No.8/9/SS/2024   Date: 23-10-2024

REQUEST FOR BUDGETARY OFFER

Sir,

> **Sub:** "Supply, Installation, Testing and commissioning of CCTV Cameras, PIDS, UVSS and allied works including onsite support at NMPA" – Submission of Budgetary Offer - Reg.

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New Mangalore Port Authority, Ministry of Ports, Shipping & Waterways, Govt. of India, intends to invite Budgetary Offer from the Public Sector Units Viz. BECIL, ECIL, BEL, ITI, TCIL, CEL for the work of "Supply, Installation, Testing and commissioning of CCTV Cameras, PIDS, UVSS and allied works including onsite support at NMPA"

The budgetary offer in sealed cover superscribed as "Supply, Installation, Testing and commissioning of CCTV Cameras, PIDS, UVSS and allied works including onsite support at NMPA" may please be submitted addressed to "The Executive Engineer (Elec.)-1, Electrical Division, Administration Building, New Mangalore Port Authority, Panambur, Mangalore- 575010" not later than 3.00 PM on or before 06-11-2024.

SL.No	Product Description	Qty	Unit of Measurement	Rate	Amount in Rs
SUPPLY OF ITEMS WITH 5 YEARS WARRANTY					
	Cameras				
1	Supply of **Multi sensor 20MP DOME CAMERA** as per technical specification attached herewith. The MAC ID's of the CCTV Cameras to be registered in the name of the OEM of the CCTV Cameras.	11	Nos.		
1a	Installation of Multi Sensor 20 MP Dome Cameras with required accessories complete.	11	Nos.		
2	Supply of **Fixed Dome Camera (5MP)** per	41	Nos.		

	technical specification attached herewith. The MAC ID's of the CCTV Cameras to be registered in the name of the OEM of the CCTV Cameras.				
2a	Installation of Fixed Dome Camera 05 MP Cameras with required accessories complete.	41	Nos.		
3	Supply of **Bullet Camera**: (**5MP**) per technical specification attached herewith. The MAC ID's of the CCTV Cameras to be registered in the name of the OEM of the CCTV Cameras..	182	Nos.		
3a	Installation of 5 MP Cameras with required accessories complete.	182	Nos.		
4	Supply of **Bullet Camera**: (**5MP**) per technical specification attached herewith. The MAC ID's of the CCTV Cameras to be registered in the name of the OEM of the CCTV Cameras.	177	Nos.		
4a	Installation of 5 MP Cameras with required accessories complete.	177	Nos.		
5	Supply of **PTZ Camera** Minimum **5MP** per technical specification attached herewith. The MAC ID's of the CCTV Cameras to be registered in the name of the OEM of the CCTV Cameras.	47	Nos.		
5a	Installation of 05 MP Cameras with required accessories complete.	47	Nos.		
6	Supply of **THERMAL AND VISUAL CAMERA** per technical specification attached herewith. The MAC ID's of the CCTV Cameras to be registered in the name of the OEM of the CCTV Cameras.	2	Nos.		
6a	Installation of Thermal and visual Camera's with required accessories complete.	2	Nos.		
7	Supply of Surveillance MicroSD card 256GB	460	Nos.		
7a	Installation of Micro SD card as per site condition.	460	Nos.		
8	Licenses required for the Video Management Server and Video Recording Servers & Storage Servers, Work station clients with bundled	1	Lumsum		

	lifetime licenses for Max. 600 cameras with parallel recording. (Existing 107 nos. and the proposed new cameras 460 nos.)				
8a	Installation of Video Management Software with Configuration of recording Server & Storage Servers, Work station clients.	1	Lumsum		
9	Supply of Public Address system with Intercom Station including failover and bidirectional audio and video recording with license	22	Nos.		
9a	Installation of Public Address System with Intercom Station.	22	Nos.		
10	Supply of Servers required for Video Management, Recording, Analytics & Storage for handling 600 Nos. cameras including redundancy of servers with necessary windows, database application license. (Existing 107 nos. and the proposed new cameras 460 nos.)	1	Lumsum		
10a	Installation of Servers and accessories.	1	Lumsum		
11	Supply of SAN storage with dual controller for maintaining camera recording backup for 600 cameras for 90 days retention using RAID 6 with Hotspare for full HD /25fps. with necessary accessories. (Existing 107 nos. and the proposed new cameras 460 nos.)	1	No		
11a	Installation of SAN Storage and Accessories. for configuring to the system.	1	No		
12	Video Analytics Software for PIDS, People Count, Fire Detection, FRS & including Hardware requirement with License and as per site requirement.	1	No		
12a	Installation of Video Analytics Software for PIDS People Count, Fire Detection, FRS & including Hardware Configuration.	1	Lumsum		
13	Supply of complete UVSS-ANPR system at entry and exit of all gates (Main Gate, SJ Gate, KK Gate) with all Accessories i.e., Driver image camera, Dashboard/ software for showing ANPR, Vehicle image, Driver Image details, Video Analytics Platform which includes	1	Lumsum		

