USB joysticks for control of pan, tilt, zoom and auxiliary camera functions.
- xxxiv. The Client Viewer should support the use of keyboard shortcuts for control of standard features.
- xxxv. The Client Viewer should have the following two-way audio functions:
 - The Client Viewer should allow an operator to play live audio from a camera's microphone and play back recorded audio.
 - The Client Viewer should allow an operator to export audio together with video in the AVI format.
 - The operator should have a "press to talk" option which should send the microphone input from the operator out to camera attached speaker.
 - Each camera view item should use the default assigned microphone and speaker, but the operator should have the ability to select other audio devices or to let the same speaker follow the operator when choosing other views.
- xxxvi. From the Client Viewer it should be possible to:
 - Run instant replay of any camera on display
 - Bookmark of any important event to facilitate search and retrieval
 - Bookmark the display layout with selected distribution of cameras across the panel
 - Exported videos with comments or similar functionality
 - Print images

• Export recording (e.g. for use as evidence) in AVI or JPEG formats and SEF (Secured export format)

* "Secured Export Format": Means system should comply to the secured format. Exported file shall be encrypted / watermarked in case to be used in court of law.

- xxxvii. The Client Viewer should have the capability to receive multicast streams if a preset number of clients are requesting the same live view camera. The Operator should have the option to configure the system to always receive unicast streams at the discretion of the system administrator. The system should have the capability to detect if the network becomes unreliable and to automatically switch to unicast to ensure that the operator is able to receive video.
- xxxviii. The operator should have the ability to use digital zoom where the zooming is performed in the image only on any number of cameras simultaneously. This functionality should be the default for fixed cameras. The use of digital zoom should not affect recording or other users.
- xxxix. The Client Viewer should integrate the following viewing capabilities:
 - Matrix Switching: The Client viewer should allow switching amongst multiple selected bookmarked display layouts with pre-determined time duration for each matrix view.
 - Matrix Window A window that is used to display cameras on demand or by an external event
 - Client viewer should allow the same camera to be viewed on multiple display tiles; one may be digitally zoomed, or on high resolution stream.
 - An overview image in the view should display the normal field-of-view and the digital zoom area in a highlighted box to provide the user with spatial awareness.
 - xl. The PTZ control window should allow the user to select pre-defined presets for PTZ cameras and drive the selected camera to the preset.
 - xli. The current camera state should be displayed and should indicate whether the camera is in live mode, in recording mode or in stopped mode.
 - xlii. The Client Viewer should display motion activated sequences for the selected camera in a drop-down menu. A line with the date, start time and duration should represent each sequence. A drop-down preview screen should allow the user to view the recorded sequence.
 - xliii. The Client Viewer should display Alerts defined as bookmarked events.
 - xliv. The Client Viewer should display a time line for each camera to represent recorded video sequences. The Client Viewer should indicate whether the video was recorded due to motion activation or recorded without motion or pre and post alarm video. The time line band should be highlighted based on the camera view selected in the display. The Client Viewer should allow video sequences for the displayed cameras to be reviewed simultaneously.

- xlv. The Client Viewer should allow an area of interest in an image to be searched for motion by time. Search parameters should include sensitivity and interval. A grid feature should allow only specific regions of interest to be searched.
- xlvi. VMS should provide options for export format type (AVI/JPEG), timestamp, frame rate (full/half), digital zoom export, and AVI CODEC, SEF (secured export format). Video clip may be exported to desktop/CD/DVD or a specific file path. All audio associated with the video being exported should automatically be included in the AVI export.

* "Secured Export Format": Means system should comply to the secured format. Exported file shall be encrypted / watermarked in case to be used in court of law.

- xlvii. VMS should watermark every frame of the Video files with watermarks to authenticate the source of the video. While exporting video segments to external media (CD/DVD) or to any folder in workstations, the VMS should allow encryption of the video files.
- xlviii. The Client Viewer should allow the digital zoom feature to be used in recordings.
- xlix. ICCC should allow seamless integration into an external Geographical Information System
 - I. From the GIS console Operators should get an overview of the system and access to all system components.
 - II. In VMS, Camera settings change restarts only the particular camera and make the recording continues uninterrupted for other cameras. VMS should support for H.264 decompression codec using GPU. Also, software should be able to decrease CPU load.
 - lii. Map function can use standard graphical file formats including jpg, gif, png, tif, etc.
- liii. System performance data for cameras and servers including camera resolution, FPS, network usage, disk space, etc.

7.2.9.6 Health Monitoring & Audit Trail

- i. The VMS desktop client should show vital system parameters for components such as Database Server, Media Servers, Local Workstation and Storage System (all available storages). The client should show the parameters such as CPU Core Usage, RAM Utilization and Storage Utilization.
- The VMS client should have automatic or manual selection of hardware accelerator decoder or software accelerator decoder for smooth media rendering based on the available resources.
- iii. The VMS should have reports such as camera uptime availability, camera recording percentage, recording status, critical events, incident video, etc.
- The System health status like Server failure, Camera Disconnection, Storage Full Indication, etc. should always be displayed within the GUI all the time.

- v. VMS should maintain a continuous log of Server Status Messages, Camera Connectivity, Storage Status, Recording ON/OFF, User Activity Logs, etc. which should be accessed from the workstations using different filters Alarm Filtering Option shall be there. It shall possible to "silence" alarms for a desired time period Ranging from 5 Minutes till 24 Hours or more. This is useful if alarms are unintentionally active all the time, e.g., due to adverse environmental conditions such as heavy wind and rain.
- vi. Alarm Centre
 - Option to view cameras only on alarm. Matrix grid size should change automatically if alarms are generated from multiple cameras simultaneously
 - Automatic or manual reset & close option of video panel

vii. Other Features

- Failover: System should support min N: 1 failover. However MSI is free to propose N:N failover as per their offered solution. Failover time should not be more than 30 seconds. In case of failover recording lost should be less than 30 seconds.
- Should support ONVIF protocol including Profile-S, G and also available on onvif website
- Option to configure video analytics in same client as VMS
- Digital Zoom:
- Both complete live picture and Zoomed picture should be visible simultaneously while zooming.
 - a. Should be available On Live and Playback Videos.
 - b. Zoom available on snapshots too.
- Dual Streaming and Automatic Switching from Low to High Quality on Full screen mode.
- Encryption: VMS Software should have minimum 256-bit AES encryption, Encryption algorithm of 4096 bit RSA and hashing of SHA -512 for tamper proof data.

7.2.10 Supply and Installation of Camera Infrastructure

Based on detailed field survey as mentioned above, MSI shall be required to supply, install and commission the surveillance and monitoring systems at the identified locations and thereafter undertake necessary work towards its testing.MSI shall use industry leading practices during the implementation phase w.r.t positioning and mounting the cameras, poles and junction boxes. Some of the check-points that need to be adhered to by the MSI while installing / commissioning cameras are as follows:

i. Ensure that surveillance and monitoring objective is met while positioning the camera such that the required field of view is being captured as finalized in field survey

- ii. Ensure that camera is protected from the on-field challenges of weather, physical damage and theft.
- iii. Make proper adjustments so as to have the best possible image / video captured.
- iv. Ensure that the pole is well placed for vibration resistance adhering to the road safety norms.
- v. Deployment of Collusion preventive barriers around the junction box and pole foundation in case it's installed in collision prone place.
- vi. Deployment of Appropriate branding or color coding (Police/Authority Branding) of poles and junction boxes, to warn mischief mongers against tampering with the equipment at the junction.

7.2.11 Installation of Poles/Cantilevers/Gantry if required

- i. The MSI shall ensure that all installations are done as per satisfaction of the Competent Authority.
- For installation of Variable Message System (VMS), CCTV Cameras, PTZ Cameras, Public Address System, etc. MSI shall provide appropriate poles and cantilevers and any supporting equipment.
- iii. MSI shall be required to supply, install, configure and integrate surveillance cameras at the identified locations and thereafter undertake necessary work towards their commissioning.
- iv. MSI shall ensure that the poles erected to mount cameras are good, both qualitatively and aesthetically
- v. MSI shall use the industry leading practices while positioning and mounting the cameras and ensure that the pole / mast implementation is vibration resistant. Arrangements for bird scare spikes on top of camera shall be made to prevent birds from sitting on top of camera box.
- vi. The poles shall be installed with base plate, pole door, pole distributor block and cover.
- vii. Base frames and screws shall be delivered along with poles and installed by the MSI.
- viii. In case the cameras need to be installed beside or above the signal heads, suitable stainlesssteel extensions for poles need to be provided and installed by the MSI so that there is clear line of sight.
- ix. MSI shall be responsible to undertake required structural analysis regarding the regulated load conditions and considering the respective wind load while installing the poles / cantilevers for cameras and Variable Messaging Sign boards
- x. MSI shall provide structural calculations and drawings for the approval of Competent Authority. The design shall match with common design standards as applicable under the jurisdiction of Competent Authority/authorized entity.
- xi. MSI shall coordinate with concerned authorities / municipalities for installation.

- xii. Poles and cabinet shall be so designed that all elements of the field equipment could be easily installed and removed.
- xiii. MSI shall ensure that physical look of the installation area returns to neat and tidy conditions after installation of poles, cantilevers etc. The placement shall be designed keeping in mind the normal flow of vehicular traffic and pedestrian movement is not disturbed.

7.2.12 UPS for field locations

- i. UPS shall serve as a backup for commercially available utility power at the intersections and shall ensure no-break functioning of all field components at each intersection in event of failure of utility power supply.
- ii. MSI shall carry out a study and identify locations to provide UPS backup, depending upon power situation across Bareilly City, to meet the camera and other field equipment's uptime requirements.
- iii. MSI shall install UPS at the identified intersections in secure, tamper-proof housing in corrosion resistant cabinets.
- iv. MSI shall ensure that the UPS is suitably protected against storms, power surges and lightning.
- v. MSI shall provide UPS for efficient heat dissipation without air conditioning. It shall be able to withstand temperatures prevalent in Bareilly throughout the year.

#	Parameters	Minimum Specifications
	Make:	
	Model:	
1.	Capacity	As per solution requirement
2.	Technology	IGBT (Rectifier & Inverter both); ECO Mode
2	Wave form & Freq	Pure Sine wave & shall have frequency converter mode
5.	converter	
4.	Display	LCD
5	Input power factor	0.99
J.	correction	
6.	Input configuration	1Ph,L-N+PE (160 to 300Vac on full load & shall support upto
		110Vac for 50% load). UPS Shall have inbuilt OVCD protection
7.	Output Power factor	0.8
8.	Frequency (Input)	40 to 70Hz frequency
9.	Frequency (output)	50Hz/60Hz frequency
10		200/208/220/230/240Vac shall be available with +/-1%
10.		regulation in battery mode

#	Parameters	Minimum Specifications
11.	V threshold	3% max full linear load, 5% max on Non-linear load
12.	Crest factor	3.0 or better
13.	Transfer time Main-Battery	0
14	Transfer time Inverter-	4 msec
14.	Bypass	
		Minimum 10A X 3 nos - Indian Socket inbuilt to the UPS back.
15.	Output Connection	One of these O/p Socket shall be Programmable with settable
		time so as to increase the back-up time for critical load
16	Monitoring software for	Shall be provided for monitoring of UPS from remote along with
10.	UPS	SNMP Card
17.	Communication	SNMP
18.	Port	USB, RS 232
19.	Battery Type	Lithium ION battery
20.	Charger	8 Amps, settable 1/2/4/6/8Amps
21.	Battery backup	Min 60 Minutes on full load
22.	Battery Make	Exide/ Rocket/ Quanta/ Leoch/ OKAYA/ Panasonic
	Environmental Parameter	
1		
23	Operating temperature	0-40 deg C with full load @ 0.9PF. Later de-rating applicable
23.	Operating temperature range	0-40 deg C with full load @ 0.9PF. Later de-rating applicable upto 50 deg C
23.	Operating temperature range	0-40 deg C with full load @ 0.9PF. Later de-rating applicable upto 50 deg C Indication required -> Over Temperature, Load on Battery,
23. 24.	Operating temperature range Other	0-40 deg C with full load @ 0.9PF. Later de-rating applicable upto 50 deg C Indication required -> Over Temperature, Load on Battery, Battery on Charge, Battery low, Mains on
23. 24.	Operating temperature range Other	0-40 deg C with full load @ 0.9PF. Later de-rating applicable upto 50 deg C Indication required -> Over Temperature, Load on Battery, Battery on Charge, Battery low, Mains on Fan Speed control (as per load & room temp) shall be possible
23. 24. 25.	Operating temperature range Other Humidity	0-40 deg C with full load @ 0.9PF. Later de-rating applicable upto 50 deg C Indication required -> Over Temperature, Load on Battery, Battery on Charge, Battery low, Mains on Fan Speed control (as per load & room temp) shall be possible 0% to 95% non-condensing
23. 24. 25. 26.	Operating temperature range Other Humidity Noise Level	0-40 deg C with full load @ 0.9PF. Later de-rating applicable upto 50 deg C Indication required -> Over Temperature, Load on Battery, Battery on Charge, Battery low, Mains on Fan Speed control (as per load & room temp) shall be possible 0% to 95% non-condensing 52 dBA max
 23. 24. 25. 26. 27. 	Operating rangetemperatureOtherImage: Image:	0-40 deg C with full load @ 0.9PF. Later de-rating applicable upto 50 deg C Indication required -> Over Temperature, Load on Battery, Battery on Charge, Battery low, Mains on Fan Speed control (as per load & room temp) shall be possible 0% to 95% non-condensing 52 dBA max Tower type only (Rack Mount type not acceptable)
 23. 24. 25. 26. 27. 28. 	OperatingtemperaturerangeOtherHumidityNoise LevelMountingAuto Start, Cold Start & EPO	0-40 deg C with full load @ 0.9PF. Later de-rating applicable upto 50 deg C Indication required -> Over Temperature, Load on Battery, Battery on Charge, Battery low, Mains on Fan Speed control (as per load & room temp) shall be possible 0% to 95% non-condensing 52 dBA max Tower type only (Rack Mount type not acceptable) Shall be available
23. 24. 25. 26. 27. 28. 29.	OperatingtemperaturerangeOtherHumidityNoise LevelMountingAuto Start, Cold Start & EPOProtection	0-40 deg C with full load @ 0.9PF. Later de-rating applicable upto 50 deg C Indication required -> Over Temperature, Load on Battery, Battery on Charge, Battery low, Mains on Fan Speed control (as per load & room temp) shall be possible 0% to 95% non-condensing 52 dBA max Tower type only (Rack Mount type not acceptable) Shall be available IP20
 23. 24. 25. 26. 27. 28. 29. 	OperatingtemperaturerangeOtherHumidityNoise LevelMountingAuto Start, Cold Start & EPOProtectionLCD Display	0-40 deg C with full load @ 0.9PF. Later de-rating applicable upto 50 deg C Indication required -> Over Temperature, Load on Battery, Battery on Charge, Battery low, Mains on Fan Speed control (as per load & room temp) shall be possible 0% to 95% non-condensing 52 dBA max Tower type only (Rack Mount type not acceptable) Shall be available IP20
23. 24. 25. 26. 27. 28. 29.	OperatingtemperaturerangeOtherHumidityNoise LevelMountingAuto Start, Cold Start & EPOProtectionLCD Display	0-40 deg C with full load @ 0.9PF. Later de-rating applicable upto 50 deg C Indication required -> Over Temperature, Load on Battery, Battery on Charge, Battery low, Mains on Fan Speed control (as per load & room temp) shall be possible 0% to 95% non-condensing 52 dBA max Tower type only (Rack Mount type not acceptable) Shall be available IP20 Input & Output Voltage, Input & Output Frequency, Bypass:
23. 24. 25. 26. 27. 28. 29.	OperatingtemperaturerangeOtherHumidityNoise LevelMountingAuto Start, Cold Start & EPOProtectionLCD Display	0-40 deg C with full load @ 0.9PF. Later de-rating applicable upto 50 deg C Indication required -> Over Temperature, Load on Battery, Battery on Charge, Battery low, Mains on Fan Speed control (as per load & room temp) shall be possible 0% to 95% non-condensing 52 dBA max Tower type only (Rack Mount type not acceptable) Shall be available IP20 Input & Output Voltage, Input & Output Frequency, Bypass: Voltage & Frequency, Remaining time & Battery Level Indicator,
23. 24. 25. 26. 27. 28. 29. 30.	OperatingtemperaturerangeOtherHumidityNoise LevelMountingAuto Start, Cold Start & EPOProtectionLCD DisplayMeasurements (On LCD)	0-40 deg C with full load @ 0.9PF. Later de-rating applicable upto 50 deg C Indication required -> Over Temperature, Load on Battery, Battery on Charge, Battery low, Mains on Fan Speed control (as per load & room temp) shall be possible 0% to 95% non-condensing 52 dBA max Tower type only (Rack Mount type not acceptable) Shall be available IP20 Input & Output Voltage, Input & Output Frequency, Bypass: Voltage & Frequency, Remaining time & Battery Level Indicator, Load Level indicator, Fault codes, Estimated or running
23. 24. 25. 26. 27. 28. 29. 30.	OperatingtemperaturerangeOtherHumidityNoise LevelMountingAuto Start, Cold Start & EPOProtectionLCD DisplayMeasurements (On LCD)	0-40 deg C with full load @ 0.9PF. Later de-rating applicable upto 50 deg C Indication required -> Over Temperature, Load on Battery, Battery on Charge, Battery low, Mains on Fan Speed control (as per load & room temp) shall be possible 0% to 95% non-condensing 52 dBA max Tower type only (Rack Mount type not acceptable) Shall be available IP20 Input & Output Voltage, Input & Output Frequency, Bypass: Voltage & Frequency, Remaining time & Battery Level Indicator, Load Level indicator, Fault codes, Estimated or running autonomy time, UPS alarm enable or disable, Overload, Short

#	Parameters	Minimum Specifications
31.		Bus start fail, Bus over & under, Inverter soft start failure,
		Inverter voltage high & low, Inverter output short, Battery
	Fault Indication (On LCD)	voltage high & low, charger output short, over temperature,
		overload, charger failure, over input current, over input current,
		battery not connected, over charge, EPO enable, Programmable
		output enable.
		Inverter voltage & frequency, Frequency converter, ECO mode,
		ECO voltage range, Bypass setting, Bypass voltage range,
		Autonmy limitation setting, Battery total Ah setting, Charger
22	Sattable data	current, Bypass frequency range, Programmable outlet,
52.	Settable data	Programmable outlet setting, Charger boost & float voltage
		setting, EPO logic setting, Isolation transformer O/P(if
		applicable), Display setting for autonomy, Acceptable input
		voltage range.
33.	Manufacturer	ISO9001-2015 & 14001 for UPS manufacturers
24	Droduct	BIS. Product should tested for Damp heat test, Dry test & Cold
34.	Product	test report from any Govt agency
25	Management Supports	Windows, Linux, Unix
35.	/Software	

7.2.13 Outdoor Cabinets / Junction Boxes

- Each intersection shall be fitted with outdoor cabinets dimensioned to host all equipment necessary to operate enforcement systems and traffic surveillance systems as defined in this RFP
- ii. MSIs shall reserve additional room in the intersection controller cabinet to accommodate the future system requirements
- iii. The size of outdoor cabinet / Junction Boxes shall be sufficient to house all the system components, which may be installed at the intersection or nearby. Boxes shall be dustproof and impermeable to splash-water. They shall be suitable for Bareilly's environmental conditions. They shall have separate lockable doors for:
 - a. Power cabinet: This cabinet shall house the electricity meter, online UPS system and the redundant power supply system
 - b. Control cabinet: This cabinet shall house the controllers for all the field components at that particular location e.g. ANPR, PTZ, RLVD, FRS, Fixed cameras etc.

- iv. Internal cabinet cabling shall be designed for an easy connection and disconnection of the equipment and power
- v. The cabinets shall be of robust construction and shall include 2-point security-locking mechanisms or better to prevent unauthorized access to the field equipment
- vi. Temperature and Humidity Control: All enclosure compartments shall be equipped with a natural convection air circulation system via provision of air circulation filters that shall not require maintenance and shall allow free circulation of air inside the enclosures to prevent overheating as well as the build-up and effects of humidity and heat, without permitting the entry of elements that might endanger system operation
- vii. MSI shall ensure that all the hardware is placed inside the junction boxes that could withstand temperatures prevalent in Bareilly throughout the year

7.2.14 Civil and Electrical Works

- i. MSI shall be responsible for carrying out all the civil and Electrical work required for setting up all the field components of the system including:
 - a. Preparation of concrete foundation for MS-Poles and cantilevers
 - b. Laying of GI Pipes (B Class) complete with GI fitting
 - c. Hard soil deep digging and backfilling after cabling
 - d. Soft soil deep digging and backfilling after cabling
 - e. Chambers with metal cover at every junction box, pole and at road crossings
 - f. Concrete foundation from the Ground for outdoor racks
- ii. MSI shall provide city to the cameras through the aggregation point. Since this component has dependency on approval from local authorities, it is recommended that MSI plans this requirement well in advance and submits the application to the concerned electricity City distribution agency with requisite fees, as applicable
- iii. MSI shall carry out all the electrical work required for powering all the components of the system
- iv. Electrical installation and wiring shall conform to the electrical codes of India
- MSI shall make provisions for providing electricity to the cameras (ANPR, PTZ, and Fixed) via
 SJB (Surveillance Junction Box), housing the UPS/SMPS power supply, with minimum backup as defined in this RFP
- vi. For the wired Box cameras, MSI shall provision for drawing power through PoE (Power over Ethernet), while PTZ cameras shall be powered through dedicated power cable laid separately along with STP/SFTP cable

- vii. Registration of electrical connections at all field sites shall be done in the name of the Competent Authority.
- viii. MSI shall house the electricity meters inside the power cabinet as mentioned in the controller Cabinet section as above.

8 Smart Elements

8.1 Public Address System (PAS)

- 1. The Public Address System (PA) shall be capable of addressing citizens at specific locations from the ICCC.
- 2. The proposed system shall contain an IP-based announcing control connected to the ICCC.
- 3. Public Address system shall be used at intersections, public places, market places or those critical locations as identified by BSCL to make important announcements for the public.
- 4. The system shall contain an IP based amplifier and uses PoE power which shall drive the speakers. The system shall also contain the control software which shall be used to control/ monitor all the components of the system which include Controller, Calling Station & keypad, Amplifier (Mixing & Booster).
- 5. It shall be able to broadcast messages across all PA systems or specific announcement could be made to a particular location supporting single zone / multi zone operations.
- The system shall also deliver pre-recorded messages to the loud speakers attached to them from CD/DVD Players & Pen drives for public announcements.
- 7. The system shall contain an IP-based amplifier and uses PoE power that could drive the speakers. The system shall also contain the control software that could be used to control/monitor all the components of the system that includes Controller, Calling Station & keypad, Amplifier (Mixing & Booster).
- 8. PA system's master controller shall have function keys for selecting the single location, group of locations or all locations, simple operation on broadcasting to any terminal or separated zones.
- 9. PA system's master controller should facilitate multiple MIC inputs and audio inputs.

Scope of Work

- The broad scope of work to be covered under this sub module will include the following, but is not limited to:
- MSI shall install IP based Public Address System as part of the information dissemination system at 25 locations (the location details will be shared & finalized with the successful MSI) in the city. These systems shall be deployed at identified junction to make public interest announcements.
- The system deployed shall be IP based and have the capability to be managed and controlled from the ICCC
- 4. MSI, in consultation with BSCL can propose alternate locations apart from the locations mentioned in this RFP for installing the PA system where their effectiveness in communicating information about traffic conditions in BSCL will be maximized.

- 5. BSCL shall review and approve the proposed locations. MSI shall install the PA system on the approved locations.
- 6. 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.

Technical Requirement for Public Address System

#	Parameter		
	Make:		
	Model:		
	Should have the capability to control individual PAS i.e. to make an announcement at select		
1.	location (1:1) or multiple locations (1: many). The PAS should also support both, Live and		
	Recorded inputs		
	Field Side Equipment		
2.	IP amplifier with minimum 50 Watts, Class D.		
3.	Native IP connectivity, no convertors to be used		
4.	0 to 55 C Temperature rating for Amplifier		
5.	Automatic Volume Control		
6.	Frequency Response: 50Hzto 15000 Hz for Amplifier		
7.	2Inputs and 1 Output relay contacts in Amplifier		
8.	Speaker: Minimum 2 Speakers 20 W capacity		
9.	Frequency Response of Speaker 350 -10,000Hz		
10.	Line Monitoring Facility for speakers		
11.	IP 55 Housing for amplifier		
12.	Control room Side Equipment		
12	Central Software based server application capable of working on virtual environment/cloud		
15.	with 100% redundancy for DC & DR		
14.	Access control mechanism would be also required to establish so that the usage is regulated.		
15.	Integration with VaMS and Command and control centre or any other component if required		
16	PA Master Controller to have facility for multiple mic inputs, direct dialing buttons, LCD		
10.	screen		
17.	Software Client for making Calls to PA and ECB		
18.	Automatic Volume Control, Call recording of all PA announcements with date and time		
19.	Transmission bandwidth16000 KHz		

#	Parameter
20.	Operating temperature for control desk 0 to +60C

8.2 Emergency Call Box

A high-quality digital transceiver, to be placed at certain key locations determined by Bareilly Police Department. Key is to make it easily accessible by public.

The unit shall preferably have a single button which when pressed, shall connect to the ICCC over the existing network infrastructure setup for CCTV Surveillance system. MSI will supply, install & implement the ECB at 6 locations (the location details will be shared & finalized with the successful MSI)

#	Minimum Specification
Make:	
Model	:
1.	Construction: Cast Iron/Steel Foundation, Sturdy Body for equipment
2.	Call Button: Watertight Large Push Button, Visual Feedback for button press
3.	Connectivity: GSM/RF/PSTN/Ethernet as per solution offered
4.	Sensors: For tempering/ vandalism
5.	IP66, IK09 Protection
6.	Operating Temperature 0 to 70 C
7.	Speaking Distance minimum 5 ft
8.	Inbuilt Class D Amplifier
9.	Minimum 3 Inputs ad 2 Output relay contacts
10.	ECB should be able to make calls to the PA system
11	Central Software based server application capable of working on virtual environment/cloud
	with 100% redundancy
12	Access control mechanism would be also required to establish so that the usage is
12.	regulated.
13.	Integration with VaMS and Command and control centre or any other component if
13.	required
14	PA Master Controller to have facility for multiple mic inputs, direct dialling buttons, LCD
	screen
15.	Software Client for making Calls to PA and ECB
16.	Automatic Volume Control

#	Minimum Specification
17.	Transmission bandwidth16000 KHz
18.	Operating temperature for control desk 0 to +60C

8.3 Environmental Sensor

Environmental sensors are for monitoring various parameters that have environmental impact on the city such as temperature, humidity, wind speed, rainfall and pollutants. Current plan is to propose environmental sensors at 3 locations in with in Bareilly City (list of location details is enclosed with separate annexure along with this document).

Environmental parameters, specifically air and noise pollution, are a major concern for the citizens and administrators of any city. As Bareilly aspires to also be an environmentally sustainable smart city, integrated environmental monitoring stations comprising of various sensors shall be implemented. The objectives of the system include:

- Integrated ambient air and noise pollution monitoring stations comprising of various environmental sensors for monitoring and trending of various ambient air and noise parameters;
- Tracking of environment with respect to these parameters and adjusting any framework for the city;
- Environmental sensors shall be integrated with ICCC for central monitoring and analysis;
- Environmental sensor parameters shall be available through City Portal and Applications for citizens as part of 'open data' initiative and to create citizen awareness.

Business Requirements

- Environment monitoring shall be done for tracking that the pollution and noise levels are within the acceptable limits.
- Display of parameters to citizens to create awareness and support 'open data' initiatives
- Establish frameworks for regulating these parameters in terms of any supporting initiatives for maintaining acceptable levels.
- Central monitoring at SCOC, city mobile application and website in an integrated manner.

8.3.1 Functional & Technical Requirement of Environmental Sensor

- Environment sensors will enable citizens and administrators to gather the air quality information in the city and to keep a check on their endeavors which impact environment and enable the city to take remedial action if required.
- Smart environment sensors will gather data about air quality, ambient conditions (temperature and humidity), levels of gases in the city (pollution) on an hourly and

subsequently daily basis. It is for information of citizens and administration to further take appropriate actions during the daily course / cause of any event.

- Environmental sensor shall be ruggedized enough to be deployed in open air areas such as streets and parks.
- Mounting of the environmental sensor shall be co-located on streetlight pole.
- Variable Message Display Boards (VMDs) installed at identified strategic location shall be used to display environmental parameters along with other promotional messages.
- The software should display real time and historical data in chart and table views for dashboard.
- Software shall display trends of environmental parameters based on specific time periods.
- It shall be possible to configure and calibrate the sensors through the software from a remote location.
- Alarms shall be generated for events where the environmental parameters breach the safe or normal levels.

#	Parameter	Minimum Requirement
	Make:	
	Model:	
		Smart environment sensors will enable citizens and administrators to gather
		the air quality information in the city and to keep a check on their endeavors
		which impact environment and enable the city to take remedial action if
		required.
1.	Functional	Smart environment sensors will gather data about air quality, ambient
		conditions (temperature and humidity), levels of gases in the city (pollution)
		on an hourly and subsequently daily basis. It is for information of citizens and
		administration to further take appropriate actions during the daily course /
		cause of any event.
		a. These environmental sensors can also be connected via 4G/3G/2G
	Basic	wireless network or Wi-Fi networks. It is not mandatory to connect all
	Requirement	sensors via MPLS fiber network.
2.	of	b. The data should be collected in a software platform that allows third
	Environment	party software applications to read that data through REST APIs. Various
	Sensors	environment sensors shall sense the prevailing environment conditions
		and send the data to the integrated control system where real time data

#	Parameter	Minimum Requirement	
		resides and the same shall be made available to various other	
		departments and applications for decision making. It is preferred if the	
		platform also includes intelligent analytical engines that makes	
		information meaningful to all stakeholders and helps ease decision	
		making.	
		c. The sensor management platform should allow the configuration of the	
		sensor to the network and also location details etc.	
		d. The sensors should be able to be managed remotely. This includes	
		sensors being updated with calibration parameters, software upgrades if	
		any. Sensors must also provide updates and detect faults with self-	
		diagnosis functionality.	
		e. Apart from information provision, the sensors must ensure data is	
		transmitted securely and have security measures from sensors to the	
		software platform. It should also ensure tamper detection mechanism in	
		cases of vandalism, security breaches, etc.	
	Environment	a. They should be ruggedized enough to be deployed in open air areas, on	
	Sensors	streets and parks	
3.	Capability &	b. They should be able to read and report at least the following	
	Measurement	parameters: Temperature, Humidity, Ambient Light, Sound, UV,	
	Elements	Pressure, CO, CO2 NO2, O3, SO2 with compulsorily PM 2.5 and PM 10.	
		NO2: 0 – 10 ppm	
	Measurement component with Measurement range (must measure required ranges)	O3 : 0 – 1000 ppb	
		SO2 : 0 – 20 ppm	
		CO : 0 – 1000 ppm	
		CO2 : 0 - 5000ppm	
4.		PM 2.5: 0 to 250 micro gms/cu.m	
		PM 10: 0 to 450 micro gms/cu.m	
		Light: up to 10,000 Lux	
		Noise: up to 100 dB (A)	
		UV: 1 to 15 UVI	
		As per central Pollution control board guidelines	
	Temperature,	Real-time Temperature Range: outdoor 0ºC ~ 50ºC	
5.	Pressure and	Real-time in Air Humidity Level Display	
L			

#	Parameter	Minimum Requirement	
	Humidity	Real-Time Pressure Display (in Bars or millibars)	
	Sensor		
6.	Connectivity	Wi-Fi / 4G / 3G / 2G	
	(Minimum)		
7.	Software and	Backup measurement data for upto 5 days in case of network failure or system	
<i>·</i> ·	Data backup	maintenance cycles	
8	Mechanical	Single enclosure with all components inside or simplified mounting and	
0.	Enclosure	should be Compliant as per IP-64	
	Data validity	Sensors must ensure data of sensors is valid and not require stabilization	
9.	and	times in case of power outages less than 5 hours.	
	stabilization		
10.	Certificates	The Environmental Monitoring System should be certified as per CE.	
	OFM	A. OEM should have the following certificates:	
11	Qualification Criteria	a. ISO 9001:2015	
11.		b. ISO 27000:2013	
		B. OEM should be located in India and product should be "Made in India".	

8.4 Variable Messaging Display (VMD)/ Outdoor Display

- Variable Messaging Display (VMD) Variable Messaging Display (VMD)/ Outdoor Display shall communicate important information & guidance about traffic, diversions etc. to the citizens / public on the road. They shall also be used for showing emergency/disaster related messages as and when required. MSI will supply, install, implement the 16 Nos of VMD Outdoor display in Bareilly (List of location will be finalized during implementation phase)
- VMD/outdoor displays shall be installed at identified strategic locations. The MSI shall describe in detail the design, operational and physical requirements of the proposed Variable Message Signboards to demonstrate compliance with all the specified requirements in this RFP.
- VMD/outdoor displays unit shall be able to communicate with the City Operation and Monitoring Centre (ICCC) using GSM Data/ Wi-Fi/ Ethernet/SMS Channel. GSM data channel (GPRS) / Wi-Fi shall be used to send online messages and SMS channel shall be used to send configuration packets to configure the SIM. Ethernet port shall also be extended to ground level using necessary cables for local troubleshooting. Each unit shall be provided with a unique identification number and shall communicate with the Integrated Command and Control Centre System (ICCC).

 VMD/outdoor displays shall be managed and operated from the City Operation and Monitoring Centre (ICCC) system using handled by a server where information in the form of data messages shall be fed in a manner to be displayed on a specific VMD/outdoor display installed at a particular location or across all locations. The VMD/outdoor displays boards shall be viewable from a distance of 100m and various angles on the road.

8.4.1 Functional Requirement for VMD

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

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

8.4.2 Technical Requirement for Outdoor VMD

#	Parameters	Minimum Requirement	
	Make:		
	Model:		
1.	Display Size (W x H)	Minimum 2.8 m x 1.9m or bigger	
2.	Pixel Pitch	8 mm or better (Lower pitch is regarded as better)	
3.	LED Configuration	RGB 3 in 1 SMD	
4.	Pixel Density Minimum 15,625 pixels per sqm or higher		
5.	Half Gain Horizontal /	H 140 deg / V 90 deg or better	
5.	Vertical Viewing Angle		
6.	Refresh Rate	>1920 Hz or better	
7.	Temp Range	-10 to +50 Degrees C or better	
8.	Gray Scale Processing	15 Bit or better	
9	Brightness	5500 cd/m² or better	
5.	(Calibrated)		
10	Maximum Power	850 w/sam or lower	
10.	Consumption		
11.	Dimming Capability	256 levels	
12.	Power Input	100 ~ 240 VAC	

#	Parameters	Minimum Requirement
	Individual	
13.	Tile/Cabinet	960 mm (W) x 960 mm (H) x 141±2 mm (D)
	Dimensions	
14.	Contrast Ratio	2000:1 or better
15	Access For	Rear
15.	Maintenance	
16.	IP Level	Front IP65 / Rear IP54
		1. The OEM/OEM Indian subsidiary of the Outdoor Direct View
		LED display should have minimum 75 Outdoor LED displays
17	Pre-Qualification	installed (similar or bigger size) in India(Government/PSU's)
17.	Criteria for OEM	all of which are connected to a single network and controlled
		centrally with content also being published centrally on all
		the displays.
	International Safety	
	Certifications	
18.	(Certificates to be	CE, UL, FCC, BIS and CB
	submitted along with	
	the product delivery)	
		Suitable power distribution to be provided inside the board to
19.	Power Supply	handle the led screen. It should be possible to switch the screen
		on or off from a central location
Mecha	nical Structure For Mour	nting Of Variable Message Display (VMB) System
		VMB should be mounted on unipole cantilever Structure and
		should be earthed properly and provided with lightning arrestor
		as well. Drawing to be approved by the department before
20.	Mounting Structure	fabrication and installation. The base of the LED shall be at a
		height of 6 meter from the ground. Foundation laying is also
		included in our scope. Structure is to be certified by the structural
		engineer.
		Should be made from mild steel and painted black along with
21.	Material	antirust coating.
Conter	nt Management Server w	ith Software for Variable Message Display (VMD) System

#	Parameters	Minimum Requirement
22.	Signage & Content Manager (Software & Hardware)	To be able to create playlists and send them over the network to 300 media players or more for playout based on schedule and sequencing. This software to be loaded on suitable hardware to be supplied by the vendor
23.	License support	The software should support management of more than 300 players
24.	Playlist Automation	Flexible scheduling based on day, date and time; Playlist Scheduling;
25.	Content Distribution	Scalable, simultaneous publishing, at least 100 simultaneous subscribers
26.	Content Management	Design simplified user interfaces

Note: Minimum Specifications has been mentioned for outdoor VMD. However, MSI shall propose the fitting and fixture as per requirement for outdoor installation.

8.5 Solid Waste Management

Any material which is discarded and not in liquid or gas form is known as solid waste. Solid waste management plays vital role in defining city's cleanliness status and in turn provides measures of lesser pollution and better health conditions of citizen. BMC has already initiated door to door collection in 31 wards out of 70 wards with overall coverage 45% households in the city. Collection of solid waste from dumping site to landfill site is being done by Municipal Corporation vehicles. BMC is in search of solutions which can increase operational efficiency of waste collection and monitor regularity of collections. Waste cycle starting from collection to recycling is monitored with the help of solid waste management software.

The MSI to ensure the following compliance:

The Union Ministry of Environment, Forests and Climate Change (MoEF & CC) recently notified the new Solid Waste Management Rules (SWM), 2016.

MSI would ensure waste collection along with automated rooster for waste collection schedule.

The broad scope will cover followings

- Door to Door Solid Waste Collection project of 10,000 no's of Bins enabled with RFID Tags.
- However 30 nos' of RFID reader device/ Handheld devices for Door to Door Collection RFID
 Tag, RFID Reader and GPS devices for 30 nos of Solid Waste Collecting Vehicle
- Solid Waste Management Application
- Vehicle Tracking Application



8.5.1 Overview

Door to Door Collection

- Visual monitoring of routes being followed by vehicles
- Report in case of points missed and area served
- Tracking route repetition
- Unwanted Idle time/Stoppage monitoring

Storage/ Community Bin Collection

- o Efficient monitoring and management of waste collection bins
- o Identify deviations in operations

Real time management of missed collection points

- Monitor and map all vehicles with real time recording of data.
- o Alert in case of missed points
- o Generate an alert if unauthorized movement occurs

Biometric Workforce attendance monitoring system

- o Biometric devices for taking attendance of sweepers
- o Stationary biometric devices for office location
- o Transparency in monitoring attendance and working hours of staff

Integration with Weighing System

- o Real-time weighing details from dumping yard
- o Per vehicle garbage collection details

Integration with Smart City Platform

- o Common data structure across all smart city component
- API integration with smart city platform

H/W for Solid Waste Collection Process

- I. All garbage collecting & transferring vehicles need to be fitted with GPS devices, RFID Tags and RFID Reader mounted over it.
- II. RFID Tags on Door to Door Collection Points/Bins
- III. All Community Bins / Container Bins need to be fitted with RFID Tags.
- IV. Biometric attendance devices have to be given to supervisor staff.
- V. Premise biometric attendance devices needs to be fitted at office location.
- VI. MSI needs to do integration with existing/upcoming Weighbridge, Entry/exit boom Barrier, Traffic Light, IP Camera etc.

8.5.2 Functional Requirement:

1) Door to Door Collection

- Bins placed at door will have RFID tag mounted on it.
- Waste Collectors will have RFID reader/ Handheld device with them to keep the track of waste collected from home or society.
- On collecting waste from household locations, RFID tags from bin get read by RFID reader/ Handheld device.
- On collection of waste from RFID bin, data of served bin will be sent to application server with the help of GPRS network.
- Missed bin will get notified in reports along with its area/zone/ward details at the end of day.

2) Commercials site Bin Collection

Various storage bins are placed thought the city with passive RFID tag mounted over it. On collecting of waste from such bins, RFID tag of such bins will be read with the help of RFID reader and passes information to server.

- Commercials site Bin should have RFID tag mounted over it.
- After collecting garbage from storage bins, real time data will be sent to server with the help of RFID reader and RFID tag.
- Application server will use this data from database server to generate reports and alerts for missed storage bins.
- User at application level will be able to access such reports and alerts based on his/her access rights.
- 3) Integration with Weighbridge Application

- RFID reader should be installed at weighbridge site.
- When vehicle arrives on weighbridge, RFID reader will identify the vehicle and sends information to Central server.
- Weighing information should also be capture from Weighbridge Application (if any available) and same data should be interfaced with Central Server through broadband connectivity.
- Weigh bridge solution needs to be integrated with GPS based fleet monitoring solution and relevant report needs to be generated from the application

4) Biometric Attendance System

- Hand-held biometric devices are used to take the biometric attendance of sweepers and workers working on streets.
- Premise biometric devices are stationary devices and can be used to take the attendance of workers at office premises.
- All such attendance details will be sent to application server on real time basis and appropriate reports can be viewed on application.

5) Integration with Smart City Platform

- All the required data should be sent to smart city server in the form of API.
- Data structure between solid waste management platform and smart city platform should be in coherence to generate city wide reports and analytics.

Features

- SWM Application
- Central Statistics / MIS: Zonal Waste Collection Summary
- Should show total no of wards per Zone
- Should show total no of Transporters/Contractors per Zone for MIS Duration Selected
- Should show total no of Complaints per Zone for MIS Duration Selected
- Should show total no of Active Vehicles v/s Planned Vehicles in case of MIS for single Day
- Should show total no of Avg. Active Vehicles v/s Avg. Planned Vehicles in case of MIS for Duration
- Should show total no of Bins Collected v/s Bins Planned in case of MIS for single Day
- Should show total no of Avg. Bins Collected v/s Avg. Bins Planned in case of MIS for Duration
- Should show total no of Bins Lifted v/s Bins Planned in case of MIS for single Day
- Should show total no of Avg. Bins Lifted v/s Avg. Bins Planned in case of MIS for Duration
- Should show total no of Completely Served Routes v/s Planned in case of MIS for single Day

- Should show total no of Avg. Served Routes (completely) v/s Avg. Planned in case of MIS for Duration
- Should show cumulative Waste Dumped in case of MIS for single Day
- Should show Avg. (Daily) Waste Dumped in case of MIS for Duration

Waste Segregation Statistics

- Should have facility to add/edit/delete waste type in system.
- Should allow configuring door to door bins according to storage type.
- Should allow configuring storage bins according to waste type.
- Should have facility to assign vehicle based upon waste type.
- Should have facility to show statistics based upon waste type.
- Should show total weight of waste collected as per waste type.

Smart Bin Statistics

- Should allow to configure bin level for empty, half and various alert level.
- Should able to generate alerts on various configuration level
- Zonewise/ward wise/area wise bin level should be shown on real time basis
- Collection of storage bins based upon its level details should be made available
- Should have facility to show real time bin capacity v/s bin fulfillment
- Should have facility to show bins on GIS map with its status. MSI shall conduct the survey with BSCL to get lat/long of Bin locations.
- Should have functionality of filtering based upon zone/ward/area.
- Should have functionality of filtering based upon bin levels.
- Should show served bin and missed bin details with different color legend on GIS map.
- Should be able to generate and display average time for fulfilling bin.

Weighing Statistics / MIS: Weighbridge wise Weighing Information

- Should show Weighbridge ID & Name (i.e. Weighbridge ID which is performing Gross Weight)
- Should show Zone wise Waste Collected at each Weighbridge in case of MIS for single Day
- Should show Zone wise Avg. (Daily) Waste Collected at each Weighbridge in case of MIS for Duration
- Should show Zone wise Transporter wise Waste Collected at each Weighbridge in case of MIS for single Day
- Should show Zone wise Transporter wise Avg. Waste Collected at each Weighbridge in case of MIS for Duration

Field Workforce Registration Details

- Should have facility to register field workforce with its relevant details including biometric information and photo ID
- Should have functionality of add/edit/delete for workforce management.
- Should able to register workforce based upon their respective ward/zone/area.
- Should able to filter/group details based upon ward/zone/area.
- Should be able to register the workforce according to their type and role.
- Should have functionality of adding details of attendance in system against each registered workforce on day to day basis.
- Should able to generate ward/zone/area wise report of attendance as and when needed.
- Should have functionality of export to excel or export to pdf.

Live Zonal Dashboard

Zonal Summary

- Should show total no of Wards
- Should show total no of Transporters with Names
- Should show total no of Complaints
- Should show total no of Active Vehicles v/s Planned
- Should show total no of collected Bins v/s Planned as per preconfigured schedule
- Should show total no of lifted Bins v/s Planned as per preconfigured schedule
- Should show total no of completely served Routes v/s Planned
- Should show Zone wise Waste dumped at Dumping Site

Ward Summary

- Should show Ward Name
- Should show total no of Active Vehicles v/s Planned
- Should show total no of Collected Bins v/s Planned as per preconfigured schedule
- Should show total no of Bins Lifted v/s Planned as per preconfigured schedule
- Should show total no of Routes Served (Completed) v/s Planned as per preconfigured schedule

Vehicle Summary

- Should show Transporter Name
- Should show Vehicle Number
- Should show Driver Name

- Should show Vehicle's Current Status (Running, Idle, Breakdown)
- Should show Trip Summary like; Trip Start time, Trip End time, Planned Ward, Planned Route, Current Location (Live Location), & Trip Status (i.e. Trip Ongoing, Trip Completed, Vehicle Breakdown on Trip, Running on unscheduled Route)
- Should show GSM Connectivity Status (i.e. Connected or Disconnected)
- Should show GPS's connectivity with Vehicle's Battery (i.e. Connected or Disconnected), In case of Disconnected will show remaining Battery of GPS device
- Should show vehicle's Avg. Running Speed for current Trip
- In case of Chhota Hathi, Bins Collected v/s Planned shown to user. In case of Bin Lifters Bins Lifted v/s Planned shown to user. In case of Compactor/Dump Trucks, Trips Completed and waste Dumped information will be shown to user.
- Vehicle wise TPM Sheet Summary will be shown to user, which shall involve POI sequence no, POI name, Collection Status (Served/Unserved), Planned Collection Time v/s Actual Collection Time.

Bin Summary

- Should show storage bin ID with its zone/ward/area
- Should show live levels of storage bins
- Should show zone/ward/area wise served bin's details on map
- Should show zone/ward/area wise un-served bin's details on map
- Should show zone wise/ward wise/area wise bin summary (like total number of bins, number of empty bins, number of half-filled bins, bins reached at alert level etc)
- Should show average filling time of individual bins.

Attendance Summary

- Should show zone/ward/area wise attendance details based on user rights.
- Should show number of total staff v/s number of actual working staff of a day based upon user rights
- Should have facility to export to excel and export to PDF for downloading attendance summary.

Complaint Dashboard

- Should have facility to view the complaint registered by citizen through mobile application with all relevant details (like registered person's name, complaint location, purpose, photo etc).
- Should have facility to replay and take action (or handle) against registered complaint.

- Should have facility to track the status of registered complaint v/s served complaint thought the city.
- Should have facility to check ward/area/zone wise registered complaint v/s served complaint.
- Should have facility to export to excel and export to PDF for downloading complaint summary.
- Map Operations

Map Operations (Live Individual Vehicle)

- Should Display Planned Route and Collection POIs in gray Scale. Tool tip will show Planned Start time, Planned End Time & POI Name. POI Served/Un-served Status shall not be available initially.
- Should Display Vehicles Actual Position. Served and Un-served Bins will be highlighted. Tool Tip will show POI Name, actual Collection time & Collection Status.
- Should show Vehicle Summary; Trip Start Time, Trip End Time, Total KM travelled, Total served POIs and unnerved POIs.

Map Operations (Route Replay of Individual Vehicle)

- Should Display Planned Route and Collection POIs in gray Scale. Tool tip will show Planned Start time, Planned End Time & POI Name.
- Should Display Vehicles actual Routes over Planned Route in Green Scale. Served and Unserved Bins will be highlighted. Tool Tip will show all above information with actual start/end time & Collection Status.
- Should show Vehicle Summary; Trip Start Time, Trip End Time, Total KM travelled, Total served POIs and unnerved POIs.
- Should show Transit history of Time duration selected; which shall be 1 Date only (under 24 hours i.e. 12:00 AM to 11:59:59 PM)

Map Operations (Zonal Vehicles Current Location & Status)

- Should show geo-fences for Zone, Ward, Transfer Station, Parking Point, Weigh Bridges, Dumping Site, Collection POIs
- Show all zonal vehicles at their Current Location and Current Status (I.e. Running, Idle, Breakdown)

Map Operations (Route Replay for Specific Vehicle)

- Should allow user to select Zone, Transporter, Vehicle Type, wise Vehicle Number for Route Replay
- Should allow user to select Day & Time Duration of Route Replay

• Should show Vehicle's Transit History with POIs Served / Un-served

Map Operations (Waste Collection Status)

- Should show Zone wise Bins Served or Un-served for any specific Day. Will Allow Day Selection Facility.
- Should show Collection Status of 24 hours i.e. 12:00 AM to 11:59:59 PM of any specific day
- Tool Tip of any Point will show POI Name, Assigned Vehicle, Assigned Route, Appointed Transporter, Collection Status, Collection Time in case of served Bins

Map Operations (STP Vehicle Status)

- Should allow user to select Zone, Vehicle Type, wise Vehicle Number for Route Replay
- Should allow user to select Day & Time Duration of Route Replay
- Should show Vehicle's Transit History with Manhole Served / Un-served
- Should show Vehicle's stoppage details with stoppage time

Map Operations (Complaint Status)

- Should allow user to select zone, ward, area details for viewing complaint
- Should allow user to select Date & time for viewing complaint status
- Should show geo-location of complaint registered with all its details.
- Should show complaint status (i.e. served, remaining, under process etc) on map.
- Should show details of vehicle & concerned person in case of served complaint status.

Field Staff Centric Mobile Application

- Should have facility to access the application based on username and password provided by authorities of corporation (with adequate user role and rights)
- Should show zone/area/ward wise waste collection statistics based on selection of date/week/month
- Should show details of zone/ward/area wise vehicle's summary based on vehicle's current status (i.e. running, idle, no communication, stand by etc)
- Should show details of ward/area/zone wise missed points, missed collection bins and route violation based on selection of date/week/month.
- Should give alert/notification on preconfigured bin's threshold level attain (based on user role)
- Should have facility to check the complaint registered by citizen and its status.
- Should have facility to locate place details whose complaint is registered by citizen.
- Should have facility to check STP and sweeping vehicle's statics details.

• Should have facility to check daily attendance details of field workforce.

8.5.3 Technical Requirement for GPS Device

#	Parameters	Minimum Specification
	Make:	
	Model:	
1.	GPS Receiver	Minimum 16 channels
2.	GPS reacquisition	Cold start <= 42 Sec, Warm
	functionality	Start < 35 sec, Hot Start <= 2 Sec
3.	GPS Tracking	-165 dBmtyp
	Sensitivity	
4.	GPS Velocity Accuracy	< 0.01 m/sec
5.	GPS Navigation	-148 dBmtyp
	Sensitivity	
6.	GPS Navigation Update	1 Second
7.	GPS Data Format	Support WGS – 84
8.	GSM/GPRS Band	GSM/ GPRS SMT quad band and UMTS (3G)
٩	Data Acquisition and	Data packets shall have configurable fields - Unit ID, Latitude,
9.	Transmission	Longitude, Speed, Time Stamp, Orientation, GPS fix, Alert Status.
10	Power Supply	Power Supply input support 7 V to 32 V DC battery and shall be
10.	rower suppry	powered by vehicle battery and not ignition
11	Alorts & Notifications	Shall be programmed to provide Alerts on power supply disconnect,
11.	Alerts & Notifications	speed violation, device tampering etc.
12.	Rating	22 tracking / 66 acquisition minimum
12	Device 1/0	GPS tracking device should have minimum 3 digital input and One
13.		Analog input and One input for SOS

8.5.4 Technical Requirement for RFID Tag

#	Parameters	Minimum Specification
	Make:	
	Model:	
1.	Туре	ABS, High Quality Engineering Plastic
2.	Supported	ISO18000-6C EPC Class 1 GEN2
	Transponders	

#	Parameters	Minimum Specification
3.	Frequency	ISM 865~928 MHz
	Range	
4.	Operation	Fixed Frequency or FHSS Software Programmable
	Mode	
5.		Tag shall support ISO18000 6C protocol standard 512 Bits storage capacity,
	Memory	1728 Bits (216bytes) writable user area; MR6730B metal supports EPC C1
	capacity	GEN2 (ISO18000-6C), with 96Bits writable EPC Code area, 512Bits writable
		user area, and 32Bits password area, EPC 128 bit user 512 bit TID 96 bits.B9
6.	Reading Rate	Software Programmable, Average Reading per 64 Bits < 10ms
7.	Tags material	Metal material
8.	Reading	Shall be able to be calibrated (to be kept as 4 - 6 m max) based on the site
	Range	visit
9.	Operation	0°C to 60°C
	Temp	
10.	IP	IP 68
	Classification	
11.	Weather	Heat, dust proof, UV resistant& sea water resistant

8.5.5 Technical Requirement for RFID Reader Device

#	Parameters	Minimum Specification
	Make:	
	Model:	
1.	Protocol	ISO18000-6C EPC GEN2
2.	Configuration	Shall support Over The Air (OTA) firmware upgrade Shall be configurable
		for mixed or single tag-type operation
2	Frequency	Standard ISM 902 928MHz or 915 MHz (US FCC), 865 MHz (ETSI 302-208),
3.	Range	and 869 MHz (ETSI 300-220)
4.	Operation	FHSS
	Mode	
5.	RF Power	0~30dBm, software adjustable
6.	Reading Speed	Software Programmable Average Reading per 64Bits <6ms
7.	Reading Mode	Timing or Touch, Software Programmable (reading shall be such that the
		reader does reads two tags at a time)
#	Parameters	Minimum Specification
-----	-----------------	--
8.	Communication	Wifi and GPRS/GSM/2G or higher
	Mode	
9.	Data Input Port	Trigger input one time
10.	Reading Range	Max 12 m (able to calibrate)
11.	Communication	RS232
	Interface	
12.	Accessories	Vehicle-mount DC power cable kit Antennas, and antenna cables
13.	Environmental	IP68
	Rating	
14.	Humidity	10% to 90%
	Shock and	Withstands standard material handling vehicle environments. Meets or
15.	Vibration	exceeds MIL STD 810F
	Protection	
16.	Operating	0°C to 55°C
	Temperature:	
17.	Storage	0°C to 65°C
	Temperature:	
18.	Power Supply	Vehicle DC power 12 to 60V, 4.5 A maximum

8.5.6 Technical Requirement for Vehicle Tracking System

#	Minimum Specification
	Make:
	Model:
	Each vehicle, using the GPS vehicle tracking (VTS) device, shall determine its precise location
1	through GIS based GPS System and transmit the same to the City Operation Centre at defined
1.	intervals of time. The location shall be displayed on GIS based route maps at City Operation
	center
2.	AVLS shall be able to give ETA at each dustbin location in real time based on speed and
	distance measured.
	System shall be able to compare the actual location of the vehicle, at any given time, with its
э.	scheduled location

#	Minimum Specification		
	System at the control rooms shall be able to calculate the time for the vehicle to reach all		
4.	subsequent stops along the route, factoring in the current vehicle and any deviations from the		
	schedule and reported traffic congestion enroute		
	Information elements that need to be captured and transmitted to City Operation Centre at		
5.	the minimum include longitude, latitude, and physical location enroute with date and time		
	stamps, vehicle number, route number, and Driver ID, etc.		
6	Shall provide these data on real time basis at pre- determined and configurable intervals (10		
0.	seconds) over GPRS/GSM network		
7	Tracking of vehicle that deviate from the scheduled route based on definition of permitted		
/.	geographic regions of operation		
8.	Vehicle Fleet Summary Dashboard – Quick view on vehicle fleet performance		
9.	Register a vehicle on unscheduled route from backend on real time basis		
10	Application must have the functioning fort planning/scheduling/ Rostering/Dispatching of any		
10.	vehicle using Software		
11	Real Time ETA based Trip Management showing trips in progress/completed trips and		
	scheduled trip and Missed Stoppage Details etc		
	Exception Recording/ Actions (Over-Speeding, Harsh Acceleration, Harsh Braking, Off-route		
12.	Detection, unscheduled stoppage, Non-Stoppage at Bus stops/collection points, Trip		
	Cancellation)		
13.	Real-time Running Trip Line diagram of vehicle on a particular route, for headway detection		
14	Application shall provide facility to query the data and generate the customized reports as per		
	the requirements		
15	System shall display the contact details of the Vehicle driver so that the operation centre staff		
13.	can communicate with them directly		
	Operation Centre operator shall be able to drill down to the exact location of the event by		
16.	clicking on the alert and see the position of event drawn over the map along with driver,		
	vehicle and standard description of event details related to the business rule.		
17.	Vehicle DC power 12 to 60V, 4.5 A maximum		

8.6 E-Governance

8.6.1 City Management Platform & integrated Mera Bareilly App

Activities available in Bareilly. From Eateries to Temple Tours and famous attractions, this app envisages to cover any and every activity offered in Bareilly. This app will also be a location-based app. For e.g. a citizen can access the app from any location in Bareilly and know about the nearest available activities that can be availed.

How it will work

- Services offered by Private tours and travellers, tourist guides and government services will be registered on the application.
- Bareilly Activity Advisor App will act as a medium to register the services and give accessibility to the user to book the service.