	camera health monitoring, foreign object detection, location name, zoom function, including Traffic Light Signal Supply & installation.				
13a	Installation & configuration of UVSS with ANPR for all gates asper site condition. (Excluding Civil Work)	1	Lumsum		
14	Supply of Client workstations with 24"Dual monitor for UVSS with all accessories	10	Nos.		
14a	Installation of Client Workstation with 24" Monitor.	10	Nos.		
15	Supply of 55" Screen for All the Gates (Main Gate, SJ Gate, KK Gate) with 24x7	10	Nos.		
15a	Installation of 55" Screen across all gates (Main Gate, SJ Gate, KK Gate).	10	Nos.		
16	Supply of Videowall 5X3 Active screen diagonal 55 Inch Display Bezel-less design with No Gap technology 500 cd/m² brightness Resolution Full HD (1920 x 1080) Viewing angle (H, V) 178° | 178° with videowall controller & client systems and Mounting structure with Accessories	15	Nos.		
16a	Installation of Video Wall with Accessories as per site condition	1	Nos.		
17	Supply of NTP server with Multi GNSS with Antenna	1	No		
17a	Installation of NTP Server with Multi GNSS.	1	Lumsum		
18	Integration of existing Boom Barrier including accessories like Receiver (Two channels), Infrared Beam set, PE sensor & Push Button for All the Gates (Main Gate, SJ Gate, KK Gate) and Integration to UVSS.	1	Lumsum		
19	Supply of 24-SFP+ slots stackable switch with 1 module bay, 4 QSFP28 ports and dual hot swap power supply, stacking cable 40G QSFP, fully loaded Necessary 10G Transceivers and Necessary License	2	Nos.		
19a	Installation of 24 Port Core Switch.	2	Nos.		
20	Supply of 24-port 100/1000T PoE+ stackable L3 switch with 4 SFP+ ports and 2 fixed power supply with fully loaded transceivers and DAC	14	Nos.		

	cable with Continuous POE should be available.				
20a	Installation of 24 Port POE Switches.	14	Nos.		
21	Supply of L2 - Industrial Grade switch with minimum 4 x 10/100/1000 Base T ports PoE+ support, 2 * 1 GB fiber slots, industrial switch., Fully Loaded with all accessories including LIU, SFU Modules, Patch cords etc. with Continuous POE should be available.	88	Nos.		
21a	Installation of L2 Industrial Grade Switch 4Port.	88	Nos.		
22	NMS License for all the switches access & managing	1	No		
22a	Installation and Configuration of NMS.	1	Lumsum.		
23	Supply of Radio Devices with receiver's asper site condition.	1	Lumsum		
23a	Installation of Radio Devices and accessories.	1	Lumsum		
24	Supply of 42U 800x1000 with Accessories	3	Nos.		
24a	Installation of 42U Rack asper site condition.	3	Nos.		
25	Supply of 27U Rack with 600x800 with Accessories	4	Nos.		
25a	Installation of 27U Rack asper site condition.	4	Nos.		
26	Supply of 9U Outdoor IP55 Rack with Electrical Surge Protectors, MCB & Electrical Surge Protectors	195	Nos.		
26a	Installation of 09U Rack asper site condition.	195	Nos.		
27	Supply of 15U Outdoor Rack with Electrical Surge Protectors, MCB & Electrical Surge Protectors	12	Nos.		
27a	Installation of 15U Rack asper site condition with accessories.	12	Nos.		
28	Supply of Communication Tower 35 Meters height with accessories.	14	Nos.		
28a	Installation of 35 Meter Tower with required Civil Foundation work asper site condition.	14	Nos.		
29	Supply of 9 Mtrs Pole with required accessories	195	Nos.		
29a	Installation of 09 Meter Pole with required Civil Foundation work asper site condition.	195	Nos.		
30	Supply of 12 Core OFC Single mode Armoured cable	34000	Mtrs		
30a	Laying OFC Cable with necessary Electrical Items	34000	Mtrs		