The MSI will create and host a Web portal & Mobile Application for Department with the following features:

Audio, video, image and text information about the following:

- a. "About Bareilly" will provide details about Bareilly city and will have dedicated sections for about the Bareilly city, history of Bareilly, how to reach, climate, local cuisines, festivals of Bareilly, Important Business locations, places of interest, art and craft, facts at a glance, where to stay, where to eat, places of interest, heritage spots, weekend getaways, nature discovery, farm tourism, places to visit, best time to visit, gallery (Photos & videos), etc. few of these points have been elaborated below in detail
- "Explore District" giving details about the districts, history, how to reach, cuisine, festivals, Important Business locations, places of interest, art and craft (Add to Favorite, Get Directions, About, Get There, nearby and each linked with Google Map and Photos of concerned location).
- c. "Facts at a Glance" giving details about area, population, currency, religion, linking roads, postal code, longitude, latitude, area, altitude, population, literacy rate, STD code, average rainfall, villages, language and best season to visit
- d. "Tourism destination" giving details on tourism experience (Add to Favorite, Get Directions/Driving Directions, About, Get There, nearby and each linked with Google Map and Photos of concerned location) heritage spots, pilgrim destination, nature discovery, heritage, farms, highway, adventure spots, Nearby places to visit, Places to Stay
- e. "Tourist Places" including the details of accommodation, tourism and private hotels, descriptions, facilities, tariff, places to visit nearby.

- f. "Where to Eat" Section with detailed listings of various eating joints including those in geographical proximity using google map functionality (i.e. Restaurants around Me). Also show Travel Distance (length of time in mins and km or miles) via walking, driving to the listings.
- g. "What to Do" listings, including listings in map using Google map API functionality. Also show Travel Distance (length of time in mins and km or miles) via walking, driving to the listings.
- h. "Events and Entertainment" with a focus on what is happening and available that evening.
 May include the ability to add to user's calendar.

NOTE: Content for the application and sections mentioned above will have to be created/updated by the implementing agency in consultation with BSCL or whomsoever that may be decided later by BSCL. The content on the mobile application should be available in Hindi and English language. MSI shall design & Provision the solution for 250 Internal and 1000 External Concurrent Users.

List of helpline numbers like police, hospital, women's helpline, transport etc.

- Mobile applications should be developed as native app, and will be having same look and feel as the web-portal. Mobile Applications shall be for Android and IOS both. It can be hybrid as well as native also.
- The Web-Portal should be build using a Digital Experience Platform which is Open Source product supported
- Twitter / Facebook Feed Integration and Sharing
- Navigation path to the destination selected by the user
- Orientation and navigation (using smart phone GPS capability)
- Push notifications to users with ability for the user to Accept / Decline receiving these notifications;
- Turn notifications On / Off
- Integration with payment gateways for payment of cab, hotels etc.
- Ability to add various items to Favorites
- Ability for users to rate the App and to add / surf comments
- Ability for users to share their comments with friends and networks via Facebook, Twitter YouTube channel & Google Plus
- Application should be user-friendly
- Mobile app solution should be scalable to allow for easy upgrades in future
- Offline content is required to offer users a rich experience without worrying about incurring roaming charges

- Emergency contact numbers and SOS feature
- It is envisaged that this application would be downloadable for free from the appropriate Google Store, Apple store, etc. App Hosting shall be in MSI scope.
- MSI Shall ensure integration with Payment gateway

Indicative list of Modules

The App will act like a medium to register any activities offered by the registered guides, tours /travel companies or offered by the Government. This app leverages the tourism of Bareilly in a more systematic manner. The broad features too be identified in this app are the following:

Modules	Sub - Modules	Remarks
Tours	Day Tour	This will be dynamic data and will be
		controlled by the Private Tours and Travels
	Tomolo Touro	or the Government. For e.g. the travel and
		tour company will have the flexibility to
		publish different schemes on the portal.
Performances	Music & Dance	This will be dynamic data as well. Like Book
	Art Galleries	My Show application.
		An initial survey of each ward will be done
Places to Eat	Restaurants	to map the long and let of the famous
		eateries in the city.
	Cafes	
Yoga Sna & Rejuvenation	Yoga Houses	This is one of the most upcoming activities
	rogu nouses	in the City.
Places to stay	Bed & Breakfast	A list of Bed and Breakfast, Ashrams and
	Star Hotels	Star Hotels will be shown in the
	Ashrams & Guest House	application.

Reference Architecture for Mobile App



Points of Interest:

The portal shall provide information about key point of interests in and around every destination of the city. The point of interests shall include local attractions, shopping places, cafes, restaurants, currency exchange centers, souvenir shops and emergency services like dial 100, tourism police and hospitals. The user shall filter these POIs based on the categories and distance. By default, all the point of interests related to a destination shall be listed.

GUI (Graphical User Interface) based Integration:

The application should have an integration with the Google Maps which allows the end user to locate the point of interest on the map and show the direction to reach the destinations accordingly. The application should have provision of location-based services. For e.g. the application should have the feature to filter the nearby activities as per the current location of the user.

Aggregation

Integration and aggregation of innovative 3rd Party citizen centric services provided by private companies that are relevant for citizens shall be possible. MSI shall develop end to end solution and manage/ change request as per RFP requirement. MSI shall be responsible for any 3rd party integration during contract period, without any additional charge to BSCL. The 3rd Party services will be identified and evaluated by either Smart City PMU team and shall be integrated by the Partner Agency after consultation with the department. These services will need to provide APIs and service flow as per the guidelines to be published so that these can be integrated into the mobile app or other mobile channels based on the technical feasibility

Survey of the Area

The application is envisaged to be a medium where the tour operators, points of interest and hotels

will be self-registered. However, the survey of the place is required to be done to map at least 50 points of interest from each category before the launch of the application.

User Registration

Citizens will be able to register in the portal for accessing services. The users will have facility to manage their profiles.

Booking System

A standard template will be available in City Management Platform, where private tours and travelers will give the data to Upload into the portal, which can be review by BSCL and later will be visible to public after BSCL approval. Only tour and travel data need to be visible for the ease of citizen.

E-Gov solution shall have Web Portal and Mobile Application and will be integrated with given subsystems.

It should also give basic information of Music & Dance, Art Galleries. MSI shall insure the integration with city management platform

8.6.2 E-Portal for National & International Promotion, trade and product information for Bareilly's Zari, Manjha and Surma products

Municipal Corporation intends to develop Technology enabled business/eCommerce platform (Global Marketplace for B2B/B2G/G2B/G2G business) to promote, trade and product information for Bareilly's Zari, Manjha and Surma products. the Bareilly for its various Government & Non-Government customers with the assistance of a Technology enabler. The platform shall be customized suiting Bareilly Municipal Corporation's traditional business requirements and also help in automating routine trade processes for improved monitoring, control and scalability. The system will initially comprise of following:

- Associate Management: Empanelment & management of buyer/sellers
- Catalogue Management: Product & Service Categories
- Procurement: Planning, Procurement, Payments and Settlement
- E-Auction: Dynamic bidding process for transparent & better negotiation
- Mobile app: Increase the accessibility to the portal
- Risk Management: Ecosystem to mitigate risk associated with defaults from buyer or seller side.
- Marketplace "The successful bidder will have to develop and implement the e-marketplace with a Open Source eCommerce platform. The marketplace shall have capability to handle both International as well as Domestic Trade. It shall have required functional features which shall be capable of handling Municipal Corporation's (domestic/International) trade on back

to back basis through its Associate or bidder as well as operate as a Marketplace operator. It shall include but not limited to Seamless integration of all modules with simple & easy user interface to provide experience of online B2B/B2G/G2B/G2G marketplace where product or service information is provided by multiple third parties, whereas transactions will be processed by Municipal Corporation (as a trader or marketplace operator). It shall maintain transparency & meet compliances as per various government guidelines from time to time.

• he platform shall be developed, upgraded and customized to have more efficient customer centric approach and increase the business avenues through it.

Key Objective: The key objectives of the Business Platform are listed but not limited to:

- Demand Aggregation The ability to aggregate demand to leverage buying power with the supply market.
- Consistent and sustainable Associate development Enabling pre-qualified Associates the opportunity to access relevant opportunities.
- Transactional Effectiveness –Automate various trade processes to enable efficient and effective functioning.
- Total Cost of Ownership Reduced cost of doing business for both Municipal Corporation and its customers.
- Effective Sale/Purchase processing—Automate Sale/Purchase process and transparent negotiation through different types of e-Auctions to get better deals.
- Open Platform Level playing field and fair competitive platform for the Associates viz. buyer or seller.
- Disposals Accessing a wider customer base when disposing of redundant assets.
- Smart governance Increased transparency, monitoring and control of entire trading process.
- Scalability: To develop an e-Commerce system which is highly robust, scalable and proven. The system shall handle substantial number of concurrent users and Transactions.
- Security: Offer a superior level of security with Secure Socket Layer (SSL) encryption, strong authentication with digital certificates and speed to conduct real time bidding over the Internet. The system to support creation of Administrative hierarchy, using adequately secured passwords with digital signatures.
- Compliance: The Software services should be compatible with PKI transaction so as to ensure secure and authenticated access and transactions which are in conformity with the Information Technology (IT) Act 2000 and any further amendments issued by the Government

of India (GoI). Provision of handling International trade without DSC but in secure manner should also be available.

- Availability: To ensure full availability of the application during working hours, alternative facilities should be provided in case exception in live environment.
- Risk Management: System with comprehensive contract management to take care of the risk associated with defaults from buyer or seller side. The system should be capable for risk assessment using past history by electronic capturing of details like EMD, bid history, winner list, quantity awarded etc.
- Efficient Price determination: To determine price through wider participation from across the country/globe, healthy competition and transparent technology enabled negotiation mechanism complying government guidelines.
- Relevant to Dynamic Market & Add value to the trade: System in establishing backward and forward linkages in the value chain and bring more value with transparency to the transaction which is relevant in changing approach of various Governments Globally and dynamic market
- Gateway to Global Trade: System to have capability to handle domestic as well as International trade in transparent, faster and simpler manner.
- Warehouse & Logistic Management system: System to have warehouse & Logistic management capabilities. It shall also have provision for integration with third-party logistics tracking system.
- Invoicing & Settlement: To enable seller to raise invoice/debit/credit note, receive/make payment and settle the complete transaction through system.
- International/Global E-Marketplace (e-IGEM): The portal eventually should become an International G2B/B2G/G2G/B2B e-marketplace and create its niche in the global market with continuous improvement ahead of competition. It shall have capability to trade freely as well as where ever required to comply to all government Sale/Purchase related guideline. Portal should be able to facilitate to promote best of the Indian Suppliers & surplus commodities to various buyers in the Global Market. It should also be able to facilitate Global Suppliers of priority commodities/items to cater to Indian Market, to support demand-supply gap as well as assist governments to undertake market intervention activities in fast & efficient manner by value chain engineering.

Scope of Work:

- Design, Development of e-Commerce Platform for BSCL using COTS or Enterprise Edition/Supported Open Source Platform. Bespoke/home-grown developed products will not be accepted
- Provisioning of extended Support Services
- Deployment of e-Procurement & e-Auction module from Purchase Requisition to Purchase Order module including Spend Analysis on single portal.
- Deployment of Clock, SMRA, Yankee and other e-Auction module including other variants of e-auction inbuilt in the system and ASP will have to demonstrate during the presentation round.
- To do digital marketing & Search engine optimization (SEO) to promote the portal globally which shall assist in developing new business avenues through the portal and meeting revenue targets.

General Scope shall consist of:

- Project Charter
- Requirement Analysis
- Configuration and Provisioning of Platform
- Integration/Interface Requirements
- Process Validation Test
- Go Live
- Training
- Operation of Platform & Support
- Change Management, Upgrades and Updates
- Transfer of Platform
- Create a Disaster Recovery Site

Key Features:

The Portal should have the Functionality of 'Send a business enquiry' and 'Inviting a Quote' and should be able to act as an aggregator for various services to citizens/ business. The Digital Commerce Platform should be build using open standards COTS or Enterprise Edition Open Source product supported by a reputable OEM having Support Centre in India and is platform independent with or without virtualization. It should have features such as access control, comprehensive search mechanism, multi lingual support, multi-currency support, rich media content support, workflow engine, necessary document management system, social media integration. It should also have a grievance & redressal mechanism with user feedback

& review system. The Portal should be able to maintain version and schedule content from staging site until production site.

- The Portal shall have grievance redress system which shall allow users to register and escalate complaints, provide feedback about the product, its delivery services, seller, packaging etc. online, via email. Customer Centre to take care of such complaints. It shall also have Auto escalation mechanism. It shall have Ability to feedback/ reviews by customers for different products and services. System should be able to redirect the query to relevant stakeholder and to Municipal Corporation automatically.
- The portal should support at-least English, Hindi with provision to add more languages in future, whenever required.
- The proposed platform should have a robust user management and security management features including password policies, user reminder settings and complete login security procedures. The Platform should support multi-tenancy and should allow department to create any number of micro-sites from a single installation without any impact on User Licenses or site licenses etc. The platform should have the capability of user segmentation based on different criteria and can have personalization for the users.
- The design of the portal should be visually appealing, have a unified look and feel and provide easy navigation throughout. The Portal should provide a consistent interface rendering across multiple channels such as mobile, desktops, tablets etc. without the need to segregate the development for each channel. Post Go-Live, with every significant change in the portal. This design should be mobile device friendly and should support the entire predominant mobile platform such as Android, iOS, with proper rendering.
- The Portal should have a simple and standardized search with a text-box able to search, sitewide such as a Google custom search. Search should be able to capture items based on category, type products, cost, source of origin, discount etc. Sub-searches should also be available based upon various filters. Search should include features like Native In-site search, Predictive Search, Type ahead search with product display etc.
- MSI shall use required workflow engine for automatic management & execution of all system processes and facilitate flow of information, tasks and events.
- Portal should be developed utilizing modern web design and standards, compatible with all leading browsers while providing graceful degradation for older browsers. Website URLs should predominantly be clean URLs The portal platform should be responsive in nature and whatever being developed on the platform should be responsive in nature.

- The solution should have catalogue management capabilities like adding new product category, product variants, automated suggestion for grouped products, assigning product to multiple categories, configuring minimum/maximum order quantities etc. The solution should have facility to create target groups, price-lists, discounts or promotions etc and can be integrated with payment gateway for enabling online mode of payment..
- Web analytics should be comprehensive enough to analyze any trend or analysis based on various parameters like No. of unique visitors, traffic report etc. Portal should be SEO friendly. It should be able to generate various products The Web Analytical tool should provide reports on page level as well as assets on the page. Eg. Number of users accessing a product in the page or downloading a document in the page. Tool should provide capability of user segregation based on different criteria based on which personalization on the content can be done for those users..
- BSCL will have access to all functionalities of the portal in order to add/remove/block the product listings as well as buyers/sellers/visitors etc. The "super- admin" should be able to manage the overall content of the website and also have the option to edit/ delete contents. The super administrator should be able to create users as per the requirement and, assign necessary permissions to update/delete/modify the portal/website content. The proposed platform should have fully featured CMS abilities such as content authoring and publishing, dynamic content targeting for different audiences, personalization and site management.
- Portal will have three categories of Associate (buyer/seller/service provider). Associate will have the option to choose normal membership & verified membership by BMC.
- Portal must be secure from virus attacks, malware and hackers etc. Architecture Design should incorporate security features to protect the site from Session Hijacking, SQL injection, Cross scripting, Denial of Service etc. Portal system should maintain a secure Password policy. The proposed portal shall also be available with complete transparency including operation manuals, help documents. The portal should support all major Operating System.
- Mobile application needs to be abreast with the changes in portal. The applications shall be
 provided on Apple App Store and Android Market perpetually and shall be clearly marked as
 the official apps for Municipal Corporation e-commerce portal and should be optimized for
 the platform it is being run on.

The broad scope will be discussed with successful MSI and the respective authorities for Bareilly online platform to showcase the handicraft and industrial product of Zari, Manjha and Surma which cause loss in business. This is one of the important issues came from citizen consultation. A system requirement study (SRS) will be needed to undertake thereafter.

8.6.3 Single Window Clearance for Bareilly

The portal shall have the following features:

- Should have public and intranet access.
- The intranet and internet data and services are hosted separately, but using the common service.
- Should have facility to upload documents and index them. Should have facility to make a document accessible for public view/download.
- Should have role-based accessibility menus and functions and access to functionality and services.
- The content should be easily manageable and preferably come from a back-end database.
- Should have facility to secure specific functional area access via https service
- Should have sections for login of employees, registered vendors and citizens.
- The portal should seamlessly integrate with payment gateways for payment processing using debit/credit/cash cards.
- The portal should seamlessly integrate with backend messaging services such as SMS and email gateways.
- Solution should design to cater Bareilly City need

The general content on the public access portal should be:

S. No.	Information and Services		
1.	Static Information about BMC		
2.	Vision, Mission, Objectives		
3.	City Information		
4.	City Map with citizen related GIS information		
5.	Administration Information		
6.	Information on Elected Representatives, Various Committees		
7.	RTI		
	Departments/ Wards: Intro, Objectives, responsibilities, powers & duties of		
	officers, employees with gross salary, activities, time limit, and directory with		
	telephone no.		
	Committee: Members, purpose, type, freq. of meeting, docs available for		
	public.		
	Projects/ Activities: Budget head, work activities, allocated amount, current		
	statistics		

S. No.	Information and Services		
	Details of concessions, subsidies given, computerization done in various		
	departments		
	• Integration required for updating of data for RTI with projects, accounts,		
	HRMS, Material, and asset.		
8.	Feedback from Citizens and contact facility		
	*MSI need to provide a web portal/mobile app and interactive SMS/ Web API		
	based "survey management tool" for customized/hierarchical structure-based		
	feedback/two-way communication between BSCL and Citizen		
9.	FAQs		
10.	Application acceptance for various services/certificates		
	Birth/Death Certificates		
	Duplicate Bills		
	Building Permission related services		
	Water Connection		
	Application for Licenses		
	No Dues Certificates		
11.	Downloading of Forms		
12.	E-filing		
	Hospitals to upload RBD records		
13.	Grievance redressal		
	Complaint registration		
	Status Tracking		
14.	Status on Applications/Complaints		
15.	Payment Details, Bill Details		
16.	Online Payments		
17.	Self-Assessment of House Tax		
18.	Link to e-procurement for Tenders		
19.	Citizen Self Service		

Overview of System



E-Governance refers to the use of information and communication technologies (ICTs) to achieve good governance. For optimizing and proper resource utilization, information is required and hence applications are required to capture the data at the source. The electronic data can then be analyzed and better services and resources can be planned.

Keeping in view of the vision of BMC and inputs from the key stakeholders of the system, and to attain its objective, we propose an e-governance system that would include the following architecture:

- A central data centre that has the necessary backend ICT for hosting several application software and their databases.
- All zonal, peripheral and allied offices to be connected to the central data centre via dedicated network.
- Implementing single window system for all citizen transactions through citizen facilitation centers (CFC).
- Internet based delivery of services such as registration entry of births and deaths, payment of taxes, registration entry of vehicles and filing of complaints
- Implementation of robust accounting system, geographical information system, vehicle tracking system, biometric access control system (BACS), property tax, water tax etc.

It is critical for the success of the project that the ICT and enterprise wide integrated application software implementations are within the same timeframes, as delay in ICT infrastructure creation can significantly lead to time and effort escalation over and above the compatibility issues.

Scalability of the System

Scalability addresses the possibilities of enhancing the system in a future date to cater to increased user / application loads.

- The proposed technical architecture is scalable in terms of growth in usage in proportionate to the growth in transaction volume, database and users. This can be done by increase in number of servers, bandwidth, and desktop depending on number of transactions.
- The datacenter services can be extended to BMC's various parastatal bodies like Jal Sansthan, Jal Nigam, and Bareilly Development Authority etc. BMC may get the application software developed for their functions (computerizing them) and bring under the same umbrella of data center.
- The Platform should be comprehensive, standards-based integration platform to build, deploy and manage integration following the concepts of service-oriented architecture (SOA).
- The platform should provide, a single deployment and management model, end-to-end security and metadata management. The platform should provide Process manager, Message Queue capability, Event processing with IoT, Analytics, dashboards, etc.
- The Software of API Management shall not restrict number of Gateways integration with the Manager.
- The System Shall provide capabilities like API Security, API Monetization for the Smart City

Integration and Compatibility within module

The proposed system is based on Service Oriented Architecture where integration within modules is much simpler process when compared to independently developed client server application modules. All the integration requirement of each of the modules recommended has been clearly defined in the module description. SOA facilitates development of functionalities without effecting the integration The above scope derived with high level consideration. The broad scope will be discussed with successful MSI and the respective authorities. A system requirement study (SRS) will be needed to undertake thereafter.

However, the broad scope will be discussed with successful MSI and the respective authorities for E-Governance solution and system requirement study (SRS) will be needed to undertake thereafter.

8.7 Smart Parking

Smart Parking solution will involve the use of near-to-real-time data and applications that allow users to monitor available or unavailable parking slots. The goal is to automate and decrease time spent manually searching for the optimal parking area. Solution will encompass a complete suite of services such as parking time notifications. A parking solution will greatly benefit both the user and the lot owner.

The details of proposals made for Parking under the SMART City proposal are as follows:

- Development of organized parking spaces with SMART Parking management solutions.
- The ICT system integrated with camera-based solutions will assist in providing real time information about vacant parking slots through city app.
- Under the Urban Transit module, modernization of the parking spaces is proposed by providing cameras for data collection on parking lot capacity & availability.
- Under Urban Transit system, it has also been proposed that all sites will be managed by an integrated parking management system. This will reduce the congestion on street by haphazard parking.
- Solution shall designed for both 2 wheeler and 4 wheeler

8.7.1 Challenges with Conventional Parking

- i. High Parking Search Time
- ii. Traffic Congestion on Road
- iii. Poor Usage of Parking Space
- iv. Poor Occupancy in Parking Lot
- v. Less Revenue / collection
- vi. Less effective parking operations
- vii. High Parking violations
- viii. Accidental Hazards
- ix. Stress to user & dissatisfaction
- x. Pollution High Emission of gas
- xi. No flexibility in Parking Charges
- xii. Suspicious parking / Lack of security arrangements in Parking
- xiii. No real time tracking, data/report for analysis for future need/expansion

8.7.2 Value Proposition SMART Parking offers to its Stakeholders

Authority	Citizens
Increase quality of life	Simplifies Payment
Improvement in citizen's parking experience & satisfaction	Easily finds the parking space

Authority	Citizens
More efficient use of parking	Time saving
Reduces illegal parking	Avoid traffic congestion
Reduces revenue leakages	
Reduces Man power cost	

Smart Parking – Mobile Solution & its Benefits

- i. Mobile App for finding parking space quickly & easily
- ii. Finding parking space with clear & simple directions reducing traffic Congestion. Parking violation detection real time system also help (Lane violation detection and reporting with alert).
- iii. Assisting user in directing to correct parking slot help in correct parking at correct slot, making optimal usage of parking space
- iv. Real time update of entry & exit of vehicle improve occupancy
- v. Improved Parking Occupancy increase collection
- vi. Ease of payment improve collection & save time
- vii. Clear, simple directions & ease in parking reduces road accidents
- viii. Improved user satisfaction by saving time, effort & cost
- ix. Less parking search time reduces emission of gases & control pollution
- x. Provision for demand responsive parking charges Higher charges during peak hours etc
- xi. Availability of data & Analysis for growing need for expansion or more parking slots; subsequently required measures to handle problem

General Requirements

- i. Installation & Maintenance of Variable Message Boards in the parking.
- ii. Integration with VMS which is managed from Integrated Command Control Center
- iii. Network and backup mechanisms for power
- iv. Installation and boom barriers and cameras
- v. This information to relay live to local and Central system where parking management application is hosted, which collates and analyses the data.
- vi. Mobile App feature to view, book the parking space as mentioned in functional and technical requirements.
- vii. Payment gateway integration and Payment gateway integration shall be in MSI scope

KPIs for Smart Parking:

i. Reduce parking sear time for citizens and pilgrims visiting the city

- ii. Reduce traffic congestion caused by people searching for parking space
- iii. Optimize parking lot usage by appropriate planning and restructuring
- iv. Add smart elements using cameras-based solutions for parking spaces to manage vehicles
- v. Identify open spaces and on road parking options
- vi. Increase revenue collection through managed parking
- vii. Improve parking experience to vehicle owners
- viii. Reduce greenhouse gases by decreasing search time for parking spaces
- ix. Monitor vehicles entering parking lots
- x. Provide real time tracking of parking availability on mobile and VMS
- xi. Online or wallet payments through mobile device to ease transactions
- xii. Gather data for analytics and planning

8.7.3 Functional Requirements for Smart Parking Management System (SPMS)

- i. The Smart Parking Management System (SPMS) should enable BSCL to obtain real time situational awareness about the occupancy of parking lot.
- ii. The SPMS should enable BSCL or any other appointed third party to manage parking locations using the SMART parking solutions.
- iii. The smart parking solution should provide real time location-based view to citizens about proximity of parking lots and availability of parking lots using different methods – Mobile application, digital display boards around the city etc.
- iv. The smart parking solution should enable the above functions with minimum manual intervention. The smart parking solution is envisaged for closed parking lots, open parking lots and road side parking as implemented as applicable
- v. The smart parking solution should be able count the number of vehicles entering and exiting any parking structure except parking on road sides.
- vi. The smart parking solution will use camera-based solutions for parking lots without sensors.
- vii. The smart parking solution should report occupancy of parking lots to a central software application deployed at the command center using the network laid out as a part of this tender document
- viii. Application should have the facility to manage the attendances of the parking stewards deployed by the third-party contractor details.
- Real time display of parking slots availability for each location should be available on Mobile
 App and on web page
- x. Receive & Send parking details to Mobile App

- xi. Receive & Send details to parking location wireless devices including Mobile App bookings and display units
- xii. The parking block time for Mobile App user should be configurable from Server and displayed in Mobile App
- xiii. Application should be able to configure time allowed to extend for blocked parking and the same will be displayed on Mobile Apps like: He can extend time by 5 minutes if he is nearby so that the blocked parking will be released after 5 minutes for only multi-level car parking
- xiv. The bookings received from the Mobile App should be updated at the control center and also at the parking location displays
- xv. The availability of parking slot should be displayed on Variable Message System (VMS) from control center.
- xvi. The total number of slots and free slots for parking must be displayed on a digital signboard near the entrance of the parking lots or as specified by BSCL.
- xvii. The smart parking solution should facilitate real time revision of parking fees and should enable real time communication of rules to handheld terminal. A sign board should be displayed in entry gate to notify the user regarding demand-based parking fee
- xviii. Save information in no SQL database or equivalent database

8.7.4 Functional Requirement for Wireless Handheld Devices

- i. Receive available parking information from control center
- ii. Allocate parking space to local users and generate ticket
- iii. Generate ticket of the mobile users via QR code reading from mobile devices
- iv. Update control central web-server with allocation information
- v. Integrated with local display unit for parking status information and boom barrier operations for which logs to be created in SPMS
- vi. Similar device at the exit location should work as payment collection device or same device if enter and exit are next to each other
- vii. The calculated amount will be received from Smart Parking Application
- viii. In case of failure of network, the amount should be calculated manually and same should be updated to SPMS later

8.7.5 Functional Requirement for Mobile App

- i. The smart parking solution should have a mobile and a web delivery channel for citizens to get real time parking availability
- ii. A mobile application and web-based user should be provided with the following features:
 - a. The application should have citizen module and officer module.

- b. Through the citizen module, the user should be able to locate nearest parking lot on his geographical coordinates. The same information must be made available on map with routing information.
- c. The citizen should be able to see all the parking lots with exact available space in a real time mode.
- d. While locating nearest parking lot, the latest parking slot availability should be given to the user.
- e. The application should have a compliance officer module where BSCL designated inspector or operator will be able to check compliance of slot occupancy against the fees paid by the citizen
- f. The citizens should be able to generate MIS report to view occupancy of parking lots over a defined time period.
- g. The administrators should be able to generate MIS report to view occupancy, collection and other usage statistics over a defined time period.
- h. Mobile App will connect to central web-server
- i. Receive parking availability information for all the parking areas of Bareilly and by default display the availability of parking space for the nearest parking location for the citizen and officer module
- j. User should be able to book a slot and receives code generated for the booking specific to the parking location
- k. If the user does not arrive at the parking location at specified time, user can request to increase the block time for him which will be configured from control center
- I. The code generated should be viewable and identified by the mobile device at the payment location of the parking
- m. User should be able to make the payment through cash or e-Wallet at the parking location
- n. Mobile App will send notification if the block time for parking is nearing threshold minutes
- o. All connected mobiles will request refresh interval should be 1 minute
- p. All the functionalities mentioned above should be displayed on a web page. This page will be linked with existing Bareilly website

8.7.6 Functional Requirement for Boom Barrier & Variable Message Boards:

The units shall receive information from the Smart Parking Application and operate accordingly. The standards for above should:

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

Be of leading industry standards and /or as per standards mentioned

8.7.7 Functional Requirement for Entry Requirement

- i. Entry to any parking space should have outdoor displays/screens showing overall availability of parking slots in the parking space.
- ii. Each entry and exit lane should be equipped with one Entry Device with the following capabilities:
- iii. The QR Code (Preferred), Smart Parking Card or any other technology used by MSI should be capable of capturing data that is easily retrievable at the exit.
- iv. Every vehicle entering the parking space should be stopped by barrier. The barrier is raised when the motorist is issued a ticket or has been identified as a legitimate user.
- In case the parking lot is already occupied to its capacity, the ticket issuing should automatically be blocked and therefore, the barrier should not open. A message should also be displayed on the outdoor screen stating the same.
- vi. The Entry Device should be able to detect and report:
 - Anti-pass back
- vii. The display on Entry Device should have capability to display messages in English and Hindi.

8.7.8 Functional Requirement for Entry and Exit Barrier

- i. The entrance and exit of each parking lot should have a barrier gate system using technologies such as boom barriers.
- ii. The barrier should remain in open position for optimal period of time for the vehicle to pass at entrance and exit.
- iii. Barrier should have capability of in-built glowing direction signage
- iv. Barrier Arms should have the following options:
 - In closed position the full arm should be illuminated red.
 - Once reached open position the full arm should be illuminated Green
- v. Upon horizontal impact by a vehicle, the barrier arm should get detached from the barrier unit with minimal damage to the vehicle and the barrier motor mechanism. An alarm should also be raised and sent to the server and monitoring console, when the barrier is detached.
- vi. An alert should be sent to the console and server to ensure that the administrator is informed that the barrier is not attached or barrier breakage.

- vii. All vehicular passages during the time the barrier is not attached should be recorded and displayed in the reports separately in order to audit the necessary revenue transactions during that time.
- viii. Upon impact during closure, the arm will stop and stay in the same position. Under no circumstances should the arm re-open upon impact. This is to prevent keeping the arm open for illegal entries or exits.
- ix. The barrier arm should be easy to refit with barrier unit in a short duration.

8.7.9 Functional Requirement for Exit Requirements

- i. Any vehicle, before leaving the parking area, should be stopped by a barrier system at the point of exit from the parking.
- ii. The solution should have clearly instructed easy to use interface
- iii. Should have a Manual Pay Station:
 - Exit of every parking should be equipped with a manned Pay station (booth).
 - The Manual Pay Station has sufficient space for the Parking Attender to sit and to keep all the necessary equipment inside.
 - The payment for parking should be collected based on entry time stamp by any personnel stationed at the Pay Station.
 - The fee for all the parking locations will be regulated by BSCL or sub-contractor. The fee structure for the parking lots will be managed by Smart Parking Application in control center and received in real time
 - The system will calculate the fee automatically and indicate this on the screen clearly visible to the motorist. No manual intervention should be necessary to compute the fee.
- iv. Once the vehicle exits a parking slot, the total parking slots available in that parking space should automatically get updated.
- v. Only after completing the full cycle correctly the transaction will be considered as valid within the car park. However, audit trail of each complete, incomplete and cancelled transaction should be available in the system.
- vi. The solution should be equipped with Anti-pass back technology and be able to detect and report any instance pass back.
- vii. The solution should allow full integration of third-party devices with the Parking Management and Guidance System, and capture all transactions to generate customized reports.
- viii. The solution should track each and every revenue source and should ensure no leakages due to manual intervention.
- ix. All type of payments modes should be possible

8.7.10 Functional Requirement for Payment options

- i. The primary mode of payment for parking will be by cash at the Pay Station.
- ii. For bookings through Mobile App or Smart Web Portal Application, payment will be made using e-Wallet, Net banking, Credit card, Debit card etc.

8.7.11 Functional Requirement for Informative Display Panels

- i. The display panels units should indicate available spaces for each parking aisle, bay/zone/level, total parking and should be able to be customized by software.
- ii. The display panel should be easy to understand and must zone status indication.

8.7.12 Functional Requirement for Real-time Monitoring and Dynamic MIS Reporting

- i. The system should include central reporting system establishing the connection between the devices and the centralized Command and Control Centre.
- ii. The solution should include reporting dashboards with location specific thresholds to be set for generating customized reports
- The solution should be capable of monitoring the number of vehicles that entered or exited the parking premises during any given time
- iv. The solution should generate reports for each parking spot, in each of the parking lots capturing utilization, cost, and revenue details, and details of assets, people and etc.
- v. These reports should be available in all standard acceptable formats like .csv, .pdf, .txt, etc.

8.7.13 Technical Specifications for Smart Parking Solution

The following standards and specification need to be followed:

8.7.13.1 Entry Device

- Should be able to generate printed receipts in designated format on selecting the duration of parking
- Conform ISO 9001 Quality Assurance Standard
- CE/FCC/IC/ CNRTLUS certified

8.7.13.2 Exit Device

Conform ISO 9001 Quality Assurance Standard

8.7.13.3 Entry / Exit Barrier

- NABL test report for product quality
- CE (UK) certified
- ISO certified
- Degree of protection : IP55
- LED display on front door panel.

8.7.13.4 Display devices

 Should display double line dynamic display with 24*24 matrix (12 digits) with a minimum size of 1000 mm * 300 mm

8.8 Capacity Building for Smart City Operation and citizen training

The massive transformation of Citizen Services to be achieved through the Smart City Mission shall only be effective when it will be understood, appreciated and availed by the citizens for whose benefit these programs are being undertaken.

In order to prepare the citizens for the services and also to prepare the operators and various stakeholders from the Govt./statutory bodies side, a structural program of capacity building needs to be undertaken parallel as various services are made available and associated infrastructure are being put in place.

Capacity Building for e-Governance

Capacity Building is required to bring under operation the e-governance systems across Bareilly Nagar Nigam. The capacity building shall focus on achieving the following objectives:

- 1. Building personnel capacity, i.e., training to employees
- 2. Building capacity to fund the project
- 3. Building the physical infrastructure including offices, data centers, hardware, networks, etc.
- 4. Educating citizens through appropriately designed communication programs to initiate any e-Governance project, the capacities required are much more comprehensive and holistic than a conventional software development life cycle (SDLC) project. E-Governance initiatives entail policy development/refinement, financial management, program management and warrant a higher emphasis on change management. Apart from this, creation of Institutional structure which brings continuity to a project. Hence while initiating any e-Governance projects there is need to develop capacities in all these areas at all the levels of corporation.

Capacity Building for Employees

As per the details provided on existing staff strength and IT initiatives, the Bareilly Municipal Corporation needs to give utmost priority for capacity building.

For driving e-governance implementation, BMC should put some incentive schemes for employees' initiatives towards IT literacy. A taskforce should be developed, which should include employees of all categories. The awareness program for class IV employees, may lead to emergence of certain employees of good caliber, and their interest factor for implementation of e-governance could be even more.

The action plan for personnel capacity building is as follows

- Prepare an organization chart based on personnel functions and assign appropriately qualified personnel to identified posts.
- Formulate an HR policy incorporating key HR elements for motivation to staff (rewards, incentives, training and career planning)
- Determine the areas of capacity building and training for the staff.
- A team of selected personnel would be constituted that will facilitate the process of training and capacity building.
- Preparation of training plan: The training strategy will develop profile of participants, training design and training modules. The training and development plan must be an integrated system of the HR development process and must be monitored periodically to measure progress.
- Training of trainers: A critical mass of trainer will be developed at multi-levels. This group will in turn take care of the training down the line.
- Conducting training: Depending on the number of trainers a series of training of trainers program will be conducted.
- Review, reinforcement and continuity: A team of experts and selected beneficiaries will conduct a mid-term review.

Capacity Building Program shall be preceded with Change Management plan covering:

- 1. Bareilly Smart City Ltd officials,
- Various stakeholders e.g. elected representatives, eminent persons, sector experts, RWAs, market associations, government entities, institutions, City/ Official/ Elected Representatives/ Concerned NGOs, Eminent Citizens, Representative from Premium Institutes of the City/State, Representatives of Business Organization etc.
- 3. Other Govt &/or statutory bodies e.g. Railway, Road Transport, Highways, Department of Archaeology, Department of Forests and National Parks etc.
- 4. Citizens

The change management plan It shall attempt to overcome any resistance and shall incorporate training programs, workshops, communication plan and workgroup discussions.

Under the Capacity Building Program:

- 1. The Smart City officials will be covered for high level understanding of the system and operations principles. Additionally, they shall be trained on the new eGov applications and workflow management system.
- For Govt and statutory bodies, the training program will include their operators and help-desk cadres who shall be undergoing user training, operation & maintenance trainings and process flow trainings to be imparted by the PMC, SI community and OEM.
- 3. Other stakeholders can be covered thru' targeted workshops and discussion forums.
- 4. Citizens shall be covered mostly thru' communication plan thru' various media outlets including social media campaign and planned workshops across selected areas towards covering the entire city of Bareilly.

The Capacity Building process can well start much before the implementation of new systems and solutions and the process shall continue even after the flagging off of these services till the time the city of Bareilly transforms herself to the desired state as per Smart City Mission.

9 Network from Managed Service Provider

The connectivity between the end devices and the ICCC may be through a Fibre provided by a telecom service provider. The network availability would be monitored through a Network Operations Centre, which will be housed along with the Integrated Command and Centre. The MSI will be responsible to arrange the required bandwidth for connectivity. Seamless and resilient connectivity required for the following but not limited to. MSI has to analyze the quality of the connectivity across required locations for both the vendors and submit a detailed report along with bandwidth requirement across the city including DR. Based on the approval MSI has to execute the agreement with selected vendor for each location and add applications which can manage bandwidth and network availability and related SLA metrics, MSI should also consider a third-party application to monitor and manage bandwidth. Procurement of network bandwidth services will be the responsibility of MSI and the cost should be borne by MSI during the entire contract period. As per TRAI guidelines, resale of bandwidth connectivity is not allowed. In such a case tri-partite agreement should be formed between Authority, selected MSI and Internet Service Provider(s).

The MSI will responsible to arrange the bandwidth requirement for connectivity. Seamless and resilient connectivity required for the following but not limited to:

- Managed Service: End devices to Data Centre
- Internet Bandwidth
- DC DR Connectivity
- DC Backhaul Bandwidth
- VPN Remote Connectivity
- Mobile/ Wireless Connectivity (GSM or any other mode)

The bidder is to further ensure that all the smart city components and devices are connected to the Data Centre and Command Control Centre in a reliable and resilient mode for smooth & efficient operation of the ICCC.

Bandwidth provisioned needs to adhere to following minimum benchmark requirements:

- Availability : The Core network uptime should be 99.999% while all the major loops/ links uptime should not less than 98.5%.
- Latency: <15 ms
- **Scalability** : Network and bandwidth capacity should be expandable.

10 Annexure A: Location Details

10.1 Traffic Junction/ Signal

10.1.1 Traffic Junction/ Signal with ITMS + ATCS

Sr	Location Name	Type of	Monitoring	Latituda	Longitudo	Otv
31		location	Parameters	Latitude	Longitude	Qty
1.	Ayub khan chowk	Commercial	Traffic Jams	26.119551°	85.391066°	1
2.	Bisalpur Chowk	Commercial	Traffic Jams	26.20082°	85.385540°	1
3.	Chowki Square	Residential	Traffic Jams	26.110028°	85.406434°	1
4.	Delapeer Tiraha	Mixed Use	Traffic Jams	26.119633°	85.40827°	1
5.	Kila Congress	Mixed Use	Traffic Jams	26.125559°	85.382899°	1
6.	Seletile Bus Stand	Mixed Use	Traffic Jams	26.119633°	85.40827°	1
7.	Selection point D Puram	Mixed Use	Traffic Jams	26.120350°	85.409448°	1
8.	Soogh Dharam Kanta	Residential	Traffic Jams	26.114914°	85.416338°	1
	Square					

10.1.2 Traffic Junction/ Signal with ITMS

6	Location Nama	Type of	Monitoring	Latituda	Longitudo	udo Otv
51	Location Name	location	Parameters	Parameters		Qty
1.	Bareilly Collage	Mixed Use	Traffic Jams	26.137751°	85.366198°	1
2.	Biyawan kothi chowk	Mixed Use	Traffic Jams	26.125559°	85.382899°	1
3.	Circuit house square	Mixed Use	Traffic Jams	26.111179°	85.411828°	1
4.	City sabji Mandi	Residential	Traffic Jams	26.107980°	85.419018°	1
5.	ljjat Nagar station road	Mixed Use	Traffic Jams	26.124307°	85.405813°	1
	Tiraha					
6.	Jilasen court Tiraha	Commercial	Traffic Jams	26.125472°	85.39446°	1
7.	Kohada peer Tiraha	Mixed Use	Traffic Jams	26.127114°	85.393455°	1
8.	Kutubkhana Tiraha	Mixed Use	Traffic Jams	26.12626°	85.358173°	1
9.	Maliyon ki police Tiraha	Mixed Use	Traffic Jams	26.123574°	85.367737°	1
10.	Mini Bypass Tiraha	Commercial	Traffic Jams	26.120715°	85.382956°	1
11.	Parsakheda Bypass	Commercial	Traffic Jams	26.121314°	85.379907°	1
	Tiraha					
12.	Sanjay Nagar Tiraha	Mixed Use	Traffic Jams	26.103786°	85.424441°	1
13.	Suresh Sharma Nagar	Mixed Use	Traffic Jams	26.124307°	85.405813°	1
-15.	Square					

10.2 City Surveillance

Sr	Location	Access Location	Qty
1.		Choupla Chouraha	4
2.		Ayub Khan Chouraha	4
3.		Gandhi Park gate	2
4.		Agrasen Park, Rampur Gate	3
5.		Collectorate Chouraha	4
6.		Chowki Station road	3
7.		Court Gate	2
8.		Circuit House Chouraha	4
9.		Islamia Gate	2
10.		Azam Nagar Chouraha	3
11.	Kotwali	Hanuman Temple	2
12.		Damodar Sawaroop Park	3
13.		Bareilly Club	2
14.		Dainik Jagran Tiraha, In front of B.O.B	4
15.		In front of police line	8
16.		Old police main gate	6
17.		Kutub Khan Chowk	4
18.		Kumar Takiz Tiraha	3
19.		Lal Masjid Chowki	2
20.		Sahu Gopinath	4
21.		Sr. SP Office Main Gate	2
22.		Biharipur Dhaal	3
23.		Neem Ki Mathiya	3
24.		Faiaz Building Kohadapeer Petrol Pump	3
25.		Murti Nursing Home	3
26.		DharamKata - bich Crystal Bar Par	2
27.	Prem Nagar	Kabristan Chouraha, Bhood	3
28.		Julelala GateChouraha	4
29.		Swamvar Marriage Farm HouseChouraha	3
30.		Kudeshiya Railway Crossing	6
31.		G.R.M Tiraha	3

32.	Selection Point	4
33.	Dharamkata Chouraha	4
34.	In front of Prem Nagar Station	6
35.	Sheel Chouraha	8
36.	D.D.Puram Petrol Pump Chouraha	8
37.	Sankar Sweet Sadar Market	2
38.	Lal Railway Crossing	2
39.	Petrol Pump Chobari	4
40.	Bukhara Road	3
41.	Naktiya Chowk	3
42.	Veerangana Chowk	4
43.	Auto Stand, Mohanpur	2
44.	Postoffice Tiraha	6
45.	Nariyaval Road	4
46.	B.I Bazar Chouraha	6
47.	Halakar No03	4
48.	Chowbari	2
49.	Babhiya	2
50.	I.T.O Office	4
51.	Kila Crossing	6
52.	Shamshan Bhoomi Railway Crossing	2
53.	Shamshan Bhoomi Tiraha	6
54.	Satya Prakash Park	3
55.	Mini Bypass	3
56.	Bakarganj Chouraha	3
57.	Sarai	2
58.	Jasoli road	4
59.	City Sabji Mandi Mod	6
60.	Kohli Cloth House	3
61.	Katra Manrai Tiraha	3
62.	Surkha Chowk	4
63.	Gandhi Nagar Chowk	4
64.	Delapeer Thiraha	6

65.	CB Gunj	Zero point	4
66.		Khalilapur Crossing	2
67.		Mathurapur Crossing	3
68.		Sleeper Road	3
69.		Maheshpura Crossing	3
70.		Vidholiya	2
71.		Bandiya Tiraha	3
72.		Pastor Crossing	3
73.		Pardhooli mod Bada bypass road	3
74.		Atakaysthan	3
75.		Lal Petrol Pump	2
76.		Kargaina Market (Old)	2
77.		Shubash Nagar to Bypass Tiraha	2
78.		Sithoura Chouraha	2
79.		BDA Colony	2
80.		Ramganga Tiraha	3
81.		Choupla Pool	6
82.		Mal Godam Road Gate	4
83.	Subbas Nagar	Itawa Road	4
84.		Subhas Nagar Tiraha	6
85.		Cartoon Tiraha	4
86.		Kareli Crossing	4
87.		Madinath Crossing	4
88.		Shanti Bihar Crossing	3
89.		Khanna Building	2
90.		Ganesh Nagar Street No-2	2
91.		Nekpur Crossing	4
92.		Lalita Devi Mandir	2
93.		Chowki Shyamganj	6
94.	Baradari (Chowki Shyam	Shyamganj Pool	6
95.	Ganj)	Bareli College Gate	8
96.		Isaiyon Ki Poolia	6
97.		Ganganagar Chouraha	6

98.		On the corner of Mirchi Street	4
99.		Tiraha near Sahu Gopi Nath College	6
100.		Under Saklaini Market Pool	6
101.		Sahdana Chouraha	8
102.	Kankan Tala	Kutubsah Ki Jiyarat	6
103.		Gosia Masjid Tiraha	6
104.		Kankar Tola Chowki	6
105.		Pipal Ki Mathia Tiraha	6
106.		Near Nawabsah Kothi	4
107.		Chowki Modal Town	6
108.		Sanjay Petrol Pump Tiraha	6
109.	Modal Town	Eat Pajaya Chouraha	8
110.		Sanjay Nagar Tiraha	6
111.		DDPuram Crossing	6
112.		Satellite	8
113.		Bilaspur Chouraha	6
114.		Christian Street	8
115.	la cat Dua	Jagatpur Tiraha/Chouraha	8
116.		Meera Ki Peth	8
117.		Chouki Jagatpur	6
118.		Satispur Chouraha	8
119.		Tulsi Nagar Gate	6
120.		Ravi Chakki	2
121.		Purana Sahar Ejaj Nagar Chouraha	8
122.		Suresh Sharma Nagar Pilibhit Road	6
123.		Bajrang Dhaba Chouraha Pilibhit Road	6
124.		Dohra Mor Chouraha Pilibhit Road	8
125.	logi Nawada	Mahant Ki Chakki Tiraha	3
126.	JORI MAMANA	Durga Nagar Chouraha (Durga Nagar or On Sanjay	6
		Nagar Road)	
127.		Sahnoori Masjid Tiraha	4
128.		Near Bankhandi Temple Sahnoori Masjid	6
129.	Ruhelkhand Chowki	Ruhelkhand University Gate	6

130.		Ruhelkhand Medical College Gate	6
131.	-	Harunagla Poolia	6
132.		Dohara Poolia	6
133.		Aala Hajrat Hospital	4
134.		Sunrise Enclave Colony	8
135.		Green Park Colony	6
136.		Dohra Road Strong Apartment	6
137.		MalukPur Chowk	4
138.	Kila	Chaman Mathiya Chowk	4
139.		Ghosiyan Masjid	3
140.		Thana Kila Gate	2
141.	Total		608

Additionally, PTZ cameras are proposed as below:

Sr	No's of Locations	Proposed PTZ per location	Qty
1.	140	2	280

10.3 Environmental Sensor Locations

Sr	Location	Qty
1.	Moti Park	1
2.	Gandhi udhyan park gate towards Tiraha	1
3.	Parsakhera Industrial Area towards road no 2	1

10.4 Variable Messaging Display (VMD)/ Outdoor Display Locations

Sr	Location Name	Qty
1.	Ghandhi Chowk	1
2.	Choupla Chowk	1
3.	Shyamgunj	1
4.	Ghanta Ghar	1

*MSI shall conduct the joint survey with BSCL to finalized the remaining locations.

10.5 Bill of Material

	Item Description	Quantity	Units
1	ICCC City Operation room		
1.01	Citizen Engagement platform Application	1	Set
1.02	IP Phone Type 1	20	No
1.03	IP Phone Type 2	10	No
1.04	IP-PBX and IP Telephony for helpdesk	1	Set
1.05	Contact Center with Integrated ACD, IVR, Reporting, Voice	1	Cat
1.05	Gateway, Recording, Emergency notification	T	Set
1.06	Monitoring Workstations Two Monitors 24"	15	No
1.07	Desktops for Helpdesk	15	No
1.08	Laptop	5	No
1.09	LCD Projector	2	No
1.1	LED Display 55"	4	No
1.11	Video Conferencing Unit with Multi Conferencing	1	Set
1.10	Videowall (3 rows x 5 columns) with controller (HA) and	1	Cat
1.12	Software	L	Set
1.13	Ceiling Speakers for Control Centre and Conference Room	1	Set
1.14	Ergonomic Officer Furniture and Fixture with Chairs	50	Set
1.15	Multi-Functional Printer Heavy Duty	2	No
1.16	Lazer Printer Mono	2	No
1.17	Diesel Generator (Minimum 250 KVA)	1	No
1.18	Conference Table with Chairs for 10 Person	2	Lot
1.19	ICCC Site preparation Cost	1	Lot
1.2	Access Control System	1	Lot
1.21	Dome Camera	40	No
1.22	PTZ Joystick	15	No
2	ICCC Data Center		
2.01	ICCC C4 Software – Full and Comprehensive version with	1	Cat
2.01	all modules implementation and integration included	T	Set
2.02	Predictive data analytics Platform	1	Set
2.03	Modular Data Center Infrastructure solution with UPS	1	Set
2.04	Intranet Router	2	No
2.05	Internet Router	2	No
2.06	Interconnecting Switch	6	No
2.07	Spine Switch	2	No
2.08	Leaf Fiber Switch	4	No
2.09	Leaf Copper Switch	4	No
2.10	SAN Switch	2	No
2.11	Blade Chassis and Blade Servers (As per the MSI Sizing)	1	Lot
2.12	Server Virtualization Software (As per the MSI Sizing)	1	Lot
2.13	Storage Primary (As per MSI Sizing)	1	Lot
2.14	Storage Secondary (As per the MSI Sizing)	1	Lot
2.15	Backup Solution with Software (As per the MSI Sizing)	1	Lot
2.16	Internet Firewall	2	No
2.17	Intranet Firewall	2	No
2.18	Data Leak Prevention	2	No