31	Supply of 24port fully Loaded with Necessary OFC patch cords and accessories as per the site requirement	10	Nos.		
31a	Installation of 24 Port Fully Loaded OFC Patch Panel.	10	Nos.		
32	Supply of 12port fully Loaded with Necessary OFC patch cords and accessories as per the site requirement	98	Nos.		
32a	Installation of 12 Port Fully Loaded OFC Patch Panel.	98	Nos.		
33	Supply of Cat 6 Outdoor Cable with Necessary LAN patch cords and accessories as per the site requirement	54000	Mtrs		
33a	Laying of CAT 6 Outdoor Cable as per the site requirement with required accessories.	54000	Mtrs		
34	Supply of Cat 6 A LAN Cable with Necessary LAN patch cords and accessories as per the site requirement.	2440	Mtrs		
34a	Laying of CAT 6 LAN CABLE as per the site requirement with required accessories.	2440	Mtrs		
35	Building Interior & providing Furniture such as Tables, Chairs etc. for the arrangements in CCTV control Room and Technical staff Room.	2000	Sq.ft		
36	Integration with existing Access Control Biometric	1	Lumsum		
37	Integration with existing 110 Cameras (Bullet and PTZ of Hikvision/Vivotec)	1	Lumsum		
38	Integration with existing RFID system	1	Lumsum		
39	Supply of Firewall with High availability.	2	Nos.		
39a	Installation of Firewall asper site condition.	2	Nos..		
40	End Point Enterprises Antivirus for all the servers & workstations	1	Lumsum		
40a	Installation of End Point Antivirus.	1	Lumsum		
41	Supply of UPS 40 KVA with N+1 redundancy and 60 mins. backup time	2	Nos.		
41a	Installation of UPS 40 KVA UPS.	2	Nos.		
42	Supply of 10KVA FM UPS 1p1p UPS with SNMP Card with battery Rack & link.60Minuts	4	Nos..		
42a	Installation of 10 KVA FM UPS.	4	Nos.		
43	Supply of 3KVA Online UPS with Battery rack &	10	Nos.		

SL.No	Description	Qty	Unit of Measurement		
	links cable 26AH* 6 Nos. SMF Batteries for 2hrs battery backups				
43a	Installation of 3 KVA UPS.	10	Nos.		
44	Supply of 1KVA Line interactive Ups 10 Minutes Backup	165	Nos.		
44a	Installation of 1 KVA UPS	165	Nos.		
45	Supply & Installation of IS3043 Earthing for UPS	6	Nos.		
46	Supply of 3Core Armored 4 Sqmm Power Cable	19200	Mtrs		
46a	Laying of Power Cable with necessary electrical items asper site condition.	19200	Mtrs		
47	Supply of 40/60mm HDPE Pipe with caller with Jointer	22000	Mtrs		
47a	Laying of HDPE Pipe as per site condition.	22000	Mtrs		
48	Supply of 100mm GI Pipe for Road Cross with concrete/Ashpalt refilling	1000	Mtrs		
48a	Laying of GI Pipe asper site condition.	1000	Mtrs		
49	Supply of PVC pipe/Truff with accessories	5000	Mtrs		
49a	Laying of PVC pipe/Truff as per site condition	5000	Mtrs		
50	Supply of Route markers	2000	Nos.		
51	Laying of Route Markers with required Civil Work as per site condition.	2000	Nos.		
51	Slicing of OFC cable with OTDR report	1	Lumsum		
52	Digging & Refilling **Hard /Soft** soil with 1 Mtrs depth	1	Lumsum		
53	Digging & Refilling 1 Mtrs depth on **concrete/Road Cutting**	1	Lumsum		
54	Civil Work for All Gates & Major Locations.	20	Lumsum		
55	Miscellaneous items required to complete the project.	1	Lumsum		
	Part-I-Total				
	Applicable Tax				
	Part-I Grand Total				

PART II : Commissioning of Surveillance system

SL.No	Description	Qty	Unit of Measurement		
1	Commissioning of entire surveillance system of CCTVs, PIDS, UVSS and allied works, complete as per Project requirement as one time job.	1	Lumsum		

		Part-II Total			
		Applicable Tax			
		Part-II Grand Total			
PART III: DEPLYOMENT OF SITE ENGINEERS					
SL. No	Description	Resource	Resource		
1	Technical Onsite Technician/ Engineers to maintain complete surveillance system of CCTV, UVSS, PIDS Etc. at NMPA Required Qualification and Experience mentioned in annexure enclosed herewith.	8	Members		
	Part-II Total				
	Applicable Tax				
	Part-III Grand Total				
	Part I+II+III Grand Total Excluding Tax				

- **Applicable tax shall be mentioned separately**

TECHNICAL COMPLIANCE

Technical Specification to provide state-of-the-art surveillance and security system comprising of Under Vehicle Surveillance System (UVSS), Perimeter Intrusion Detection System (PIDS) and upgradation of existing CCTV Network by providing cameras covering perimeter of custom bound area and other vital installations at New Mangalore Port Authority, premises located at Panambur, Mangalore, Karnataka.