	Item Description	Quantity	Units	
2.19	Web Application Firewall	2	No	
2.20	Endpoint and HIPS Protection (As per the MSI Sizing)	1	Lot	
2.21	Anti-Apt	2	No	
2.22	SIEM with Forensics	2	No	
2.23	Anti-DDOS	2	No	
2.24	Server Load Balancer	2	No	
2.25	Link Load Balancer	2	No	
2.26	Identity and Access Management	1	Lot	
2.27	Wi-Fi Access Point with Controller	20	Nos	
2.28	Enterprise Management Solution	1	Lot	
2.29	SMS Gateway System	1	Lot	
2.3	Email Security & Services	1	Lot	
2.31	Online UPS for ICCC	2	No	
2.32	Site Preparation Cost	1	Lot	
2.33	KVM Module	2	No	
2.34	ААА	1	No	
2.35	Antivirus	1	Lot	
2.36	Application & Data Security	1	Lot	
3	DC Bandwidth and Disaster Recovery			
3.01	DR as a service (Sizing as mentioned in RFP)	1	Lot	
3.02	DR Management Software	1	Lot	
3.03	DC - DR Connectivity and Bandwidth	1	Lot	
4	Field Endpoint Connectivity			
4.01	Last Mile Connectivity and Bandwidth	1	Lot	
4.02	Field Passive component as per the RFP specifications	1	Lot	
4.03	DC Connectivity and Aggregate bandwidth	1	Lot	
4 04	Intranet Connectivity and Bandwidth of 11 Locations (9	1	Lot	
	Police station + Tehsil + Sadar) with ICCC	-	201	
4.05	Desktops for Police station, Tehsil and Sadar	11	Nos	
4.06	Internet Connectivity (Sizing As Per Requirement)	1	Lot	
5	ITMS			
6	ATCS			
6.01	3 Signal Aspects –Red, Green & Yellow	168	No	
6.02	1 Signal Aspects -Green Arrow	336	No	
6.03	Vehicle Countdown Timer	84	No	
6.04	Pedestrian Integrated Unit (Walk Man & Stop Man)	168	No	
6.05	Traffic Detector(Thermal Camera)	32	No	
6.06	ATCS Controller with cabinet and other accessories	8	No	
6.07	Signal Controller with cabinet and other accessories	13	No	
6.08	Electrical Supplies (including but not limited to UPS,	24	1	
	Junction box, mounting structure, Ruggedized Switch,	21	LOT	
C 00	Earthing, etc.)	0.4	No	
6.09	Cantilever Poles along with foundation	ŏ4 م <i>ا</i>	No	
0.10	Other civil works (including but not limited to transh	ō4	INU	
6.11	filling ducts junction how chambers mounting structures	21	Lot	
	etc)	21		
	,			
Other services (including but not limited to surveys, installation, commissioning, testing, traffic engineering, etc.) 21 Lot 6.13 ATCS Software (including but not limited to integration, APIs, etc.) 1 Set 6.14 Outdoor PTZ Camera 21 No 7 ITMS Software component - - 7.01 ITMS - RUPS Software and Solution 1 Set 7.02 ITMS - SVD (Instant and Average Speed) software and solution 1 Set 7.04 ITMS - E Challan solution 1 Set 7.05 ITMS - E Challan solution 1 Set 7.06 ITMS - E Camanagement software and solution 1 Set 7.07 ITMS - Traffic Monitoring & Management System 1 Set 7.08 ITMS - Traffic Monitoring & Management System 1 Lot 8.01 Red Light Violation Detection (RLVD) sensors/Camera 84 No 8.02 Camera with ANPR capability 168 No 8.03 Local processing unit (As per requirement) 1 Lot 9.04 Camera, sensors,		Item Description	Quantity	Units
---	-------	--	----------	-------
6.12 installation, commissioning, testing, traffic engineering, etc.) 21 Lot 6.13 ATCS Software (including but not limited to integration, APIs, etc.) 1 Set 6.14 Outdoor PTZ Camera 21 No 7 ITMS Software Component 1 Set 7.01 ITMS - NNPR Software and Solution 1 Set 7.03 ITMS - StyD (Instant and Average Speed) software and solution 1 Set 7.03 ITMS - E Challan solution 1 Set 7.04 ITMS - E Challan solution 1 Set 7.05 ITMS - NA Software and solution 1 Set 7.06 ITMS - Taffic Monitoring & Management System 1 Set 8.01 Red Light Violation Detection (RLVD) sensors/Camera 84 No 8.02 Camera with ANPR capability 168 No 8.03 Local processing unit (As per requirement) 1 Lot 8.04 Marking etc.(As per requirement) 1 Lot 8.04 Mounting structure with pole, junction boxes, Road 1 Lot 8.05 Network Switch Ruggedized (As per req		Other services (including but not limited to surveys,		
etc.) Image: setc.) 6.13 ATCS Software (including but not limited to integration, APIs, etc.) 1 Set 6.14 Outdoor PTZ Camera 21 No 7 ITMS Software Component 1 Set 7.01 ITMS - ANPR Software and Solution 1 Set 7.02 ITMS - SVD (Instant and Average Speed) software and solution 1 Set 7.03 ITMS - E Challan solution 1 Set 7.04 ITMS - E Challan solution 1 Set 7.05 ITMS - PA Software and solution 1 Set 7.06 ITMS - Traffic Monitoring & Management System 1 Set 7.07 ITMS - Traffic Monitoring & Management System 1 Set 8 RtVD - - - 8.01 Red Light Violation Detection (RLVD) sensors/Camera 84 No 8.02 Camera with ANPR capability 168 No 8.03 Local processing unit (As per requirement) 1 Lot 8.04 Mounting structure with pole, jun	6.12	installation, commissioning, testing, traffic engineering,	21	Lot
6.13 ATCS Software (including but not limited to integration, APIs, etc.) 1 Set 6.14 Outdoor PTZ Camera 21 No 7 ITMS Software component		etc.)		
APIs, etc.) 1 No 6.14 Outdoor PTZ Camera 21 No 7 ITMS Software Component 1 Set 7.01 ITMS - ANPR Software and Solution 1 Set 7.02 ITMS - RLVD Software and solution 1 Set 7.03 ITMS - SVD (Instant and Average Speed) software and solution 1 Set 7.04 ITMS - E Challan solution 1 Set 7.05 ITMS - PA Software and solution 1 Set 7.06 ITMS - Variable Message Software and solution 1 Set 7.07 ITMS - Variable Message Software and solution 1 Set 7.08 RtVD 8.01 Red Light Violation Detection (RLVD) sensors/Camera 84 No 8.02 Camera with ANPR capability 168 No 8.03 Local processing unit (As per requirement) 1 Lot 8.04 Mounting structure with pole, junction boxes, Road 1 Lot 9.05 Network Switch Ruggedized (As per requirement) 1 Lot 9.01 camera	6.13	ATCS Software (including but not limited to integration,	1	Set
6.14 Outdoor PTZ Camera 21 No 7 ITMS Software Component 1 Set 7.01 ITMS - NLVD Software and solution 1 Set 7.02 ITMS - RLVD Software and solution 1 Set 7.03 ITMS - SVD (Instant and Average Speed) software and solution 1 Set 7.04 ITMS - E Challan solution 1 Set 7.05 ITMS - PA Software and solution 1 Set 7.06 ITMS - Variable Message Software and solution 1 Set 7.07 ITMS - Traffic Monitoring & Management System 1 Set 7.08 ITMS - Traffic Monitoring & Management System 1 Set 8.01 Red Light Violation Detection (RLVD) sensors/Camera 84 No 8.02 Camera with ANPR capability 168 No 8.03 Local processing unit (As per requirement) 1 Lot 8.04 Mounting structure with pole, junction boxes, Road 1 Lot 8.05 Network Switch Ruggedized (As per requirement) 1 Lot 9.01 camera, sensors, wide angle evidence camera, IR	0.15	APIs, etc.)	-	500
7 ITMS Software Component 7.01 ITMS - ANPR Software and solution 1 Set 7.02 ITMS - RVD Software and solution 1 Set 7.03 ITMS - E Challan solution 1 Set 7.04 ITMS - E Challan solution 1 Set 7.05 ITMS - E Challan solution 1 Set 7.06 ITMS - Variable Message Software and solution 1 Set 7.08 ITMS - Variable Message Software and solution 1 Set 7.08 ITMS - Traffic Monitoring & Management System 1 Set 8.01 Red Light Violation Detection (RLVD) sensors/Camera 84 No 8.02 Camera with ANPR capability 168 No 8.03 Local processing unit (As per requirement) 1 Lot 8.04 Mounting structure with pole, junction boxes, Road 1 Lot 9.01 camera, sensors, wide angle evidence camera, IR 6 No 9.01 sensor, with cabling & mounting (As per requirement) 1 Lot 9.02 Sensor, with cabling & mounting (As per requirement) 1 Lot <td>6.14</td> <td>Outdoor PTZ Camera</td> <td>21</td> <td>No</td>	6.14	Outdoor PTZ Camera	21	No
7.01 ITMS - ANPR Software and Solution 1 Set 7.02 ITMS - RLVD Software and solution 1 Set 7.03 ITMS - SUD (Instant and Average Speed) software and solution 1 Set 7.04 ITMS - SUD (Instant and Average Speed) software and solution 1 Set 7.04 ITMS - E Challan solution 1 Set 7.05 ITMS - E Challan solution 1 Set 7.06 ITMS - ECB management software and solution 1 Set 7.07 ITMS - Variable Message Software and solution 1 Set 7.08 RLVD 8.01 Red Light Violation Detection (RLVD) sensors/Camera 84 No 8.02 Camera with ANPR capability 168 No 8.03 Local processing unit (As per requirement) 1 Lot 8.04 Mounting structure with pole, junction boxes, Road 1 Lot 8.05 Network Switch Ruggedized (As per requirement) 1 Lot 9 SVD 9.01 camera, sensors, wide angle evidence camera, IR <t< td=""><td>7</td><td>ITMS Software Component</td><td></td><td></td></t<>	7	ITMS Software Component		
7.02 ITMS - RLVD Software and solution 1 Set 7.03 ITMS - SVD (Instant and Average Speed) software and solution 1 Set 7.04 ITMS - E Challan solution 1 Set 7.05 ITMS - PA Software and solution 1 Set 7.06 ITMS - PA Software and solution 1 Set 7.07 ITMS - Variable Message Software and solution 1 Set 7.07 ITMS - Variable Message Software and solution 1 Set 7.08 ITMS - Traffic Monitoring & Management System 1 Set 8.01 Red Light Violation Detection (RLVD) sensors/Camera 84 No 8.02 Camera with ANPR capability 168 No 8.03 Local processing unit (As per requirement) 1 Lot 8.04 Mounting structure with pole, junction boxes, Road 1 Lot 9.04 Marking etc. (As per requirement) 1 Lot 9.05 Speed Detection System for covering 2 lanes in one direction with complete subcomponents including ANPR camea, sensors, wide angle evidence camera, IR 6 No 9.01 camera, sensors, wide angle evidence camera, IR	7.01	ITMS - ANPR Software and Solution	1	Set
7.03 ITMS - SVD (Instant and Average Speed) software and solution 1 Set 7.04 ITMS - E Challan solution 1 Set 7.05 ITMS - PA Software and solution 1 Set 7.06 ITMS - ECB management software and solution 1 Set 7.07 ITMS - Variable Message Software and solution 1 Set 7.08 ITMS - Traffic Monitoring & Management System 1 Set 8.01 Red Light Violation Detection (RLVD) sensors/Camera 84 No 8.02 Camera with ANPR capability 1688 No 8.03 Local processing unit (As per requirement) 1 Lot 8.04 Mounting structure with pole, junction boxes, Road 1 Lot 8.05 Network Switch Ruggedized (As per requirement) 1 Lot 9.01 Camera, sensors, wide angle evidence camera, IR 6 No illuminator, non-intrusive speed including SVD average Speed Lic 1 Lot 9.02 Sensor, with cabling & mounting (As per requirement) 1 Lot 9.03 Mounting structure with pole, junction boxes etc. with Network Switch Ruggedized (As per requirem	7.02	ITMS - RLVD Software and solution	1	Set
7.04 ITMS - E Challan solution 1 Set 7.05 ITMS - PA Software and solution 1 Set 7.06 ITMS - PA Software and solution 1 Set 7.07 ITMS - Variable Message Software and solution 1 Set 7.08 ITMS - Traffic Monitoring & Management System 1 Set 8.01 Red Light Violation Detection (RLVD) sensors/Camera 84 No 8.01 Red Light Violation Detection (RLVD) sensors/Camera 84 No 8.02 Camera with ANPR capability 168 No 8.03 Local processing unit (As per requirement) 1 Lot 8.04 Mounting structure with pole, junction boxes, Road 1 Lot 8.05 Network Switch Ruggedized (As per requirement) 1 Lot 9.01 Speed Detection System for covering 2 lanes in one direction with complete subcomponents including ANPR camera, sensors, wide angle evidence camera, IR 6 No 9.01 Sensor, with cabling & mounting (As per requirement) 1 Lot 9.02 Sensor, with cabling Integration with ICCC 1 Lot 9.03 Mountring structure with pole, j	7.03	ITMS - SVD (Instant and Average Speed) software and	1	Set
7.04 ITMS - E Challan solution 1 Set 7.05 ITMS - PA Software and solution 1 Set 7.06 ITMS - ECB management software and solution 1 Set 7.07 ITMS - CEB management software and solution 1 Set 7.08 ITMS - Traffic Monitoring & Management System 1 Set 8 RLVD		solution	_	
7.05 ITMS - PA Software and solution 1 Set 7.06 ITMS - ECB management software and solution 1 Set 7.07 ITMS - Variable Message Software and solution 1 Set 7.08 ITMS - Traffic Monitoring & Management System 1 Set 8 RLVD 1 Set 8.01 Red Light Violation Detection (RLVD) sensors/Camera 84 No 8.02 Camera with ANPR capability 168 No 8.03 Local processing unit (As per requirement) 1 Lot 8.04 Mounting structure with pole, junction boxes, Road 1 Lot 9 SVD 1 Lot 9 SVD 1 Lot 9 SVD 1 Lot 9 SVD 1 Lot 9.01 camera, sensors, wide angle evidence camera, IR 6 No illuminator, non-intrusive speed including SVD average Speed Lic 1 Lot 9.02 Sensor, with cabling & mounting (As per requirement) 1 Lot 10 Smart Elements including Integration with ICCC </td <td>7.04</td> <td>ITMS – E Challan solution</td> <td>1</td> <td>Set</td>	7.04	ITMS – E Challan solution	1	Set
7.06 ITMS - ECB management software and solution 1 Set 7.07 ITMS - Variable Message Software and solution 1 Set 7.08 ITMS - Traffic Monitoring & Management System 1 Set 8 RLVD 8.01 Red Light Violation Detection (RLVD) sensors/Camera 84 No 8.02 Camera with ANPR capability 168 No 8.03 Local processing unit (As per requirement) 1 Lot 8.04 Mounting structure with pole, junction boxes, Road Marking etc. (As per requirement) 1 Lot 9 Sypeed Detection System for covering 2 lanes in one direction with complete subcomponents including ANPR 6 No 9.01 camera, sensors, wide angle evidence camera, IR illuminator, non-intrusive speed including SVD average Speed Lic 6 No 9.02 Sensor, with cabling & mounting (As per requirement) 1 Lot 9.03 Mounting structure with pole, junction boxes etc. with Network Switch Ruggedized (As per requirement) 1 Lot 9.03 Sonart Elements including Integration with ICCC 10.01 Public Address System – IP based PA with speakers <td>7.05</td> <td>ITMS - PA Software and solution</td> <td>1</td> <td>Set</td>	7.05	ITMS - PA Software and solution	1	Set
7.07 ITMS - Variable Message Software and solution 1 Set 7.08 ITMS - Traffic Monitoring & Management System 1 Set 8 RLVD 1 Set 8.01 Red Light Violation Detection (RLVD) sensors/Camera 84 No 8.02 Camera with ANPR capability 168 No 8.03 Local processing unit (As per requirement) 1 Lot 8.04 Mounting structure with pole, junction boxes, Road Marking etc.(As per requirement) 1 Lot 9 Speed Detection System for covering 2 lanes in one direction with complete subcomponents including ANPR 6 No 9.01 Camera, sensors, wide angle evidence camera, IR illuminator, non-intrusive speed including SVD average Speed Lic 6 No 9.02 Sensor, with cabling & mounting (As per requirement) 1 Lot 9.03 Mounting structure with pole, junction boxes etc. with Network Switch Ruggedized (As per requirement) 1 Lot 9.03 Sonart Elements including Integration with ICCC 1 Lot 10.01 Public Address System – IP based PA with speakers 25 No 10.02 hardware and accessories as required + Mounting structur	7.06	ITMS - ECB management software and solution	1	Set
7.08 ITMS – Traffic Monitoring & Management System 1 Set 8 RLVD	7.07	ITMS - Variable Message Software and solution	1	Set
8RtVD8.01Red Light Violation Detection (RLVD) sensors/Camera848.02Camera with ANPR capability1688.03Local processing unit (As per requirement)18.04Mounting structure with pole, junction boxes, Road Marking etc.(As per requirement)18.05Network Switch Ruggedized (As per requirement)19SVD	7.08	ITMS – Traffic Monitoring & Management System	1	Set
8.01Red Light Violation Detection (RLVD) sensors/Camera84No8.02Camera with ANPR capability168No8.03Local processing unit (As per requirement)1Lot8.04Mounting structure with pole, junction boxes, Road Marking etc.(As per requirement)1Lot8.05Network Switch Ruggedized (As per requirement)1Lot9SVD	8	RLVD		
8.02Camera with ANPR capability168No8.03Local processing unit (As per requirement)1Lot8.04Mounting structure with pole, junction boxes, Road Marking etc.(As per requirement)1Lot8.05Network Switch Ruggedized (As per requirement)1Lot9SVD	8.01	Red Light Violation Detection (RLVD) sensors/Camera	84	No
8.03 Local processing unit (As per requirement) 1 Lot 8.04 Mounting structure with pole, junction boxes, Road Marking etc. (As per requirement) 1 Lot 8.05 Network Switch Ruggedized (As per requirement) 1 Lot 9 SVD 1 Lot 9 Speed Detection System for covering 2 lanes in one direction with complete subcomponents including ANPR 6 No 9.01 camera, sensors, wide angle evidence camera, IR illuminator, non-intrusive speed including SVD average Speed Lic 6 No 9.02 Sensor, with cabling & mounting (As per requirement) 1 Lot 9.03 Mounting structure with pole, junction boxes etc. with Network Switch Ruggedized (As per requirement) 1 Lot 10.01 Public Address System – IP based PA with speakers 25 No 10.02 hardware and accessories as required + Mounting structure for VMS including UPS facility as per specifications 16 No 10.03 ECB system 6 No 10.04 Environmental sensors 3 No 10.04 Environmental sensors 3 No 1 Lot 10.05 UPS (of required capacity)(As per requirement)	8.02	Camera with ANPR capability	168	No
8.04Mounting structure with pole, junction boxes, Road Marking etc.(As per requirement)1Lot8.05Network Switch Ruggedized (As per requirement)1Lot9SVD1Lot9Sypeed Detection System for covering 2 lanes in one direction with complete subcomponents including ANPR 9.016No9.01camera, sensors, wide angle evidence camera, IR illuminator, non-intrusive speed including SVD average Speed Lic6No9.02Sensor, with cabling & mounting (As per requirement)1Lot9.03Mounting structure with pole, junction boxes etc. with Network Switch Ruggedized (As per requirement)1Lot10Smart Elements including Integration with ICCCIII10.01Public Address System – IP based PA with speakers25No10.02hardware and accessories as required + Mounting structure for VMS including UPS facility as per specifications1Lot10.03ECB system6NoNo10.04Environmental sensors3No1Lot10.05UPS (of required capacity)(As per requirement)1Lot1Lot10.06Mounting structure with pole etc.(As per requirement)1Lot1Lot10.05UPS (of required capacity)(As per requirement)1Lot1Lot10.06Mounting structure with pole etc.(As per requirement)1Lot1Lot10.05UPS (of required capacity)(As per requirement)1Lot <td>8.03</td> <td>Local processing unit (As per requirement)</td> <td>1</td> <td>Lot</td>	8.03	Local processing unit (As per requirement)	1	Lot
Marking etc.(As per requirement)1Lot8.05Network Switch Ruggedized (As per requirement)1Lot9SVD	8 04	Mounting structure with pole, junction boxes, Road	1	Lot
8.05 Network Switch Ruggedized (As per requirement) 1 Lot 9 SVD Image: Speed Detection System for covering 2 lanes in one direction with complete subcomponents including ANPR No 9.01 camera, sensors, wide angle evidence camera, IR 6 No 9.02 Sensor, with cabling & mounting (As per requirement) 1 Lot 9.03 Mounting structure with pole, junction boxes etc. with Network Switch Ruggedized (As per requirement) 1 Lot 10 Smart Elements including Integration with ICCC Image: Complexity of the comp	0.04	Marking etc.(As per requirement)	-	201
9SVDImage: SVDSpeed Detection System for covering 2 lanes in one direction with complete subcomponents including ANPRA9.01camera, sensors, wide angle evidence camera, IR illuminator, non-intrusive speed including SVD average Speed Lic69.02Sensor, with cabling & mounting (As per requirement)19.03Mounting structure with pole, junction boxes etc. with Network Switch Ruggedized (As per requirement)110Smart Elements including Integration with ICCCImage: Complexity of the speed of the sp	8.05	Network Switch Ruggedized (As per requirement)	1	Lot
Speed Detection System for covering 2 lanes in one direction with complete subcomponents including ANPR camera, sensors, wide angle evidence camera, IR6No9.01camera, sensors, wide angle evidence camera, IR illuminator, non-intrusive speed including SVD average Speed Lic6No9.02Sensor, with cabling & mounting (As per requirement)1Lot9.03Mounting structure with pole, junction boxes etc. with Network Switch Ruggedized (As per requirement)1Lot10Smart Elements including Integration with ICCC10.01Public Address System – IP based PA with speakers25No10.02hardware and accessories as required + Mounting structure for VMS including UPS facility as per specifications16No10.03ECB system6No10.04Environmental sensors3No10.05UPS (of required capacity)(As per requirement)1Lot10.07Junction boxes, Civil work, Electrical work, UPS and other auxiliary equipment required (As per requirement)1Lot10.07Outdoor Fixed Bullet Cameras + IR Illuminator583No11.02Outdoor Fixed Bullet Cameras + IR Illuminator583No	9	SVD		
direction with complete subcomponents including ANPR camera, sensors, wide angle evidence camera, IR6No9.01camera, sensors, wide angle evidence camera, IR6Noilluminator, non-intrusive speed including SVD average Speed Lic1Lot9.02Sensor, with cabling & mounting (As per requirement)1Lot9.03Mounting structure with pole, junction boxes etc. with Network Switch Ruggedized (As per requirement)1Lot10Smart Elements including Integration with ICCC10.01Public Address System – IP based PA with speakers25No10.02hardware and accessories as required + Mounting structure for VMS including UPS facility as per specifications16No10.03ECB system6No10.04Environmental sensors3No10.05UPS (of required capacity)(As per requirement)1Lot10.07Junction boxes, Civil work, Electrical work, UPS and other auxiliary equipment required (As per requirement)1Lot10.07Outdoor Fixed Bullet Cameras + IR Illuminator583No11.01Outdoor Fixed Bullet Cameras + IR Illuminator583No		Speed Detection System for covering 2 lanes in one		
9.01camera, sensors, wide angle evidence camera, IR illuminator, non-intrusive speed including SVD average Speed Lic6No9.02Sensor, with cabling & mounting (As per requirement)1Lot9.03Mounting structure with pole, junction boxes etc. with Network Switch Ruggedized (As per requirement)1Lot10Smart Elements including Integration with ICCC1Lot10.01Public Address System – IP based PA with speakers25No10.02hardware and accessories as required + Mounting structure for VMS including UPS facility as per specifications16No10.03ECB system6No10.04Environmental sensors3No10.05UPS (of required capacity)(As per requirement)1Lot10.07Junction boxes, Civil work, Electrical work, UPS and other auxiliary equipment required (As per requirement)1Lot11Surveillance System1Lot10.07Outdoor Fixed Bullet Cameras + IR Illuminator583No11.02Outdoor Fixed Bullet Cameras (4k) + IR Illuminator25No		direction with complete subcomponents including ANPR		
Illuminator, non-intrusive speed including SVD average Speed LicI9.02Sensor, with cabling & mounting (As per requirement)1Lot9.03Mounting structure with pole, junction boxes etc. with Network Switch Ruggedized (As per requirement)1Lot10Smart Elements including Integration with ICCC10.01Public Address System – IP based PA with speakers25No10.02hardware and accessories as required + Mounting structure for VMS including UPS facility as per specifications16No10.03ECB system6No10.04Environmental sensors3No10.05UPS (of required capacity)(As per requirement)1Lot10.07Junction boxes, Civil work, Electrical work, UPS and other auxiliary equipment required (As per requirement)1Lot11Surveillance System583No11.01Outdoor Fixed Bullet Cameras + IR Illuminator583No	9.01	camera, sensors, wide angle evidence camera, IR	6	No
Speed LicImage: Speed Lic9.02Sensor, with cabling & mounting (As per requirement)1Lot9.03Mounting structure with pole, junction boxes etc. with Network Switch Ruggedized (As per requirement)1Lot10Smart Elements including Integration with ICCC10.01Public Address System – IP based PA with speakers25No10.02Hoddress System – IP based PA with speakers25No10.03ECB system and accessories as required + Mounting structure for VMS including UPS facility as per specifications16No10.04Environmental sensors3No10.05UPS (of required capacity)(As per requirement)1Lot10.07Junction boxes, Civil work, Electrical work, UPS and other auxiliary equipment required (As per requirement)1Lot11.01Outdoor Fixed Bullet Cameras + IR Illuminator583No11.02Outdoor Fixed Bullet Cameras (4k) + IR Illuminator25No		illuminator, non-intrusive speed including SVD average		
9.02Sensor, with cabing & mounting (As per requirement)1Lot9.03Mounting structure with pole, junction boxes etc. with Network Switch Ruggedized (As per requirement)1Lot10Smart Elements including Integration with ICCC1Lot10.01Public Address System – IP based PA with speakers25No10.02hardware and accessories as required + Mounting structure for VMS including UPS facility as per specifications16No10.03ECB system6No10.04Environmental sensors3No10.05UPS (of required capacity)(As per requirement)1Lot10.07Junction boxes, Civil work, Electrical work, UPS and other auxiliary equipment required (As per requirement)1Lot11Surveillance System1Lot11.01Outdoor Fixed Bullet Cameras + IR Illuminator583No11.02Outdoor Fixed Bullet Cameras (4k) + IR Illuminator25No	0.02	Speed LIC	1	
9.03Mounting structure with pole, junction boxes etc. with Network Switch Ruggedized (As per requirement)1Lot10Smart Elements including Integration with ICCC10.01Public Address System – IP based PA with speakers25No10.02Public Address System – IP based PA with speakers25No10.02VMS board including VMS controller size 3000mm*1500mm*200 mm (minimum) with complete hardware and accessories as required + Mounting structure for VMS including UPS facility as per specifications16No10.03ECB system6No10.04Environmental sensors3No10.05UPS (of required capacity)(As per requirement)1Lot10.06Mounting structure with pole etc.(As per requirement)1Lot10.07Junction boxes, Civil work, Electrical work, UPS and other auxiliary equipment required (As per requirement)1Lot11Surveillance System583No11.01Outdoor Fixed Bullet Cameras + IR Illuminator583No11.02Outdoor Fixed Bullet Cameras (4k) + IR Illuminator25No	9.02	Sensor, with cabling & mounting (As per requirement)	L	Lot
10Smart Elements including Integration with ICCC10.01Public Address System – IP based PA with speakers2510.01Public Address System – IP based PA with speakers2510.01Public Address System – IP based PA with speakers2510.02NoVMS board including VMS controller size 3000mm*1500mm*200 mm (minimum) with complete10.02hardware and accessories as required + Mounting structure for VMS including UPS facility as per specifications1610.03ECB system610.04Environmental sensors310.05UPS (of required capacity)(As per requirement)110.06Mounting structure with pole etc.(As per requirement)110.07Junction boxes, Civil work, Electrical work, UPS and other auxiliary equipment required (As per requirement)111Surveillance System111.01Outdoor Fixed Bullet Cameras + IR Illuminator58311.02Outdoor Fixed Bullet Cameras (4k) + IR Illuminator25	9.03	Notwork Switch Buggediand (As per requirement)	1	Lot
10Smart Elements including integration with rect10.01Public Address System – IP based PA with speakers2510.01Public Address System – IP based PA with speakers2510.02NOVMS board including VMS controller size 3000mm*1500mm*200 mm (minimum) with complete10.02hardware and accessories as required + Mounting structure for VMS including UPS facility as per specifications1610.03ECB system610.04Environmental sensors310.05UPS (of required capacity)(As per requirement)110.06Mounting structure with pole etc.(As per requirement)110.07Junction boxes, Civil work, Electrical work, UPS and other auxiliary equipment required (As per requirement)111Surveillance System111.01Outdoor Fixed Bullet Cameras + IR Illuminator58311.02Outdoor Fixed Bullet Cameras (4k) + IR Illuminator25	10	Smort Elements including Integration with ICCC		
10.01Public Address System – IP based PA with speakers2.5NoVMS board including VMS controller size 3000mm*1500mm*200 mm (minimum) with complete hardware and accessories as required + Mounting structure for VMS including UPS facility as per specifications16No10.02ECB system6No10.03ECB system6No10.04Environmental sensors3No10.05UPS (of required capacity)(As per requirement)1Lot10.06Mounting structure with pole etc.(As per requirement)1Lot10.07Junction boxes, Civil work, Electrical work, UPS and other auxiliary equipment required (As per requirement)1Lot11Surveillance System-1Lot11.01Outdoor Fixed Bullet Cameras + IR Illuminator583No11.02Outdoor Fixed Bullet Cameras (4k) + IR Illuminator25No	10 01	Smart Elements including integration with rece	25	Ne
10.02Nors board including VMs controller size 3000mm*1500mm*200 mm (minimum) with complete hardware and accessories as required + Mounting structure for VMS including UPS facility as per specifications16No10.03ECB system6No10.04Environmental sensors3No10.05UPS (of required capacity)(As per requirement)1Lot10.06Mounting structure with pole etc.(As per requirement)1Lot10.07Junction boxes, Civil work, Electrical work, UPS and other auxiliary equipment required (As per requirement)1Lot11Surveillance System1Lot11.01Outdoor Fixed Bullet Cameras + IR Illuminator583No11.02Outdoor Fixed Bullet Cameras (4k) + IR Illuminator25No	10.01	VMC board including VMC controller size	25	INO
10.02hardware and accessories as required + Mounting structure for VMS including UPS facility as per specifications16No10.03ECB system6No10.04Environmental sensors3No10.05UPS (of required capacity)(As per requirement)1Lot10.06Mounting structure with pole etc.(As per requirement)1Lot10.07Junction boxes, Civil work, Electrical work, UPS and other auxiliary equipment required (As per requirement)1Lot11Surveillance System6No11.01Outdoor Fixed Bullet Cameras + IR Illuminator583No11.02Outdoor Fixed Bullet Cameras (4k) + IR Illuminator25No		2000mm*1E00mm*200 mm (minimum) with complete		
10.02Inardware and accessories as required + Modulting1010structure for VMS including UPS facility as per specifications6No10.03ECB system6No10.04Environmental sensors3No10.05UPS (of required capacity)(As per requirement)1Lot10.06Mounting structure with pole etc.(As per requirement)1Lot10.07Junction boxes, Civil work, Electrical work, UPS and other auxiliary equipment required (As per requirement)1Lot11Surveillance System11.01Outdoor Fixed Bullet Cameras + IR Illuminator583No11.02Outdoor Fixed Bullet Cameras (4k) + IR Illuminator25No	10.02	bardware and accessories as required + Mounting	16	No
structure for VMS including OFS facility as per specifications610.03ECB system610.04Environmental sensors310.05UPS (of required capacity)(As per requirement)110.06Mounting structure with pole etc.(As per requirement)110.07Junction boxes, Civil work, Electrical work, UPS and other auxiliary equipment required (As per requirement)111Surveillance System111.01Outdoor Fixed Bullet Cameras + IR Illuminator583No11.02Outdoor Fixed Bullet Cameras (4k) + IB Illuminator25No	10.02	structure for VMS including LIPS facility as per		
10.03ECB system6No10.04Environmental sensors3No10.05UPS (of required capacity)(As per requirement)1Lot10.06Mounting structure with pole etc.(As per requirement)1Lot10.07Junction boxes, Civil work, Electrical work, UPS and other auxiliary equipment required (As per requirement)1Lot11Surveillance System1Lot11.01Outdoor Fixed Bullet Cameras + IR Illuminator583No11.02Outdoor Fixed Bullet Cameras (4k) + IR Illuminator25No		specifications		
10.05Leb system1010.04Environmental sensors3No10.05UPS (of required capacity)(As per requirement)1Lot10.06Mounting structure with pole etc.(As per requirement)1Lot10.07Junction boxes, Civil work, Electrical work, UPS and other auxiliary equipment required (As per requirement)1Lot11Surveillance System1Lot11.01Outdoor Fixed Bullet Cameras + IR Illuminator583No11.02Outdoor Fixed Bullet Cameras (4k) + IR Illuminator25No	10.03	FCB system	6	No
10.04Environmental sensors3No10.05UPS (of required capacity)(As per requirement)1Lot10.06Mounting structure with pole etc.(As per requirement)1Lot10.07Junction boxes, Civil work, Electrical work, UPS and other auxiliary equipment required (As per requirement)1Lot11Surveillance System1Lot11.01Outdoor Fixed Bullet Cameras + IR Illuminator583No11.02Outdoor Fixed Bullet Cameras (4k) + IR Illuminator25No	10.03	Environmental sensors	3	No
10.05Or 5 (or required capacity) (As per requirement)1Lot10.06Mounting structure with pole etc. (As per requirement)1Lot10.07Junction boxes, Civil work, Electrical work, UPS and other auxiliary equipment required (As per requirement)1Lot11Surveillance System1Lot11.01Outdoor Fixed Bullet Cameras + IR Illuminator583No11.02Outdoor Fixed Bullet Cameras (4k) + IR Illuminator25No	10.04	LIPS (of required capacity)(As per requirement)	1	Lot
10.00 Woulding structure with pole etc. (As per requirement) 1 Lot 10.07 Junction boxes, Civil work, Electrical work, UPS and other auxiliary equipment required (As per requirement) 1 Lot 11 Surveillance System 1 Lot 11.01 Outdoor Fixed Bullet Cameras + IR Illuminator 583 No 11.02 Outdoor Fixed Bullet Cameras (4k) + IR Illuminator 25 No	10.05	Mounting structure with note atc (As per requirement)	1	Lot
10.07Junction Boxes, civil work, Electrical work, or s and other auxiliary equipment required (As per requirement)1Lot11Surveillance System111.01Outdoor Fixed Bullet Cameras + IR Illuminator583No11.02Outdoor Fixed Bullet Cameras (4k) + IR Illuminator25No	10.00	Junction boxes Civil work Electrical work LIPS and other	1	LOI
11Surveillance System11.01Outdoor Fixed Bullet Cameras + IR Illuminator58311.02Outdoor Fixed Bullet Cameras (4k) + IR Illuminator25	10.07	auxiliary equipment required (As per requirement)	1	Lot
11.01 Outdoor Fixed Bullet Cameras + IR Illuminator 583 No 11.02 Outdoor Fixed Bullet Cameras (4k) + IR Illuminator 25 No	11	Surveillance System		
11.02 Outdoor Fixed Bullet Cameras (4k) + IR Illuminator 25 No	11.01	Outdoor Fixed Bullet Cameras + IR Illuminator	5.83	No
	11.02	Outdoor Fixed Bullet Cameras (4k) + IR Illuminator	25	No

	Item Description	Quantity	Units
11.03	Outdoor PTZ Camera	280	No
11.04	Surveillance Camera (with Voice Input)	10	No
11.05	Video Management Software with VA and Analytics	1	Lot
11.06	Ruggedized switch	250	No
11.07	Mobile Bike/ Body Worn Camera	20	No
11.08	Drone camera with one additional battery	6	No
11.09	Mounting structure with pole etc. (As per requirement)	1	Lot
11 10	Junction boxes, Civil work, Electrical Work and other	1	Lot
11.10	auxiliary equipment required (As Per Requirement)	T	LUI
12	City Portal and E-Gov		
	E-Gov (City Management Platform and Integration with		
12.01	Mera Bareilly, National and International Promotion) for	1	Set
	100 workflow users.		
12.02	City Portal	1	Set
12.03	Mobile Application	1	Set
13	Manpower		
13.01	Manpower as per the RFP	1	Lot
14	Solid Waste Management with ICCC Integration		
14.01	Smart Bin Pair	134	No
14.02	RFID Reader (With Controller) for vehicles	30	No
14.03	RFID Tags for house to Commercial Bins	10000	No
14.04	Smart Bin Software Supply & Installation for data centre	1	Cat
14.04	hosting including DB, solution and Lic Cost	T	Set
14.05	Connectivity (GSM sim) Pair	134	No
14.06	VTMS (Vehicle Tracking and Monitoring system) – In House	1	Lot
14.00	solution with customization cost including Licenses	Ţ	LOI
14.07	GPS Devices (for Vehicles) including Installation & support	30	No
1/ 08	Field Staff Centric Mobile Application Customization &	1	Sot
14.00	integration	1	Jei
15	Smart Parking Management with ICCC Integration		
15.01	Smart Parking Management System with Mobile App	1	Set
15.02	Boom Barrier Entry & Exit 4 wheeler	20	No
15.03	Boom Barrier Entry & Exit 2 wheeler	20	No
15.04	Outdoor Fixed Bullet Cameras + IR Illuminator	50	No
	Ticket Collecting Machine / Wireless Handheld Device with	50	No
15.05	Connectivity	50	NO
15.06	Variable messaging signs(VMS) for entry gate	20	No
15.07	Controller with Connectivity	20	No
15.00	Junction boxes, Civil work, Electrical work, UPS and other	1	Lot
15.08	auxiliary equipment required (As per requirement)	Ţ	LOL
16	Other Smart city Solution		
16.01	Single Window clearance for Bareilly	1	Lot
16.00	Capacity Building for Smart City Operation and Citizen	1	Lot
10.02	Training		LOC
16.02	Other Software and hardware required for the Solution	1	Lot
10.03	MSI	L	LUC

Note :

All the above-mentioned line items should comply to Minimum Technical specifications and Scope of work includes all applicable Licenses, Cables and Accessories, Installation, Commissioning and Configuration with 5 Year Operation & Maintenance including warranty and support.



Request for Proposal for Selection of Master System Integrator for Integrated Command and Control Centre (ICCC) of Bareilly Smart City Limited (BSCL) (including 5 years O&M)

Volume III: Master Service Level Agreement Bareilly Smart City Limited (BSCL)

Table of Contents

A.	G	eneral conditions of contract (GCC)	4
	1.	Definition of Terms	4
	2.	Interpretation	6
	3.	Conditions Precedent	7
	4.	Scope of work	7
	5.	Key Performance Measurements	8
	6.	Commencement and Progress	8
	7.	Standards of performance	9
	8.	Approvals and Required Consents	9
	9.	Constitution of Consortium	9
	10.	Bidder's Obligations	.10
	11.	Authority's Obligations	. 18
	12.	Payments	. 19
	13.	Intellectual Property Rights	.20
	14.	Taxes	.21
	15.	Indemnity	.22
	16.	Warranty	.22
	17.	Term and Extension of the Contract	.23
	18.	Dispute Resolution	.24
	19.	Time is the essence	.25
	20.	Conflict of interest	.25
	21.	Publicity	.25
	22.	Force Majeure	.25
	23.	Delivery	.26
	24.	Insurance	.26
	25.	Transfer of Ownership	.27
	26.	Exit Management Plan	.27
в.	S	pecial conditions of contract (SCC)	.29
	27.	Performance Security	. 29
	28.	Liquidated Damages (Phase-1)	. 29
	29.	Limitation of Liability:	. 29
	30.	Ownership and Retention of Documents	.30
	31.	Information Security	.30
	32.	Records of contract documents	.31
	33.	Security and Safety	.31
	34.	Confidentiality	.32
	35.	Events of Default by SI	.32

3	6.	Termination
3	7.	Consequence of Termination
3	8.	Change Control Note (CCN)
C.	Se	ervice levels
3	9.	Purpose
4	0.	Service Level Agreements & Targets
4	1.	General principles of Service Level Agreements
4	2.	Service Levels Monitoring
4	3.	Penalties for Non/Under Performance (Phase-2)
4	4.	Reporting Procedures
4	5.	Issue Management Procedures52
4	6.	Service Level Change Control53
D.	A	NNEXURES
А	nne	ex I: Change Control Note54
Annex II: Form of Agreement5		

A. General conditions of contract (GCC)

1. Definition of Terms

- 1.1. "Acceptance of System": The system shall be deemed to have been accepted by the Authority, subsequent to its installation, rollout & deployment of trained manpower, when all the activities as defined in Scope of Work have been successfully executed and completed to the satisfaction of Authority or when the authority uses the deliverables for its intended use, whichever is earlier. Refer Section 5 of RFP Volume II
- 1.2. "Applicable Law(s)": Any statute, law, ordinance, notification, rule, regulation, judgment, order, decree, bye-law, guideline, requirement or other governmental restriction or any similar form of decision applicable to the relevant party and as may be in effect on the date of the execution of this Agreement and during the subsistence thereof, applicable to the Project.
- 1.3. "Authority" means the Bareilly Smart City Limited. The project shall be executed in Bareilly and shall be owned by Bareilly Smart City Limited and Bareilly Smart City Limited.
- 1.4. "Bidder" shall mean organization/ consortium submitting the proposal in response to this RFP.
- 1.5. "SI" means the bidder who is selected by the Authority at the end of this RFP process.The agency shall carry out all the services mentioned in the scope of work of this RFP.
- 1.6. "Contract" means the Contract entered into by the parties with the entire documentation specified in the RFP.
- 1.7. "Contract Value" means the price payable to SI under this Contract for the full and proper performance of its contractual obligations.
- "Commercial Off-The-Shelf (COTS)" refers to software products that are ready-made and available for sale, lease, or license to the general public.
- 1.9. "Data Centre Site" means the Data Centre sites including their respective Data Centre space, wherein the delivery, installation, integration, management and maintenance services as specified under the scope of work are to be carried out for the purpose of this contract.

- 1.10. "Document" means any embodiment of any text or image however recorded and includes any data, text, images, sound, voice, codes, databases or any other electronic documents as per IT Act 2000.
- 1.11. **"Effective Date"** means the date on which this Contract is signed or LoI is issued by Authority, whichever is earlier and executed by the parties hereto. If this Contract is executed in parts, then the date on which the last of such Contracts is executed shall be construed to be the Effective Date.
- 1.12. "GCC" means General Conditions of Contract
- 1.13. "Goods" means all of the equipment, sub-systems, hardware, software, products accessories, software and/or other material / items which SI is required to supply, install and maintain under the contract.
- 1.14. "[ULB HO]" means City operational center. The site for the same shall be informed to selected bidder.
- 1.15. **"City** operation center" OR "COC" & "Command and Control Center" or "CCC" means the center from where Bareilly Smart City Limited would conduct centralized operations & surveillance on civil issues on the entire Bareilly City.
- 1.16. "Intellectual Property Rights" means any patent, copyright, trademark, trade name, service marks, brands, proprietary information whether arising before or after the execution of this Contract and the right to ownership and registration of these rights.
- 1.17. "Go- Live" means commissioning of project after commencement of all smart city components, including training as per scope of work mentioned in RFP. Bidder should have the approval from Authority for user acceptance testing.
- 1.18. "Notice" means: a notice; or a consent, approval or other communication required to be in writing under this Contract.
- 1.19. **"OEM"** means the **Original Equipment Manufacturer of any equipment / system / software / product** which are providing such goods to the Authority under the scope of this RFP.
- 1.20. **"SI's Team"** means SI who has to provide goods & services to the Authority under the scope of this Contract. This definition shall also include any and/or all of the employees of SI, authorized service providers/ partners and representatives or other personnel employed or engaged either directly or indirectly by SI for the purposes of this Contract.

- 1.21. **"Consortium"** means the entity named in the contract for any part of the work has been sublet with the consent in writing of the Authority and the heirs, legal representatives, successors and assignees of such person.
- 1.22. "Replacement Service Provider" means the organization replacing SI in case of contract termination for any reasons for reasons arising out of breach of contract by SI
- 1.23. "**Sub-Contractor**" shall mean the entity named in the contract for any part of the work or any person to whom any part of the contract has been sublet with the consent in writing of the Authority and the heirs, legal representatives, successors and assignees of such person.
- 1.24. "SCC" means Special Conditions of Contract.
- 1.25. **"Services"** means the work to be performed by the agency pursuant to this RFP and to the contract to be signed by the parties in pursuance of any specific assignment awarded by the Authority.

2. Interpretation

- 2.1. In this Contract unless a contrary intention is evident:
 - a. the clause headings are for convenient reference only and do not form part of this Contract;
 - b. unless otherwise specified a reference to a clause number is a reference to all of its sub-clauses;
 - c. the word "include" or "including" shall be deemed to be followed by "without limitation" or "but not limited to" whether or not they are followed by such phrases;
 - d. unless otherwise specified a reference to a clause, sub-clause or section is a reference to a clause, sub-clause or section of this Contract including any amendments or modifications to the same from time to time;
 - e. a word in the singular includes the plural and a word in the plural includes the singular;
 - f. a word importing a gender includes any other gender;
 - g. a reference to a person includes a partnership and a body corporate;
 - h. a reference to legislation includes legislation repealing, replacing or amending that legislation;

- i. where a word or phrase is given a particular meaning, it includes the appropriate grammatical forms of that word or phrase which have corresponding meanings.
- j. in the event of an inconsistency between the terms of this Contract and the RFP and the Bid, the terms hereof shall prevail.

3. Conditions Precedent

This Contract is subject to the fulfillment of the following conditions precedent by SI.

- 3.1. Furnishing by SI, an unconditional and irrevocable Performance Bank Guarantee of 10% of the contract value (PBG) (Annexure 7 (a) of the RFP Volume I) and acceptable to the Authority which would remain valid until such time as stipulated by the Authority.
- 3.2. Obtaining of all statutory and other approvals required for the performance of the Services under this Contract. This may include approvals/clearances, wherever applicable, that may be required for execution of this contract e.g. clearances from Government authorities for importing equipment, exemption of Tax/Duties/Levies, work permits/clearances for Bidder/Bidder's team, etc.
- 3.3. Furnish notarized copies of any/all contract(s) duly executed by SI and its OEMs existing, at the time of signing of this contract in relation to the Authority's project. Failure to do so within stipulated time of signing of contract would attract penalty as defined in clause 42 in this Section.
- 3.4. Furnishing of such other documents as the Authority may specify/ demand.
- 3.5. The Authority reserves the right to waive any or all of the conditions specified in Clause 3 above in writing and no such waiver shall affect or impair any right, power or remedy that the Authority may otherwise have.
- 3.6. In the event that any of the conditions set forth in Clause 3 herein above are not fulfilled within 1 months from the date of this Contract, or such later date as may be mutually agreed upon by the parties, the Authority may terminate this Contract.
- 3.7. In case there is a contradiction in RFP then Pre-bid clarification and corrigendum can be referred.

4. Scope of work

4.1. Scope of the work shall be as defined in **RFP Volume II** and Annexures thereto of the tender.

4.2. Authority has engaged SI to provide services related to implementation of Bareilly Smart City solutions using which the Authority intends to perform its business operations. SI is required to provide such goods, services and support as the Authority may deem proper and necessary, during the term of this Contract, and includes all such processes and activities which are consistent with the proposals set forth in the Bid, the Tender and this Contract and are deemed necessary by the Authority, in order to meet its business requirements (hereinafter 'scope of work').

5. Key Performance Measurements

- 5.1. Unless specified by the Authority to the contrary, SI shall deliver the goods, perform the services and carry out the scope of work in accordance with the terms of this Contract, Scope of Work and the Service Specifications as laid down under *Service Level Agreement section*.
- 5.2. If the Contract, scheduled requirements, service specification includes more than one document, then unless the Authority specifies to the contrary, the later in time as mutually agreed and discussed by both parties shall prevail over a document of earlier date to the extent of any inconsistency.
- 5.3. The Authority reserves the right to amend any of the terms and conditions in relation to the Contract / Service Specifications and may issue any such directions which are not necessarily stipulated therein if it deems necessary for the fulfillment of the Schedule of Requirements.

6. Commencement and Progress

- 6.1. SI shall subject to the fulfillment of the conditions precedent above, commence the performance of its obligations in a manner as per the Scope of Work (RFP Volume II).
- 6.2. SI shall proceed to carry out the activities / services with diligence and expedition in accordance with any stipulation as to the time, manner, mode, and method of execution contained in this Contract.
- 6.3. SI shall be responsible for and shall ensure that all activities /services are performed in accordance with the Contract, Scope of Work and Service Specifications and that SI's Team complies with such Specifications and all other standards, terms and other stipulations/conditions set out hereunder.
- 6.4. SI shall perform the activities / services and carry out its obligations under the Contract with due diligence, efficiency and economy, in accordance with generally accepted techniques and practices used in the industry and shall observe sound

management, engineering and security practices. SI shall always act, in respect of any matter relating to this Contract, as faithful advisors to the Authority and shall, at all times, support and safeguard the Authority's legitimate interests in any dealings with Third parties.

7. Standards of performance

- 7.1. SI shall perform the Services and carry out its obligations under the Contract with due diligence, efficiency and economy, in accordance with generally accepted techniques and best practices used in the industry and with IT standards recognized by international professional bodies and shall observe sound management, engineering and security practices. It shall employ appropriate technology and engineering practices and safe and effective equipment, machinery, material and methods. SI shall always act, in respect of any matter relating to the Contract, as faithful advisors to the Authority and shall, at all times, support and safeguard the Authority's legitimate interests in any dealings with Third Parties.
- 7.2. There should be software acceptance committee to be evaluate and approve the softwares.

8. Approvals and Required Consents

- 8.1. The Authority shall extend necessary support to SI to obtain, maintain and observe all relevant and customary regulatory and governmental licenses, clearances and applicable approvals (hereinafter the "Approvals") necessary for SI to provide the Services. The costs of such Approvals shall be borne by SI. Both parties shall give each other all co-operation and information reasonably.
- 8.2. The Authority shall also provide necessary support to Bidder in obtaining the Approvals. In the event that any Approval is not obtained, SI and the Authority shall co-operate with each other in achieving a reasonable alternative arrangement.

9. Constitution of Consortium

- 9.1. For the purposes of fulfillment of its obligations as laid down under the Contract, where the Authority deems fit and unless the contract requires otherwise, Prime Bidder shall be the sole point of interface for the Authority and would be absolutely accountable for the performance of its own, the other member of Consortium and/or its Team's functions and obligations.
- 9.2. The Consortium member has agreed that the lead bidder of SI is the prime point of contact between the Consortium member and the Authority and it shall be primarily

responsible for the discharge and administration of all the obligations contained herein and, the Authority, unless it deems necessary shall deal only with Lead bidder of SI. The sole bidder/Lead bidder shall be and solely responsible for the project execution

- 9.3. Without prejudice to the obligation of the Consortium member to adhere to and comply with the terms of this Contract, the Consortium member has executed and submitted a Power of Attorney in favor of Lead bidder authorizing him to act for and on behalf of such member of the Consortium and do all acts as may be necessary for fulfillment of contractual obligations.
- 9.4. No agreement/contract executed within the consortium members be amended, modified and/or terminated without the prior written consent of the Authority. An executed copy of each of such agreements/contracts shall, immediately upon execution be submitted by SI to the Authority.
- 9.5. Where, during the term of this Contract, SI terminates any contract/arrangement or agreement relating to the performance of Services, SI shall be responsible and severally liable for any consequences resulting from such termination. SI shall in such case ensure the smooth continuation of Services by providing a suitable replacement to the satisfaction of the Authority at no additional charge and at the earliest opportunity.

10. Bidder's Obligations

- 10.1. SI's obligations shall include all the activities as specified by the Authority in the Scope of Work and other sections of the Tender and Contract and changes as mutually agreed by both parties, thereof enable Authority to meet the objectives and operational requirements. It shall be SI's responsibility to ensure the proper and successful implementation, performance and continued operation of the proposed solution in accordance with and in strict adherence to the terms of his Bid, the Tender and this Contract.
- 10.2. In addition to the aforementioned, SI shall provide services to manage and maintain the said system and infrastructure as mentioned in Section 1 of RFP Volume II
- 10.3. Authority reserves the right to interview the personnel proposed that shall be deployed as part of the project team. If found unsuitable, the Authority may reject the deployment of the personnel. But ultimate responsibility of the project implementation shall lie with SI.

- 10.4. Authority reserves the right to require changes in personnel which shall be communicated to SI. SI with the prior approval of the Authority may make additions to the project team. SI shall provide the Authority with the resume of Key Personnel and provide such other information as the Authority may reasonably require. The Authority also reserves the right to interview the personnel and reject, if found unsuitable. In case of change in its team members, for any reason whatsoever, SI shall also ensure that the exiting members are replaced with at least equally qualified and professionally competent members.
- 10.5. SI shall ensure that none of the Key Personnel (refer Section 3.6.1 of the RFP Volume I proposed) and manpower exit from the project during first 6 months of the beginning of the project. In such cases of exit MSI need to provide replacement within 7 days (Qualification Mentioned in RFP section 3.6.1 / Corrigendum), except for medical reason/death a penalty of INR 2 lakhs per such replacement shall be imposed on SI.
- 10.6. SI should submit profiles of only those resources who shall be deployed on the project. Any change of resource should be approved by the Authority and compensated with equivalent or better resource.
- 10.7. In case of change in its team members, SI shall ensure a reasonable amount of time overlap in activities to ensure proper knowledge transfer and handover / takeover of documents and other relevant materials between the outgoing and the new member.
- 10.8. SI shall ensure that SI's Team is competent, professional and possesses the requisite qualifications and experience appropriate to the task they are required to perform under this Contract. SI shall ensure that the services are performed through the efforts of SI's Team, in accordance with the terms hereof and to the satisfaction of the Authority. Nothing in this Contract relieves SI from its liabilities or obligations under this Contract to provide the Services in accordance with requirements and as stated in this Contract and the Bid to the extent accepted by the Authority and SI shall be liable for any non-performance, non-compliance, breach or other loss and damage resulting either directly or indirectly by or on account of its Team.
- 10.9. MSI shall be fully responsible for deployment/installation/development and integration of all the software and hardware components supplied by the MSI and resolve any problems/issues that may arise due to integration of components.
- 10.10. SI shall ensure that the OEMs supply equipment/ components (including associated accessories & software) are available and shall ensure installation, commissioning,

integration and maintenance of these components during the entire period of contract. SI shall ensure that supply the software applications and shall ensure the installation / deployment, integration, roll-out and maintenance of these applications during the entire period of contract. It must clearly be understood by MSI that warranty and O&M of the System, products and services incorporated as part of System would commence from the day of Go-Live of the System of the respective Phase.

- 10.11. The software licenses shall not be restricted based on location for the intended purpose and the Authority should have the flexibility to use the software licenses for other requirements if required for the intended purpose.
- 10.12. All OEMs that SI proposes should have Dealer/Manufacturer possession licenses.
- 10.13. The Authority reserves the right to review the terms of the Warranty and Annual Maintenance agreements entered into between SI and OEMs and no such agreement/contract shall be executed, amended, modified and/or terminated without the prior written consent of the Authority. An executed copy of each of such agreements/contracts shall, immediately upon execution be submitted by SI to the Authority.
- 10.14. SI shall ensure that none of the components and sub-components is declared end-of-sale or end-of-support by the respective OEM at the time of submission of bid. If the OEM declares any of the products/ solutions end-of-sale subsequently, the SI shall ensure that the same is supported by the respective OEM for contract period.
- 10.15. If a product is de-supported by the OEM for any reason whatsoever, from the date of Acceptance of the System till the end of contract, SI should replace the products/ solutions with an alternate that is acceptable to the Authority at no additional cost to the Authority and without causing any performance degradation.
- 10.16. The Licenses will be in the name of Authority only.
- 10.17. SI shall ensure that the OEMs provide the support and assistance to SI in case of any problems / issues arising due to integration of components supplied by him with any other component(s)/ product(s) under the purview of the overall solution. If the same is not resolved for any reason whatsoever, SI shall replace the required component(s) with an equivalent or better substitute that is acceptable to Authority without any additional cost to the Authority and without impacting the performance of the solution in any manner whatsoever.

- 10.18. SI shall ensure that the OEMs for hardware servers/equipment supply and/or install all type of updates, patches, fixes and/or bug fixes for the firmware or software from time to time at no additional cost to the Authority and update should happen Over the Air.
- 10.19. SI shall ensure that the OEMs for hardware servers/ equipment or Bidder's trained engineers conduct the preventive maintenance on a Quarterly basis and break-fix maintenance in accordance with the best practices followed in the industry.SI shall ensure that the documentation and training services associated with the components shall be provided by the OEM partner or OEM's certified training partner without any additional cost to the Authority.
- 10.20. The training has to be conducted using official OEM course curriculum mapped with the hardware / Software Product's to be implemented in the project.
- 10.21. SI and their personnel/representative shall not alter / change / replace any hardware component proprietary to the Authority and/or under warranty or O&M of third party without prior consent of the Authority.
- 10.22. SI shall provision the required critical spares/ components at the designated Datacenter Sites / office locations of the Authority for meeting the uptime commitment of the components supplied by him.
- 10.23. SI's representative(s) shall have all the powers requisite for the execution of scope of work and performance of services under this contract. SI's representative(s) shall liaise with the Authority's representative for the proper coordination and timely completion of the works and on any other matters pertaining to the works. SI shall extend full co-operation to Authority's representative in the manner required by them for supervision/ inspection/ observation of the equipment/ goods/ material, procedures, performance, progress, reports and records pertaining to the works. He shall also have complete charge of SI's personnel engaged in the performance of the works and to ensure compliance of rules, regulations and safety practice. He shall also cooperate with the other Service Providers/Vendors of the Authority working at the Authority's office locations & field locations and DC& DR sites. Such Bidder's representative(s) shall be available to the Authority's Representative at respective Datacenter during the execution of works.
- 10.24. SI shall be responsible on an ongoing basis for coordination with other vendors and agencies of the Authority in order to resolve issues and oversee implementation of

the same. SI shall also be responsible for resolving conflicts between vendors in case of borderline integration issues.

- 10.25. SI is expected to set up a project office in Bareilly. The technical manpower deployed on the project should work from the same office. However, some resources may be required to work from the client office during the contract period.
- 10.26. Access to Sites
- 10.26.1. Sites would include, all field level activities, Data Center, Command and Control Center/City Operation Center
- 10.26.2. The Authority's representative upon receipt of request from SI, intimating commencement of activities at various locations, shall give access to SI as much of the Sites as may be necessary to commence and proceed with the installation of the works in accordance with the program of work. Any reasonable proposal of SI for access to Site to proceed with the installation of work in accordance with the program of work in accordance with the program of work in accordance with the installation of work in accordance with the program of work in accordance with the installation of work in accordance with the program of work in accordance with the program of work shall be considered for approval and shall not be unreasonably withheld by the Authority. Such requests shall be made to the Authority's representative in writing at least 7 days prior to start of the work.
- 10.27. Start of Installation
- 10.27.1. Bidder shall co-ordinate with the Authority and stakeholders for the complete setup of sites before commencement of installation of other areas as mentioned in Section 1: of the RFP Volume II document. SI shall also co-ordinate regarding Network / Bandwidth connectivity in order to prepare the installation plan and detailed design / architectural design documents.
- 10.27.2. As per TRAI guidelines, resale of bandwidth connectivity is not allowed.
- 10.27.3. The plan and design documents thus developed shall be submitted by SI for approval by the Authority.
- 10.27.4. After obtaining the approval from the Authority, SI shall commence the installation.
- 10.28. Reporting Progress
- 10.28.1. SI shall monitor progress of all the activities related to the execution of this contract and shall submit to the Authority, progress reports with reference to all related work, milestones and their progress during the implementation phase.
- 10.28.2. Formats for all above mentioned reports and their dissemination mechanism shall be discussed and finalized along with project plan. The Authority on mutual

agreement between both parties may change the formats, periodicity and dissemination mechanism for such reports.

- 10.28.3. Periodic meetings shall be held between the representatives of the Authority and SI once in every 15 days during the implementation phase to discuss the progress of implementation. After the implementation phase is over, the meeting shall be held as an ongoing basis, as desired by Authority, to discuss the performance of the contract.
- 10.28.4. SI shall ensure that the respective solution teams involved in the execution of work are part of such meetings.
- 10.28.5. Several review committees involving representative of the Authority and senior officials of SI shall be formed for the purpose of this project. These committees shall meet at intervals, as decided by the Authority later, to oversee the progress of the implementation.
- 10.28.6. All the goods, services and manpower to be provided / deployed by SI under the Contract and the manner and speed of execution and maintenance of the work and services are to be conducted in a manner to the satisfaction of Authority's representative in accordance with the Contract.
- 10.28.7. The Authority reserves the right to inspect and monitor/ assess the progress/ performance of the work / services at any time during the course of the Contract. The Authority may demand and upon such demand being made, SI shall provide documents, data, material or any other information which the Authority may require, to enable it to assess the progress/ performance of the work / service.
- 10.28.8. At any time during the course of the Contract, the Authority shall also have the right to conduct, either itself or through another agency as it may deem fit, an audit to monitor the performance by SI of its obligations/ functions in accordance with the standards committed to or required by the Authority and SI undertakes to cooperate with and provide to the Authority/ any other agency appointed by the Authority, all Documents and other details as may be required by them for this purpose. Such audit shall not include Bidder's books of accounts.
- 10.28.9. Should the rate of progress of the works or any part of them at any time fall behind the stipulated time for completion or is found to be too slow to ensure completion of the works by the stipulated time, or is in deviation to Tender requirements/ standards, the Authority's representative shall so notify SI in writing.

- 10.28.10. SI shall reply to the written notice giving details of the measures he proposes to take to expedite the progress so as to complete the works by the prescribed time or to ensure compliance to RFP requirements. SI shall not be entitled to any additional payment for taking such steps. If at any time it should appear to the Authority or Authority's representative that the actual progress of work does not conform to the approved plan SI shall produce at the request of the Authority's representative a revised plan showing the modification to the approved plan necessary to ensure completion of the works within the time for completion or steps initiated to ensure compliance to the stipulated requirements
- 10.28.11. The submission seeking approval by the Authority or Authority's representative of such plan shall not relieve SI of any of his duties or responsibilities under the Contract.
- 10.28.12. In case during execution of works, the progress falls behind schedule or does not meet the Tender requirements, SI shall deploy extra manpower/ resources to make up the progress or to meet the RFP requirements. Plan for deployment of extra man power/ resources shall be submitted to the Authority for its review and approval. All time and cost effect in this respect shall be borne, by SI within the contract value.

10.29. Knowledge of Data Center, Command and Control Center/City Operation Center

- 10.29.1. SI shall be granted access to the Data Center, Command and Control Center/ City Operation Center for inspection by the Authority before commencement of installation. The plan shall be drawn mutually at a later stage.
- 10.29.2. SI shall be deemed to have knowledge of the Data Center, Command and Control Center/ City Operation Center and its surroundings and information available in connection therewith and to have satisfied itself the form and nature thereof including, the data contained in the Bidding Documents, the physical and climatic conditions, the quantities and nature of the works and materials necessary for the completion of the works, the means of access, etc. and in general to have obtained itself all necessary information of all risks, contingencies and circumstances affecting his obligations and responsibilities therewith under the Contract and his ability to perform it. However, if during pre-installation survey / during delivery or installation, SI detects physical conditions and/or obstructions affecting the work, SI shall take all measures to overcome them.

10.30. Project Plan

- 10.30.1. Within 15 calendar days of effective date of the contract/ Issuance of LoI, SI shall submit to the Authority for its approval a detailed Project Plan with details of the project showing the sequence, procedure and method in which he proposes to carry out the works. The Plan so submitted by SI shall conform to the requirements and timelines specified in the Contract. The Authority and SI shall discuss and agree upon the work procedures to be followed for effective execution of the works, which SI intends to deploy and shall be clearly specified. The Project Plan shall include but not limited to project organization, communication structure, proposed staffing, roles and responsibilities, processes and tool sets to be used for quality assurance, security and confidentiality practices in accordance with industry best practices, project plan and delivery schedule in accordance with the Contract. Approval by the Authority's Representative of the Project Plan shall not relieve SI of any of his duties or responsibilities under the Contract.
- 10.30.2. If SI's work plans necessitate a disruption/ shutdown in Authority's operation, the plan shall be mutually discussed and developed so as to keep such disruption/shutdown to the barest unavoidable minimum. Any time and cost arising due to failure of SI to develop/adhere such a work plan shall be to his account.

10.31. Adherence to safety procedures, rules regulations and restriction

- 10.31.1. SI's Team shall comply with the provision of all laws including labor laws, rules, regulations and notifications issued there under from time to time. All safety and labour laws enforced by statutory agencies and by Authority shall be applicable in the performance of this Contract and Bidder's Team shall abide by these laws.
- 10.31.2. Access to the Data Center, Command and Control Center / City Operation Center shall be strictly restricted. No access to any person except the essential members of SI's Team who are authorized by the Authority and are genuinely required for execution of work or for carrying out management/ maintenance shall be allowed entry. Even if allowed, access shall be restricted to the pertaining equipment of the Authority only. SI shall maintain a log of all activities carried out by each of its team personnel.
- 10.31.3. No access to any staff of SI, except the essential staff who has genuine work-related need, should be given. All such access should be logged in a loss free manner for permanent record with unique biometric identification of the staff to avoid misrepresentations or mistakes
- 10.31.4. SI shall take all measures necessary or proper to protect the personnel, work and facilities and shall observe all reasonable safety rules and instructions. SI's Team shall

adhere to all security requirement/ regulations of the Authority during the execution of the work. Authority's employee also shall comply with safety procedures/ policy.

10.31.5. SI shall report as soon as possible any evidence, which may indicate or is likely to lead to an abnormal or dangerous situation and shall take all necessary emergency control steps to avoid such abnormal situations.

10.32. Statutory Requirements

- 10.32.1. During the tenure of this Contract nothing shall be done by SI or his team including consortium in contravention of any applicable law, act and/ or rules/regulations, there under or any amendment thereof governing inter-alia customs, stowaways, foreign exchange etc. and shall keep Authority indemnified in this regard.
 - 10.33. In case there is a contradiction between the sections, the below hierarchy of sections in order of precedence
 - i. MSI Pre-bid clarification and Corrigendum, if any
 - ii. Volume III of RFP (SCC holds precedence over GCC)
 - iii. RFP volume I, II
 - iv. Proposal submitted by MSI/Bidder

11. Authority's Obligations

- 11.1. Authority or his/her nominated representative shall act as the nodal point for implementation of the contract and for issuing necessary instructions, approvals, commissioning, acceptance certificates, payments etc. to SI.
- 11.2. Authority shall ensure that timely approval is provided to SI as and when required, which may include approval of project plans, implementation methodology, design documents, specifications, or any other document necessary in fulfillment of this contract.
- 11.3. The Authority's representative shall interface with SI, to provide the required information, clarifications, and to resolve any issues as may arise during the execution of the Contract. Authority shall provide adequate cooperation in providing details, coordinating and obtaining of approvals from various governmental agencies, in cases, where the intervention of the Authority is proper and necessary.
- 11.4. Authority may provide on Bidder's request, particulars/ information/ or documentation that may be required by SI for proper planning and execution of work and for providing services covered under this contract and for which SI may have to coordinate with respective vendors.

- 11.5. Authority reserves the right to procure the hardware in a phased manner, which will be finalized during implementation, and O&M shall be applicable whenever the devices are procured and deployed till end of the contract.
- 11.6. **Site Not Ready**: Authority hereby agrees to make the project sites ready as per the agreed specifications, within the agreed timelines. Authority agrees that SI shall not be in any manner liable for any delay arising out of Authority's failure to make the site ready within the stipulated period and SI shall be entitled to mutually agreed delay cost.

12. Payments

- 12.1. Authority shall make payments to SI at the times and in the manner set out in the Payment schedule as specified Payment Milestones in RFP Volume I subject to the penalties as mentioned under Clause 42 of Section C- Service Levels of Volume 3. Authority shall make all efforts to make payments to SI within 60 days of receipt of invoice(s) and all necessary supporting documents.
- 12.2. All payments agreed to be made by Authority to SI in accordance with the Bid shall be inclusive of all statutory levies, duties, taxes and other charges whenever levied/applicable, if any, and Authority shall not be liable to pay any such levies/ other charges under or in relation to this Contract and/or the Services.
- 12.3. No invoice for extra work on account of change order shall be submitted by SI unless the said extra work /change order has been authorized/approved by the Authority in writing in accordance with Change Control Note (Annexure I of this section of the RFP).
- 12.4. In the event of Authority noticing at any time that any amount has been disbursed wrongly to SI or any other amount is due from SI to the Authority, the Authority may without prejudice to its rights recover such amounts by other means after notifying SI or deduct such amount from any payment falling due to SI. The details of such recovery, if any, shall be intimated to SI. SI shall receive the payment of undisputed amount under subsequent invoice for any amount that has been omitted in previous invoice by mistake on the part of the Authority or SI.
- 12.5. All payments to SI shall be subject to the deductions of tax at source under Income Tax Act, and other taxes and deductions as provided for under applicable law, rule or regulation. All costs, damages or expenses which Authority may have paid or incurred, for which under the provisions of the Contract, SI is liable, the same shall be deducted by Authority from any dues to SI. All payments to SI shall be made after making necessary deductions as per terms of the Contract and recoveries towards facilities, if any, provided by the Authority to SI on chargeable basis.

- 12.6. Payment terms are 70% Capex and 30% Opex and 70% of Capex is divided in various phases based on outcome based implementation
- 12.7. DG Fuel Charges Shall be reimbursable by BSCL as per actual on quarterly basis to MSI. Electricity bill and the connections for new electrical meters will be reimbursable by BSCL. RoW Charges shall be waived Off

13. Intellectual Property Rights

- 13.1. Retention of Ownership except for the rights expressly granted to the SI under this Agreement, the authority shall retain all right, title and interest in and to the Licensed Technology, including all worldwide Technology and intellectual property and proprietary rights.
- 13.2. Preservation of Notice Licensee shall not remove, efface or obscure any copyright notices or other proprietary notices or legends from any Licensed Technology or materials provided under this Agreement, and shall reproduce all such notices and legends when incorporating Licensed Technology or materials into any Integrated Products.
- 13.3. SI must ensure that while using any software, hardware, processes, document or material in the course of performing the Services, it does not infringe the Intellectual Property Rights of any person/Company. SI shall keep the Authority indemnified against all costs, expenses and liabilities howsoever, arising out any illegal or unauthorized use (piracy) or in connection with any claim or proceedings relating to any breach or violation of any permission/license terms or infringement of any Intellectual Property Rights by SI or SI's Team during the course of performance of the Services. SI's liability is excluded regarding any claim based on any of the following (a) anything Authority provides which is incorporated into the Solution; (b) the Authority's modification of the solution; (c) the combination, operation, or use of the solution with other materials, if the third party claim has been caused by the combination, operation or use of the solution
- 13.4. Authority shall own and have a right in perpetuity to use all newly created Intellectual Property Rights which have been developed solely during execution of this Contract, including but not limited to all processes, products, specifications, reports and other documents which have been newly created and developed by SI solely during the performance of Services and for the purposes of inter-alia use or sub-license of such Services under this Contract. SI undertakes to disclose all such Intellectual Property Rights arising in performance of the Services to the Authority, execute all such agreements/documents and obtain all permits and approvals that may be necessary in regard to the Intellectual Property Rights of the Authority.

Page | 20

- 13.5. If Authority desires, SI shall be obliged to ensure that all approvals, registrations, licenses, permits and rights etc. which are inter-alia necessary for use of the goods supplied / installed by SI, the same shall be acquired in the name of the Authority, prior to termination of this Contract and which may be assigned by the Authority to SI for the purpose of execution of any of its obligations under the terms of the Bid, Tender or this Contract. However, subsequent to the term of this Contract, such approvals, registrations, licenses, permits and rights etc. shall endure to the exclusive benefit of the Authority.
- 13.6. SI shall not copy, reproduce, translate, adapt, vary, modify, disassemble, decompile or reverse engineer or otherwise deal with or cause to reduce the value of the Materials except as expressly authorized by Authority in writing

14. Taxes

- 14.1. SI shall bear all personnel taxes levied or imposed on its personnel, or any other member of SI's Team, etc. on account of payment received under this Contract. SI shall bear all corporate taxes, levied or imposed on SI on account of payments received by it from the Authority for the work done under this Contract.
- 14.2. SI shall bear all taxes and duties etc. levied or imposed on SI under the Contract. It shall be the responsibility of SI to submit to the concerned Indian authorities the returns and all other connected documents required for this purpose. SI shall also provide the Authority such information, as it may be required in regard to SI's details of payment made by the Authority under the Contract for proper assessment of taxes and duties. The amount of tax withheld by the Authority shall at all times be in accordance with Indian Tax Law and the Authority shall promptly furnish to SI original certificates for tax deduction at source and paid to the Tax Authorities.
- 14.3. SI agrees that he shall comply with Indian Income Tax Act in force from time to time and pay Income Tax, as may be imposed/ levied on them by the Indian Income Tax Authorities, for payments received by them for the works under the Contract
- 14.4. SI shall fully familiarize themselves about the applicable domestic taxes (such as value added or GST, income taxes, duties, fees, levies, etc.) on amounts payable by the Authority under the Agreement. All such taxes must be included by Bidders in the financial proposal. (Bidder to find out applicable taxes for the components being proposed.) However, variation in rates of GST on works applicable on output of the works contracts shall be adjusted on either side, increases, or decreases after mutual discussion between BSCL and MSI.

Note : GST variation over any material shall not be entertained.

14.5. SI shall indemnify Authority against any and all liabilities or claims arising out of this Contract for such taxes including interest and penalty by any such Tax Authority may assess or levy against the Authority/Prime Bidder.

15. Indemnity

- 15.1. SI shall indemnify the Authority from and against any costs, loss, damages, expense, claims including those from third parties or liabilities of any kind howsoever suffered, arising or incurred inter alia during and after the Contract period out of: (However Successful bidder's cumulative liability for its obligations under the contract shall not exceed the contract value)
 - a. any negligence or wrongful act or omission by SI or any third party associated with SI in connection with or incidental to this Contract; or
 - b. any breach of any terms of SI's did as agreed, the RFP and this Contract by SI
 - c. any infringement of patent, trademark/copyright or industrial design rights arising from the use of the supplied goods and related services or any part thereof
- 15.2. SI shall also indemnify the Authority against any privilege, claim or assertion made by a third party with respect to right or interest in, ownership, mortgage or disposal of any asset, property etc.
- 15.3. Regardless of anything contained (except for SI's liability for bodily injury and/ or damage to tangible and real property for which it is legally liable and it's liability for patent and copyright infringement in accordance with the terms of this Agreement) the total liability of SI, is restricted to the total value of the contract and SI is not responsible for any third party claims.

16. Warranty

- 16.1. A comprehensive warranty applicable on goods supplied under this contract shall be provided for the period of contract from the date of acceptance of respective system by the Authority, which shall be for a period of minimum 5 years.
- 16.2. Technical Support for Software applications shall be provided by the respective OEMs for the period of contract. The Technical Support should include all upgrades, updates and patches to the respective Software applications.
- 16.3. SI warrants that the Goods supplied under the Contract are new, non-refurbished, unused and recently manufactured; shall not be nearing End of sale / End of support;

and shall be supported by the SI and respective OEM along with service and spares support to ensure its efficient and effective operation for the entire duration of the contract.

- 16.4. SI warrants that at the time of delivery the goods supplied under this contract shall be of the highest grade and quality and consisted with the established and generally accepted standards for materials of this type. The goods shall be in full conformity with the specifications and shall operate properly and safely. All recent design improvements in goods, unless provided otherwise in the Contract, shall also be made available.
- 16.5. SI further warrants at the time of delivery that the Goods supplied under this Contract shall be free from all encumbrances and defects/faults arising from design, material, manufacture or workmanship (except insofar as the design or material is required by the Authority's Specifications) or from any act or omission of the SI, that may develop under normal use of the supplied Goods in the conditions prevailing at the respective Datacenter / Server Room Sites.
- 16.6. The Authority shall promptly notify the SI in writing of any claims arising under this warranty.
- 16.7. Upon receipt of such notice, the SI shall, with all reasonable speed, repair or replace the defective Goods or parts thereof, without prejudice to any other rights which the Authority may have against the SI under the Contract.
- 16.8. If the SI, having been notified, fails to remedy the defect(s) within the warranty period, the Authority may proceed to take such remedial action as may be necessary, at the SI's risk and expense and without prejudice to any other rights which the Authority may have against the SI under the Contract.
- 16.9. Any OEM specific warranty terms that do not conform to conditions under this Contract shall not be acceptable

17. Term and Extension of the Contract

- 17.1. Contract period shall commence from the date of signing of contract, whichever is earlier, and shall remain valid for 60 Months from the date of Go Live of the system
- 17.2. If the delay occurs due to circumstances beyond control of SI such act of god, strikes, lockouts, fire, accident, defective materials, delay in approvals or any cause whatsoever beyond the reasonable control of SI, a reasonable extension of time shall be granted by the Authority.

- 17.3. The Authority shall reserve the sole right to grant any extension to the term abovementioned and shall notify in writing to SI, at least 3 (three) months before the expiration of the Term hereof, whether it shall grant SI an extension of the Term. The decision to grant or refuse the extension shall be at the Authority's discretion and such extension of the contract, if any, shall be as per terms agreed mutually between the Authority and SI.
- 17.4. Where the Authority is of the view that no further extension of the term be granted to SI, the Authority shall notify SI of its decision at least 3 (three) months prior to the expiry of the Term. Upon receipt of such notice, SI shall continue to perform all its obligations hereunder, until such reasonable time beyond the Term of the Contract within which, the Authority shall either appoint an alternative agency/SI or create its own infrastructure to operate such Services as are provided under this Contract.

18. Dispute Resolution

- 18.1. In case, a dispute is referred to arbitration, the arbitration shall be under the Indian Arbitration and Conciliation Act, 1996 and any statutory modification or re-enactment thereof.
- 18.2. the procedure for arbitration shall be as follows:
 - a. In case of dispute or difference arising between the employer and the contractor relating to any matter arising out of concerned with this agreement it shall be settled in accordance with the arbitration and conciliation act 1996. The same shall be referred to a Sole Arbitrators, constituted as per the terms of and under the (Indian) Arbitration and Conciliation Act, 1996. Sole Arbitrator shall be appointed for each party.
 - b. The Arbitration proceedings shall be held in **Bareilly**, **Uttar pradesh**, India
 - c. The cost and expenses of arbitration proceedings will be paid as determined by the Arbitrator. However the expenses incurred by each party in connection with the preparation, presentation, etc. shall be borne by each party itself
 - d. Performance under the contract shall continue during the arbitration proceedings and the payment due to the contractor by the authority shall not be withheld unless they are the subject matter of the arbitration proceedings
- 18.3. Arbitration proceedings shall be governed by Arbitration and Conciliation Act, 1996
- 18.4. The Arbitration proceeding shall be governed by the substantive laws of India.
- 18.5. The proceedings of Arbitration shall be in English language.

19. Time is the essence

19.1. Time shall be of the essence in respect of any date or period specified in this Contract or any notice, demand or other communication served under or pursuant to any provision of this Contract and in particular in respect of the completion of the activities by SI by the specified completion date.

20. Conflict of interest

20.1. SI shall disclose to the Authority in writing, all actual and potential conflicts of interest that exist, arise or may arise (either for SI or SI's Team) in the course of performing the Services as soon as it becomes aware of that conflict.

21. Publicity

21.1. SI shall not make or permit to be made a public announcement or media release about any aspect of this Contract unless the Authority first gives SI its written consent.

22. Force Majeure

- 22.1. Force Majeure shall not include any events caused due to acts/ omissions of SI resulting in a breach/ contravention of any of the terms of the Contract and/or SI's Bid. It shall also not include any default on the part of SI due to its negligence or failure to implement the stipulated/ proposed precautions, as were required to be taken under the Contract.
- 22.2. Failure or occurrence of a delay in performance of any of the obligations of either party shall constitute a Force Majeure event only where such failure or delay could not have reasonably been foreseen i.e. war, or hostility, acts of public enemy, civil commotion, sabotage, fires, floods, explosions, epidemics, quarantine restriction, strikes, Riots, terrorism, lockouts or act of God (hereinafter referred to as events), or where despite the presence of adequate and stipulated safeguards the failure to perform obligations has occurred at any location in scope. In such an event, the affected party shall inform the other party in writing within five days of the occurrence of such event. Any failure or lapse on the part of SI in performing any obligation as is necessary and proper, to negate the damage due to projected force majeure events or to mitigate the damage that may be caused due to the above mentioned events or the failure to provide adequate disaster management/ recovery or any failure in setting up a contingency mechanism would not constitute force majeure, as set out above.
- 22.3. In case of a Force Majeure, all Parties shall endeavor to agree on an alternate mode of performance in order to ensure the continuity of service and implementation of the

obligations of a party under the Contract and to minimize any adverse consequences of Force Majeure.

22.4. In the event a Force Majeure, persists for a period beyond 90 days without prejudice to any other provisions contained anywhere in the agreement the authority has the right to terminate the contract

23. Delivery

- 23.1. SI shall bear the cost for packing, transport, insurance, storage and delivery of all the goods for "Selection of Master System Integrator for Implementation of Bareilly Integrated Smart Solutions" at all locations identified by the Authority in Bareilly, Uttar Pradesh.
- 23.2. Goods and manpower supplied under this Contract shall conform to the standards mentioned in the RFP, and, when no applicable standard is mentioned, to the authoritative standards; such standard shall be approved by Authority.

24. Insurance

- 24.1. Goods supplied under this Contract shall be comprehensively insured by SI at his own cost, against any loss or damage, for the entire period of the contract. SI shall submit to the Authority, documentary evidence issued by the insurance company, indicating that such insurance has been taken.
- 24.2. SI shall bear all the statutory levies like customs, insurance, freight, Local warehousing etc. applicable on the goods and also the charges like transportation charges, octroi, etc. that may be applicable till the goods are delivered at the respective sites of installation shall also be borne by SI.
- 24.3. SI shall take out and maintain at its own cost, on terms and conditions approved by the Authority, insurance against risks, and for coverages, as specified below;
 - a. at the Authority's request, shall provide evidence to the Authority showing that such insurance has been taken out and maintained and that the current premiums therefore have been paid.
 - b. Employer's liability and workers' compensation insurance in respect of the Personnel of the Company, in accordance with the relevant provisions of the Applicable Law, as well as, with respect to such Personnel, any such life, health, accident, travel or other insurance as may be appropriate

25. Transfer of Ownership

- 25.1. All the assets and goods procured for the purpose of the project shall be in the name of BSCL OR SI must transfer all titles to the assets and goods procured for the purpose of the project to the Authority at the time of Acceptance of System. All the licenses, titles, source code, certificates, hardware, devices, equipment's etc. related to the system designed, developed, installed and maintained by SI. SI is expected to provide source code, transfer IPR and ownership right of only those solutions which would be customized by bidder for use of Bareilly Smart City Ltd. For any pre-existing work, SI & Bareilly Smart City Ltd shall be jointly and severally responsible and its use in any other project by SI shall be decided on mutual consent.
- 25.2. Forthwith upon expiry or earlier termination of the Contract and at any other time on demand by the Authority, SI shall deliver to Authority all Documents provided by or originating from the Authority and all Documents produced by or from or for SI in the course of performing the Services, unless otherwise directed in writing by the Authority at no additional cost. SI shall not, without the prior written consent of the Authority store, copy, distribute or retain any such Documents.

26. Exit Management Plan

- 26.1. An Exit Management plan shall be furnished by SI in writing to the Authority within 90 days from the date of signing the Contract, which shall deal with at least the following aspects of exit management in relation to the contract as a whole and in relation to the Project Implementation, and Service Level monitoring.
 - A detailed program of the transfer process that could be used in conjunction with a Replacement Service Provider including details of the means to be used to ensure continuing provision of the services throughout the transfer process or until the cessation of the services and of the management structure to be used during the transfer;
 - ii. Plans for provision of contingent support to Project and Replacement Service Provider for a reasonable period after transfer.
 - iii. Exit Management plan in case of normal termination of Contract period
 - iv. Exit Management plan in case of any eventuality due to which Project is terminated before the contract period.
 - v. Exit Management plan in case of termination of SI
- 26.2. Exit Management plan at the minimum adhere to the following:

Page | 27

- i. Three (3) months of the support to Replacement Service Provider post termination of the Contract
- ii. Complete handover of the Planning documents, bill of materials, functional requirements specification, technical specifications of all equipment's, change requests if any, sources codes, wherever applicable, reports, documents and other relevant items to the Replacement Service Provider/ Authority
- iii. Certificate of Acceptance from authorized representative of Replacement Service Provider issued to SI on successful completion of handover and knowledge transfer
- 26.3. In the event of termination or expiry of the contract, Project Implementation, or Service Level monitoring, both Bidder and Authority shall comply with the Exit Management Plan.
- 26.4. During the exit management period, SI shall use its best efforts to deliver the services.

B. Special conditions of contract (SCC)

27. Performance Security

27.1. SI shall furnish Performance Security to the Authority at the time of signing the Contract which shall be equal to 10% of the value of the Contract and shall be in the form of a Bank Guarantee Bond from a Nationalized / Scheduled Bank in the Performa given in Annexure 5 (a) RFP volume I within 15 days after issuance of letter of intent (LOI) or Letter of Award (LoA) which would be valid up to a period of "Go- Live + 60" after the contract completion period.

28. Liquidated Damages (Phase-1)

- 28.1. If SI fails to supply, install or maintain any or all of the goods as per the contract, within the time period(s) specified in the RFP Vol I, the Authority without prejudice to its other rights and remedies under the Contract, deduct from the Contract price, as liquidated damages, a sum equivalent to 0.1 % per week of entire contract value for a milestone/quarter.
- 28.2. The deduction shall not in any case exceed **10 % of the contract value**.
- 28.3. The Authority may without prejudice to its right to effect recovery by any other method, deduct the amount of liquidated damages from any money belonging to SI in its hands (which includes the Authority's right to claim such amount against SI's Bank Guarantee) or which may become due to SI. Any such recovery or liquidated damages shall not in any way relieve SI from any of its obligations to complete Work or from any other obligations and liabilities under the Contract.
- 28.4. Delay not attributable to SI shall be considered for exclusion for the purpose of computing liquidated damages.

29. Limitation of Liability:

Limitation of Bidder's Liability towards the Authority:

- 29.1. Except in case of gross negligence or willful misconduct on the part of SI or on the part of any person or company acting on behalf of SI in carrying out the Services, with respect to damage caused by SI to Authority's property, shall not be liable to Authority:
 - i for any indirect or consequential loss or damage; and
 - ii for any direct loss or damage caused by the SI the limitation of liability under the contract shall not exceed (A) the total payments payable under the Contract to SI

hereunder, or (B) the proceeds SI may be entitled to receive from any insurance maintained by SI to cover such a liability, whichever of (A) or (B) is higher.

29.2. This limitation of liability shall not affect SI liability, if any, for damage to Third Parties caused by SI or any person or company acting on behalf of SI in carrying out the Services.

30. Ownership and Retention of Documents

- 30.1. The Authority shall own the Documents, prepared by or for SI arising out of or in connection with the Contract.
- 30.2. Forthwith upon expiry or earlier termination of this Contract and at any other time on demand by Authority, SI shall deliver Authority all documents provided by or originating from the Authority and all documents produced by or for SI in the course of performing the Services, unless otherwise directed in written by the Authority at no additional cost. SI shall not, without the prior written consent of the Authority store, copy, distribute or retain any such documents.

31. Information Security

- 31.1. SI shall not carry any written/printed document, layout diagrams, CD, hard disk, storage tapes, other storage devices or any other goods /material proprietary to Authority into / out of any location without written permission from Authority.
- 31.2. SI shall not destroy any unwanted documents, defective tapes/media present at any location on their own. All such documents, tapes/media shall be handed over to the Authority.
- 31.3. All documentation and media at any location shall be properly identified, labeled and numbered by SI. SI shall keep track of all such items and provide a summary report of these items to the Authority whenever asked for.
- 31.4. Access to Authority's data and systems, Internet facility by SI at any location shall be in accordance with the written permission by the SI. The Authority shall allow SI to use facility in a limited manner subject to availability. It is the responsibility of SI to prepare and equip himself in order to meet the requirements
- 31.5. SI must acknowledge that Authority's business data and other Authority proprietary information or materials, whether developed by Authority or being used by Authority pursuant to a license agreement with a third party (the foregoing collectively referred to herein as "proprietary information") are confidential and proprietary to Authority; and SI along with its team agrees to use reasonable care to safeguard the proprietary

Page | 30

information and to prevent the unauthorized use or disclosure thereof, which care shall not be less than that used by SI to protect its own proprietary information. SI recognizes that the goodwill of Authority depends, among other things, upon SI keeping such proprietary information confidential and that unauthorized disclosure of the same by SI or its team could damage the goodwill of Authority, and that by reason of SI's duties hereunder. SI may come into possession of such proprietary information, even though SI does not take any direct part in or furnish the services performed for the creation of said proprietary information and shall limit access thereto to employees with a need to such access to perform the services required by this agreement. SI shall use such information only for the purpose of performing the said services.

- 31.6. SI shall, upon termination of this agreement for any reason, or upon demand by Authority, whichever is earliest, return any and all information provided to SI by Authority, including any copies or reproductions, both hardcopy and electronic.
- 31.7. By virtue of the Contract, SI team may have access to personal information of the Authority and/or a third party. The Authority has the sole ownership of and the right to use, all such data in perpetuity including any data or other information pertaining to the citizens that may be in the possession of SI team in the course of performing the Services under the Contract

32. Records of contract documents

- 32.1. SI shall at all-time make and keep sufficient copies of the process manuals, operating procedures, specifications, Contract documents and any other documentation for him to fulfill his duties under the Contract.
- 32.2. SI shall keep on the Site at least three copies of each and every specification and Contract Document, in excess of his own requirement and those copies shall be available at all times for use by the Authority's Representative and by any other person authorized by the Authority's Representative.

33. Security and Safety

- 33.1. SI shall comply with the directions issued from time to time by the Authority and the standards related to the security and safety, in so far as it applies to the provision of the Services.
- 33.2. SI shall upon reasonable request by Authority, or its nominee(s) participate in regular meetings when safety and information technology security matters are reviewed.

34. Confidentiality

- 34.1. SI shall not, either during the term or after expiration of this Contract, disclose any proprietary or confidential information relating to the Services/Contract and/or Authority's business/ operations, information, Application/software, hardware, business data, architecture schematics, designs, storage media and other information / documents without the prior written consent of the Authority.
- 34.2. Authority reserves the right to adopt legal proceedings, civil or criminal, against SI in relation to a dispute arising out of breach of obligation by SI under this clause.
- 34.3. SI shall do everything reasonably possible to preserve the confidentiality of the Confidential Information including execution of a confidentiality agreement with the Authority to the satisfaction of the Authority.
- 34.4. SI shall notify the Authority promptly if it is aware of any disclosure of the Confidential Information otherwise than as permitted by the Contract or with the authority of the Authority.
- 34.5. SI shall be liable to fully recompense the Authority for any loss of revenue arising from breach of confidentiality.

35. Events of Default by SI

The failure on the part of SI to perform any of its obligations or comply with any of the terms of this Contract shall constitute an Event of Default on the part of SI. The events of default are but not limited to:

- 35.1. SI has failed to perform any instructions or directives/amended directive, instructions, modification issued by the Authority which it deems proper and necessary to execute the scope of work or provide services under the Contract, or
- 35.2. SI has failed to confirm / adhere to any of the key performance indicators as laid down in the Key Performance Measures / Service Levels, or if SI has fallen short of matching such standards / benchmarks / targets as the Authority may have designated with respect to the system or any goods, task or service, necessary for the execution of the scope of work and performance of services under this Contract. The above mentioned failure on the part of SI may be in terms of failure to adhere to performance, quality, timelines, specifications, requirements or any other criteria as defined by the Authority;
- 35.3. SI has failed to remedy a defect or failure to perform its obligations in accordance with the specifications issued by the Authority, despite being served with a default notice

which laid down the specific deviance on the part of SI/ SI's Team to comply with any stipulations or standards as laid down by the Authority; or SI has failed to demonstrate or sustain any representation or warranty made by it in this Contract, with respect to any of the terms of its Bid, the RFP and this Contract

- 35.4. There is a proceeding for bankruptcy, insolvency and winding up
- 35.5. SI has failed to comply with or is in breach or contravention of any applicable laws. Where there has been an occurrence of such defaults inter alia as stated above, the Authority shall issue a notice of default to SI, setting out specific defaults / deviances / omissions / non-compliances / non-performances and providing a notice of thirty (30) days to enable such defaulting party to remedy the default committed.
- 35.6. Where despite the issuance of a default notice to SI by the Authority, SI fails to remedy the default to the satisfaction of the Authority, the Authority may, where it deems fit, issue to the defaulting party another default notice or proceed to contract termination.

36. Termination

Authority may, terminate this Contract in whole or in part by giving SI a minimum 30 day prior and written notice indicating its intention to terminate the Contract under the following circumstances:

- 36.1. Where Authority is of the opinion that there has been such Event of Default on the part of SI which would make it proper and necessary to terminate this Contract and may include failure on the part of SI to respect any of its commitments with regard to any part of its obligations under its Bid, the RFP or under this Contract.
- 36.2. Where it comes to the Authority's attention that SI (or SI's Team) is in a position of actual conflict of interest with the interests of the Authority, in relation to any of terms of SI's Bid, the RFP or this Contract.
- 36.3. Where SI's ability to survive as an independent corporate entity is threatened or is lost owing to any reason whatsoever, including inter-alia the filing of any bankruptcy proceedings against SI, any failure by SI to pay any of its dues to its creditors, the institution of any winding up proceedings against SI or the happening of any such events that are adverse to the commercial viability of SI. In the event of the happening of any events of the above nature, the Authority shall reserve the right to take any steps as are necessary, to ensure the effective transition of the sites to a successor agency, and to ensure business continuity
36.4. Termination for Insolvency: The Authority may at any time terminate the Contract by giving written notice to SI, without compensation to SI, if SI becomes bankrupt or otherwise insolvent, provided that such termination shall not prejudice or affect any right of action or remedy which has accrued or shall accrue thereafter to the Authority.

37. Consequence of Termination

- 37.1. In the event of termination of the Contract due to any cause whatsoever, whether consequent to the stipulated Term of the Contract or otherwise the Authority shall be entitled to impose any such obligations and conditions and issue any clarifications as may be necessary to ensure an efficient transition and effective business continuity of the project which SI shall be obliged to comply with and take all available steps to minimize loss resulting from that termination/breach, and further allow and provide all such assistance to the Authority and/ or the successor agency/ service provider, as may be required, to take over the obligations of SI in relation to the execution/continued execution of the requirements of the Contract.
- 37.2. Where the termination of the Contract is prior to its stipulated term on account of a Default on the part of SI or due to the fact that the survival of SI as an independent corporate entity is threatened/has ceased, or for any other reason, whatsoever, the Authority, shall pay SI for that part of the Services which have been authorized by the Authority and satisfactorily performed by SI up to the date of termination.
- 37.3. Nothing herein shall restrict the right of the Authority to invoke the Bank Guarantee and other Guarantees furnished hereunder and pursue such other rights and/or remedies that may be available to the Authority under law.
- 37.4. Termination hereof shall not affect any accrued right or liability of either Party nor affect operation of provisions of Contract that are expressly or by implication intended to come into or continue in force on or after such termination.
- 37.5. MSI shall be entitled to paid for work completed or work in progress as per BSCL survey and smooth access shall be given to next selected party by BSCL.

38. Change Control Note (CCN)

38.1. This applies to and describes the procedure to be followed in the event of any proposed change to contract, site Implementation, and Service levels. Such change shall include, but shall not be limited to, changes in the scope of services provided by SI and changes to the terms of payment.

- 38.2. Change requests in respect of the contract, shall emanate from the SI, either on his own or as instructed by the authority, However the same shall be approved by the authority who shall act as its sponsor throughout the Change Control Process, for which SI shall complete Part A of the CCN (Annex I, Section 3 of the RFP).
- 38.3. SI and the Authority while preparing the CCN, shall consider the change in the context of whether the change is beyond the scope of Services. The CCN shall be applicable for the items which are beyond the stated/implied scope of work as per the RFP document.
- 38.4. In event, there is no common consensus between both the parties, a Committee of Subject/Industry Expert will be appointed by the Authority and the decision of the Committee will be final and binding on both the parties.
- 38.5. In the event the SI has quoted for an infrastructure that has already been listed in his quote and is easily tangible, the same shall be applicable if variation order is placed at any point during the 5 years of SI's appointment. CCN will be applicable only for any new functional requirement and new infrastructure requirement.
- 38.5.1 SI shall assess the CCN and complete Part B of the CCN. In completing Part B of the CCN SI shall provide as a minimum:
 - a description of the change;
 - o a list of deliverables required for implementing the change;
 - o a timetable for implementation;
 - o an estimate of any proposed change;
 - any relevant acceptance criteria;
 - o an assessment of the value of the proposed change;
 - Material evidence to prove that the proposed change is not already covered within the scope of the RFP, Agreement and Service Levels
- 38.5.2 Prior to submission of the completed CCN to the Authority or its nominated agencies, SI shall undertake its own internal review of the proposal and obtain all necessary internal approvals. As a part of this internal review process, SI shall consider the materiality of the proposed change in the context of the Agreement, the sites, Service levels affected by the change and the total effect that may arise from implementation of the change.
- 38.5.3 Each Party shall be responsible for its own costs incurred in the quotation, preparation of CCNs and in completion of its obligations described in this process provided SI meets the obligations as set in the CCN. In the event SI is unable to meet the obligations as defined in the CCN then the cost of getting it done by third party shall be borne by SI.

Page | 35

Change requests and CCNs shall be reported monthly to each Party's representative who shall prioritize and review progress.

C. Service levels

39. Purpose

- 39.1. The purpose is to define the levels of service provided by SI to the Authority for the duration of the contract. The benefits of this are:
 - Start a process that applies to Authority and SI attention to some aspect of performance, only when that aspect drops below the threshold defined by the Authority
 - Help Authority control the levels and performance of SI's services
- 39.2. The Service Levels are between the Authority and SI

40. Service Level Agreements & Targets

- 40.1. This section is agreed to by Authority and SI as the key performance indicator for the project. This may be reviewed and revised according to the procedures detailed in Clause 46 SLA Change Control.
- 40.2. The following section reflects the measurements to be used to track and report system's performance on a regular basis. The targets shown in the following tables are for the period of contact.
- 40.3. The procedures in Clause 46 shall be used if there is a dispute between Authority and SI on what the permanent targets should be.

41. General principles of Service Level Agreements

Service Level agreements have been logically segregated in following categories:

41.1. Liquidated Damages (Phase-2)

The liquidated damages shall come into effect once the notification of Award/ Agreement has been issued/signed by the Authority. It would be mainly applicable on the implementation phase of the project. Phase -2 is subset of phase-1.

41.2. Service Level Agreement

SLA would be applicable in operations and maintenance phase of the project. The penalties shall be applicable on Operations & Maintenance cost of the project calculated quarterly. SLA would be applicable on:

- a. Network as Service
- b. Data Center as co-location
- c. ICT based Solid Waste Management

- d. Smart Traffic
- e. Smart poles
 - Environmental Sensor
 - Public Address System
 - Panic Button
- f. ICCC Wi-Fi
- g. Surveillance Cameras
- h. Variable Messaging SYSTEM
- i. BILLBOARDS
- j. Control and Operation Centers/ City Operation Center

42. Service Levels Monitoring

Service Level parameters defined in Clause 43 shall be monitored on a periodic basis, as per the individual parameter requirements. SI shall be responsible for providing appropriate web based online SLA measurement and monitoring tools and it is also proposed to have a independent technical auditor, third party appointed by the authority for monitoring the Service levels. SI shall be expected to take immediate corrective action for any breach in SLA. In case issues are not rectified to the complete satisfaction of Authority, within a reasonable period of time defined in this RFP, then the Authority shall have the right to take appropriate penalizing actions, or termination of the contract.

43. Penalties for Non/Under Performance (Phase-2)

43.1. A maximum level of performance penalties is established and described in this section

Severity Level	Penalty as a percentage of applicable payment milestone
9	Event of default and termination as per Clause 35 & 36 of this section of RFP respectively and the consequences as provided in Clause 37 of this section of RFP
8	5.0%
7	2.0%
6	1.0%
5	0.5%
4	0.4%
3	0.3%
2	0.2%

Page | 38

Bareilly Smart City Limited				
Severity Level	Penalty as a percentage of applicable payment milestone			
1	0.1%			
0	No Penalty			

- 43.2. Performance Penalty for not meeting a measurement parameter for any two months in consecutive quarters shall result in twice the penalty percentage of that respective measurement parameter in the third quarter for all the three months
- 43.3. Maximum Penalty applicable for any quarter shall not exceed 10% of the 'applicable fees' for the respective quarter.
- 43.4. Three consecutive quarterly deductions of 10% of the applicable fee on account of any Reasons shall be deemed to be an event of default and termination as per Clause 36 of this Section of RFP respectively and the consequences as provided in Clause 37 of this section of RFP shall follow.
- 43.5. The payment to the agency shall be on Quarterly basis however the penalty shall be calculated on monthly basis as per the SLAs stated in the RFP.

43.6. Measurement & Targets

43.6.1 Implementation phase related performance levels

S. No.	Measurement	Definition	Target	Penalty
Comme	encement of Work			
1.	Team Mobilization and Commencement of Work	SI is expected to mobilize project team for commencement of work Commencement of work would mean reporting and availability of SI's resources (90% Key Personnel as per the RFP requirement) at the Authority's office for	Within 15 days of issuance of Lol or contract agreement, whichever is earliest	Delay beyond 15 calendar days = 0.2% of the contract value Delay between 15 to 30 calendar days = 0.5% of the contract value Delay beyond 30 days may lead to Termination of the Contract at the

Bareilly Smart City Li	nited			
defined period of 15		discretion	of	the
days and remaining 10%		Authority		
in next 15 days).				
However All Key				
personnel's handling				
overall responsibility				
shall mobilize as per				
mentioned in RFP.				
However MSI is allowed				
other respective				
recourses one week				
before commencement				
of particular activity as				
per schedule submitted				
to BSCL.				

43.6.2 . DATA CENTER COLOCATION

#	Measurement	Definition	Target	Severity Level
1	Network - Wired &Wireless Networks Covering routers & switches storage Backup drives VM ware IOT platform Enterprise network firewalls/Intrusion Prevention System Modular Servers	Data center components (availability for a month is defined as total time (in minutes) in a month less total down time (in minutes) in a month excluding planned datacenter downtime. The data center is considered available when all the services in full capacity are available. Data center Availability (%) = (Total minutes during the month – Planned downtime - Downtime minutes during the month) *100 / Total minutes during the month Total Time shall be measured 24x7 basis for DC depending upon functional requirement. Planned data center Downtime refers to unavailability of data center services due to infrastructure maintenance activities such as configuration changes, upgradation or changes to any supporting infrastructure. Details related to such planned outage shall be agreed with the Authority and data center Measurement Tool: Reports from EMS	99.999%	> 99.999 = 0 < 99.999 to 99.99 = 2 <99.99 to 98 = 5 < 98 = 9

43.6.3. Network related performance levels

*SLA/downtime calculation will be done basis the trouble ticket raised by the customer/MSI with the bidder central helpdesk. Bidder will share the monthly uptime report with the customer where all the SR will be captured along with detailed RFO/RCA.

#	Measurement	Definition	Target	Severity Level
1.	Network Availability	Network components (availability for a month is defined as total time (in	> 98.5% up time	
	for all field level	minutes) in a month less total down time (in minutes) in a month excluding	measured on a	0
	devices to CoC - SI to	planned network downtime. Network is considered available when all services	monthly basis	
	take network as a	in full capacity are available.	≤98.5% to >97.0% up	
	service to ISP		time measured on a	4
		Network Availability (%) = (Total minutes during the month – Planned	monthly basis	
		downtime - Downtime minutes during the month) *100 / Total minutes during	≤97.0% to >95.0% up	
		the month	time measured on a	5
			monthly basis	
		Total Time shall be measured 24x7 basis.	≤95.0% to >93.0% up	
			time measured on a	7
		Planned Network Component Downtime refers to unavailability of network	monthly basis	
		services due to infrastructure maintenance activities such as configuration		
		changes, upgradation or changes to any supporting infrastructure Details	< 93.0% up time	
		related to such planned outage shall be agreed with the Authority.	measured on a	8
			monthly basis	
		Measurement Tool: Reports from EMS		

Bareilly Smart	City Limited
-----------------------	--------------

#	Measurement		asurement Definition		Target	Severity Level
2.	Network Service	Quality	Οf	Quality of Service (QoS) refers to the capability of a network to provide traffic engineering to selected network traffic from	99% throughput of minimum stipulated	0
				a. Field Level Infrastructure and Access Point	bandwidth during 24*7 hours	
				b. Access point to DC, DR and CCC switch and optical fiber	≥97% and <99%	5
				c. Leased Line between Switch at CCC and DC and DR.	<97%	6
					Average Packet loss	
				The primary goal of QoS is to provide priority including dedicated bandwidth,	exceeding 0.5% over	
				controlled jitter, latency and improved loss characteristics.	a month (at Data	4
					Centre and WAN	
				Measurement Tool: Reports from EMS	level)	
					Latency Delay > 150	
					ms (every instance)	Δ
					(at Data Centre and	т
	WAN level)		WAN level)			

43.6.4. Service Level for ICT Solutions

#	Measurements	Definitions	Target	Severity Level
1	 Availability of Application Softwares 1. Public Address System 2. Variable Message System 3. Environmental Sensors 4. Smart Water 5. Smart Traffic / ATMS 6. Smart Transport 7. Smart SWM 8. Video analytics software 9. Video management software 10.Integrated Operations Platform 	Uptime = {1 - (Application downtime-maintenance downtime) / (Total Time – maintenance downtime)} Application Downtime shall be measured from the time the equipment becomes unavailable (due to any reasons whatsoever attributable to the Bidder) for Business processing to the end user to the time it becomes fully available. Any downtime for maintenance shall be with prior written intimation to the Authority. Please note that continuous downtime of every 2 hours (from 7am to 12midnight) would raise the severity by one level. e.g. the severity level will raise from 0 to 1 Please note that continuous downtime of every 4 hours (from midnight to 7am) would raise the severity by one level. e.g. the severity level will raise from 0 to 1	 Minimum 98% uptime measured on monthly basis ≥96% to < 98% uptime measured on monthly basis ≥93% to < 96% uptime measured on monthly basis < 93% uptime measured on monthly basis 	0 5 7 9
2	Availability of other software including:	Uptime = {1 - (Application downtime-maintenance downtime) / (Total Time – maintenance downtime)}	Minimum 97% uptime measured on monthly basis	0

#	Measurements	Definitions	Target	Severity Level
	 Anti-virus SLA, helpdesk &EMS virtualization software IBMS 	Application Downtime shall be measured from the time the equipment becomes unavailable (due to any reasons whatsoever attributable to the Bidder) for Business processing to the end user to the time it becomes fully available. Any downtime for maintenance shall be with prior written intimation to the Authority. Please note that continuous downtime of every 2 hours (from 7am to 12midnight) would raise the severity by one level. e.g. the severity level will raise from 0 to 1 Please note that continuous downtime of every 4 hours (from midnight to 7am) would raise the severity by one level. e.g. the severity level will raise from 0 to 1	 ≥96% to < 97% uptime measured on monthly basis ≥95% to < 96% uptime measured on monthly basis < 95% uptime measured on monthly basis 	4 6 7
3	Availability of City Operation centre	Uptime = {1 - (Equipment downtime-maintenance	Minimum 99%	0
	infrastructure including	downtime) / (Total Time – maintenance downtime)}	uptime measured on monthly basis	

#	Measurements	Definitions	Target	Severity Level
	 Work Stations Video Wall Cameras Phones Biometric Access Control System 	Equipment Downtime shall be measured from the time the equipment becomes unavailable (due to any reasons whatsoever attributable to the Bidder) for Business processing to the end user to the time it becomes fully available. Any downtime for maintenance shall be with prior written intimation to the Authority.	 ≥96% to < 97% uptime measured on monthly basis ≥95% to < 96% uptime measured on monthly basis 	4
	 6. UPS/DG sets 7. Air Conditioner 	Please note that continuous downtime of every 2 hours (from 7am to 12midnight) would raise the severity by one level. e.g. the severity level will raise from 0 to 1 Please note that continuous downtime of every 4 hours (from midnight to 7am) would raise the severity by one level. e.g. the severity level will raise from 0 to 1 Measurement Tool: Reports from EMS	< 95% uptime measured on monthly basis	7
4	Fire Detection and Suppression system uptime	Availability of fire detection and suppression system in the CCC/COC. Periodic audits would be done by the agency to check the availability of these system Measurement Tool: Random Check	100% availability measured periodically Any incident of non-compliance	0 5

#	Measurements	Definitions	Target	Severity Level
4	 Availability of field infrastructure including: GPS/GSM Unit Public Address System - Loudspeakers GPS based handheld/ Mobile Device Environmental Sensors Smart Water Unit Smart Traffic Detectors, Sensors & Controllers 	Uptime = {1 - (Equipment downtime-maintenance downtime) / (Total Time – maintenance downtime)} Equipment Downtime shall be measured from the time the equipment becomes unavailable (due to any reasons whatsoever attributable to the Bidder) for Business processing to the end user to the time it becomes fully available. Any downtime for maintenance shall be with prior written intimation to the Authority. Please note that continuous downtime of every 2 hours (from 7am to 12midnight) would raise the severity by one level. e.g. the severity level will raise from 0 to 1	Minimum97%uptimemeasuredon monthlybasis≥96%to97%uptimemeasuredon monthlybasis≥95%to< 96%uptimemeasuredon monthlybasis< 95%uptimemeasuredon	0 4 5 7
	 Variable Message Signboard CCTV Other equipment 	Please note that continuous downtime of every 4 hours (from midnight to 7am) would raise the severity by one level. e.g. the severity level will raise from 0 to 1 Measurement Tool: Reports from EMS	monthly basis	
5	Battery Replacement for all equipment/devices procured	Replacement of various equipment batteries. This excludes the regular maintenance of the UPS and its Batteries	Batteries to be replaced every 3 rd Year	5

#	Measurements	Definitions	Target	Severity Level
		Measurement Tool: SLA Monitoring Tool for inventory Management.		
6	Repair/replacement of field/CCC infrastructure including: • GPS/GSM Unit	Bidder should keep minimum 10% spare at any given point of project execution. MSI need to factor the cost.	Within 4 business hours of logging compliant	0
	 Public Address System - Loudspeakers GPS based handheld/ Mobile 	Infrastructure equipment should be replaced or repaired after complaint login from authority officials	2 to 4 business days of logging compliant	5
	DeviceWeight SensorsEnvironmental Sensors	Measurement Tool: System Generated Call Log at Help Desk	More than 4 days of logging compliant	7
	 Smart Water Unit Smart Traffic Detectors, Sensors & Controllers 			
	Variable Message SignboardOther equipment			
7	Asset/Inventory Management		≥ 95% of the minimum required	0

#	Measurements	Definitions	Target	Severity Level		
		Provide Monthly MIS of Asset Inventory to check Asset Inventory level Measurement Tool: SLA Monitoring Tool for Inventory Management	inventory level should be available measured on monthly basis <95% of the minimum required inventory level	3 (Severity level would increase by 1 for every 5%		
				drop in inventory level)		
		Conduct Annual Physical Asset verification once in a year and give report within 2 months from the date of verification	100% Management approval of physical asset verification report	5		

Note: During post-implementation period, in case the pole /outdoor cabinets or any other field equipment is damaged by a vehicular accident (or due to any other reason outside the control of SI) and needs repair/replacement, then the corresponding equipment to be replaced by Bidder as per the SLAs defined in this section. In such cases, damages are to be borne by SI through proper comprehensive insurance for all the equipment (in the field or at CCC/COC) during contract period.

43.6.5. Help Desk

Service	Parameter	SLA	Validation	Penalty	Tools used
Help Desk	Help Desk should be available	100% calls to	Reports	95%-99% calls are logged and ticket is	Automated
Availability	and all incidents/ events	be logged and	generated from	generated: Penalty of 2% of O&M	Monitoring
	raised with the IT Help Desk	service ticket	ticket logging	Charges	Tool
	shall; be logged into the	no, shall be	system	90%-95% calls are logged and ticket is	
	system and service ticket	generated		generated: Penalty of 5% of O&M	
	number should be provided			Charges	
	to the employee				
	Resolution of ticket logged as	99%	Reports	95%-99% calls resolved in specified	Automated
	per the severity definition		generated from	time: Penalty of 2% of O&M Charges	Monitoring
	chart		ticket logging	90%-95% calls resolved in specified	Tool
			system	time: Penalty of 5% of O&M Charges	
				< 90% calls resolved in specified time:	
				Penalty of 10 % of O&M Charges	
Problem	Supplier shall analyze all the	100% timely	Root cause	5% penalty on monthly of O&M	
Management	incidents and provide a root	submission	report	charges of that project area ,if the	
	cause report every month if	covering all		supplier does not submit a problem	
	there are more than 10	incidents		report for that month	
	incidents of the same type.	logged in that	Incident Report	5% penalty on monthly of O&M	
		month	stating	charges of that project area if the	
			problems faced	supplier does not submit a problem	
			by the User	report for that month	

43.6.6. Camera feed and quality wherever installed

#	Measurements	Definitions	Target	Severity
				Level
	Ratio of Live cameras v/s Total	Number of live working cameras divided by total number of cameras	≥98%	0
1	Cameras at any point of time	Measurement Tool: Log from VMS tools wherein alerts to the control	≥95 % to < 98%	3
	(To be measured every 1 hour)	room shall be generated on non-functioning of camera	< 95%	5
	Average Frame rate maintained	Average frame rate is 25 FPS to be maintained by all cameras calculated	≥90%	0
2	for viowing	on a Monthly Basis	≥85 % to < 90%	3
		Measurement tool: Log from VMS	< 85%	4
	Average Frame rate maintained	Average frame rate is 12.5 FPS to be maintained by all cameras calculated	≥95%	0
3	for Pocording	on a Monthly Basis	≥90 % to < 95%	3
		Measurement tool: Log from VMS	< 90%	4
		Time required for transmission of video feed from one point to another	≤40ms	0
4	Video stream Latency	Measurement tool: Report from EMS	>40ms to ≤60ms	3
			>60ms	4
	Change of Screen from one	Time required for transmission of screen from one camera source to	≥2s	0
5	camera Source to another	another	>2s to ≤5s	3
		Measurement tool: Log from VMS	>5s	4
	Video Feed Query Retrieval	Time taken for receiving response to a query raised for video feed	≤10s	0
6		Measurement tool: Log from VMS	>10s to ≤20s	3
			>20s	4

44. Reporting Procedures

44.1. SI representative shall prepare and distribute Service level performance reports in a mutually agreed format by the **5th working day of subsequent month**. The reports shall include **"actual versus target"** Service Level Performance, a variance analysis and discussion of appropriate issues or significant events. Performance reports shall be distributed to Authority management personnel as directed by Authority. Also, SI may be required to get the Service Level performance report audited by a third-party Auditor appointed by the Authority.

45. Issue Management Procedures

45.1. General

This process provides an appropriate management structure for the orderly consideration and resolution of business and operational issues in the event that quick consensus is not reached between Authority and Bidder.

Implementing such a process at the beginning of the outsourcing engagement significantly improves the probability of successful issue resolution. It is expected that this pre-defined process shall only be used on an exception basis if issues are not resolved at lower management levels.

45.2. Issue Management Process

- 45.2.1. Either Authority or SI may raise an issue by documenting the business or technical problem, which presents a reasonably objective summary of both points of view and identifies specific points of disagreement with possible solutions.
- 45.2.2. Any unresolved issues/disputes concerning the Project/Contract between the Parties shall first be referred in writing to the Project Manager for his consideration and resolution. If the Project Manager is unable to resolve any issue/dispute within 5 days of reference to them, the Project Manager shall refer the matter to the Program Management Committee. If the Program Management Committee is unable to resolve the issues/disputes referred to them within 15 days the unresolved issue/dispute shall be referred to Steering Committee / high powered committee/Project Implementation Committee for resolve the issue/dispute.

45.2.3. If the Steering Committee fails to resolve a dispute as per the above clause, the same shall be referred to arbitration. The arbitration proceedings shall be carried out as per the Arbitration procedures mentioned in Clause 18 of this section of RFP.

46. Service Level Change Control

46.1. General

It is acknowledged that this **Service levels may change as Authority's business needs evolve over the course of the contract period**. As such, this document also defines the following management procedures:

- a. A process for negotiating changes to the Service Levels
- b. An issue management process for documenting and resolving particularly difficult issues.
- c. Authority and Bidder management escalation process to be used in the event that an issue is not being resolved in a timely manner by the lowest possible level of management.

Any changes to the levels of service provided during the term of this Agreement shall be requested, documented and negotiated in good faith by both parties. Either party can request a change.

- 46.2. Service Level Change Process: The parties may amend Service Level by mutual agreement in accordance. Changes can be proposed by either party .Unresolved issues shall also be addressed. SI's representative shall maintain and distribute current copies of the Service Level document as directed by Authority. Additional copies of the current Service Levels shall be available at all times to authorized parties.
- 46.3. Version Control / Release Management: All negotiated changes shall require changing the version control number. As appropriate, minor changes may be accumulated for periodic release or for release when a critical threshold of change has occurred.

D. ANNEXURES

Annex I: Change Control Note

Change Control Note	CCN Number:			
Part A: Initiation				
Title				
Originator				
Sponsor				
Date of Initiation				
	Details of Proposed Change			
(To include reason for attachments as A1, A2, and	change and appropriate details/specifications. A3 etc.)	Identify	any	
Authorized by Authority Date				
Name				
Signature				
Received by the Bidder Date				
Name				
Signature				
Change				
Change Control Note	CCN Number:			
Part B: Evaluation				

(Identify any attachments as B1, B2, and B3 etc.)

Changes to Services, payment terms, payment profile, documentation, training, service levels and component working arrangements and any other contractual issue.

Brief Description of Solution:

Deliverables:

Timetable:

Charges for Implementation:

Other Relevant Information:

(including value-added and acceptance criteria)

Authorized by Authority	Date	
Name		
Signature		
Change Control Note	CCN Number:	

Part C: Authority to Proceed

Implementation of this CCN as submitted in Part A, in accordance with Part B is: (tick as appropriate)

Approved Rejected

Requires Further Information (as follows, or as Attachment 1 etc.)

For Authority and its	For SI
nominated agencies	

Annex II: Form of Agreement

THIS Agreement made thedate of......2016, between......(hereinafter......referred to as the "SI") of the one part and (hereinafter called the "Authority") of the other part.

WHEREAS SI has the required professional skills, personnel and technical resources, has agreed to provide the Services on the terms and conditions set forth in this Contract and is about to perform services as specified in this RFP(hereinafter called "works") mentioned, enumerated or referred to in certain Contract conditions, specification, scope of work, other sections of the RFP, covering letter and schedule of prices which, for the purpose of identification, have been signed by on behalf of the

SI and(the Authority) on behalf of the Authority and all of which are deemed to form part of the Contract as though separately set out herein and are included in the expression "Contract" whenever herein used.

NOW, THEREFORE, IT IS HEREBY AGREED between the parties as follows:

- a. The Authority has accepted the tender of SI for the provision and execution of the said works for the sum ofupon the terms laid out in this RFP.
- b. SI hereby agrees to provide Services to Authority, conforming to the specified Service Levels and conditions mentioned
- c. The following documents attached hereto shall be deemed to form an integral part of this Agreement:

Complete Request for Proposal (RFP) Document	Volumes I, II and III of the RFP and corrigendum and addendum, if any
Break-up of cost components	Bidder's Commercial bid
The Authority's Letter of Intent dated <<>>	To be issued later by the Authority
SI's Letter of acceptance dated <<>>	To be issued later by the SI
Bid submitted by SI as per file No. <<>>	Bidder's Technical bid

- d. The mutual rights and obligations of the "Authority" and SI shall be as set forth in the Agreement, in particular:
 - SI shall carry out and complete the Services in accordance with the provisions of the Agreement; and
 - the "Authority" shall make payments to SI in accordance with the provisions of the Agreement.

NOW THESE PRESENTS WITNESS and the parties hereto hereby agree and declare as follows, that is to say, in consideration of the payments to be made to SI by the Authority as hereinafter mentioned, SI shall deliver the services for the said works and shall do and perform all other works and things in the Contract mentioned or described or which are implied there from or there in respectively or may be reasonably necessary for the completion of the said works within and at the times and in the manner and subject to the terms, conditions and stipulations mentioned in the said Contract.

AND in consideration of services and milestones, the Authority shall pay to SI the said sum ofor such other sums as may become payable to SI under the provisions of this Contract, such payments to be made at such time and in such manner as is provided by the Contract.

IN WITNESS WHEREOF the parties hereto have signed this deed hereunder on the dates respectively mentioned against the signature of each.

Signed		Signed	
Name	:	Name	:
Designation	:	Designation	:
Date		Date	
Place		Place	
In Presence of		In Presence Of	
Signed		Signed	

Bareilly Smart City Limited				
Name	:	Name	:	
Designation	:	Designation	:	
Date		Date		
Place		Place		