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1. IP CCTV CAMERAS

SL NO	Parameter	Technical Description	
MULTI-SENSOR CAMERA WITH 5MP X 4 SENSOR		
1	Image Sensor	1/2.7" Progressive CMOS or Better	
2	Max. Resolution	(5MP) x 4 or better	
3	Lens Type	Motorized, Vari-Focal, Remote Focus	
4	Focal Length	f = 3.7 ~ 7.7 mm or better	
5	Iris type	Auto-iris	
6	Day/Night	Yes	
7	Removable IR-cut Filter	Yes	
8	IR Illuminators	Built-in IR illuminators, effective up to30 meters with Smart IR	
9	Rotation Range	±90° each lens	
10	On-board Storage	Slot type: MicroSD/SDHC/SDXC card slot	
11		Seamless Recording	
12	Video Compression	H.265, H.264, MJPEG	
13	Maximum Frame Rate	30 fps @ (2688x1920) x 4	
14	Maximum Streams	3 simultaneous streams	
15	S/N Ratio	60 dB or better	
16	Dynamic Range	110 dB or better	
17	Video Streaming	Adjustable resolution, quality and bitrate control	
18		Time stamp, text overlay, flip and mirror, scheduled profile settings, configurable brightness/contrast/saturation/sharpness, white balance, exposure control, gain,	

	Image Settings	backlight compensation, privacy masks, defog, 3DNR	
19	Audio Capability	Two-way Audio (full duplex)	
20	Audio Compression	G.711, G.726	
21	Effective Range	5 meters	
22	Users	Live viewing for up to 06 clients	
23	Protocols	As per standard Industry practice	
24	Interface	10 Base-T/100 Base-TX/1000 Base-T Ethernet (RJ-45)	
25	ONVIF	Supported	
26	Video Motion Detection	Five-window video motion detection	
27	Alarm Triggers	camera tampering detection, digital input*, manual trigger, motion detection, periodical trigger, recordingnotification, SD card life expectancy, system boot	
28	Alarm Events	Event notification via digital output, email, HTTP, FTP, NAS server, SD card	
29		File upload via email, HTTP, FTP, NAS server, SD card	
30	Connectors	RJ-45 cable connector for 10/100/1000Mbps Network/PoE connection	
31		Audio input	
32		Audio output	
33		AC 24V Power input	
34		Digital input	
35		Digital output	
36	Power Input	AC 24V	
37		IEEE 802.3at PoE Class 4 or Better	
38	Casing	IP66, IK10	
39	Safety Certifications	CE, FCC, UL, BIS or any other industry standard certification	

40	Cyber security	Embedded	
41	**Warranty**	**5 Years OEM Warranty.**	

5MP DOME VARI-FOCAL with WDR			
SL NO	**Parameter**	**Technical Description**	
1	Image Sensor	1/2.8" Progressive CMOS or Better	
2	Max. Resolution	(5MP)	
3	Lens Type	Vari-focal, Remote Focus, Remote Zoom	
4	Focal Length	f = 2.8 ~ 13mm Lens or better	
5	Iris-type	Auto-iris	
6	Day/Night	Yes	
7	Pan Range	350°	
8	Tilt Range	80°	
9	Rotation Range	175°	
10	IR Illuminators	Built-in IR illuminators, effective up to50 meters with IR LED*4	
11	On-board Storage	Slot type: MicroSD/SDHC/SDXC card slot	
12		Seamless Recording	
13	Video Compression	H.265, H.264, MJPEG	
14	Maximum Frame Rate	30 fps @ 2560x1920	
15		60 fps @ 1920x1080	
16	Maximum Streams	3 simultaneous streams or better	
17	S/N Ratio	50 dB or better	
18	Dynamic Range	120 dB or better	
19	Video Streaming	Adjustable resolution, quality and bitrate control	

20	Image Settings	Time stamp, text overlay, flip & mirror; Configurable brightness, contrast, saturation, sharpness, white balance, exposure control, gain, backlight compensation, privacy masks; Scheduled profile settings, video rotation, 3DNR, DIS, HLC	
21	Audio Capability	Two-way Audio (full duplex)	
22	Audio Compression	G.711, G.726	
23	Audio Interface	Built-in microphone	
24		External microphone input	
25		External line output	
26	Users	Live viewing for up to 06 clients	
27	Protocols	As per standard Industry practice	
28	Interface	10 Base-T/100 Base-TX Ethernet (RJ-45)	
29	ONVIF	**Supported S,G,T**	
30	Video Motion Detection	Five-window video motion detection, human detection, time filter	
31	Edge Analytics	Intrusion detection, loitering detection,line crossing detection, unattended object detection, missing object detection, face detection, crowd detection, runningdetection	
32	Alarm Triggers	Motion detection, manual trigger, digital input, periodical trigger, systemboot, recording notification, camera tampering detection, audio detection,MicroSD card life expectancy	

33	Alarm Events	Event notification using digital output,HTTP, SMTP, FTP, NAS server and MicroSD card	
34		File upload via HTTP, SMTP, FTP, NASserver and MicroSD card	

35	Connectors	RJ-45 cable connector for 10/100Mbps Network/PoE connection	
36		Audio line input	
37		Audio line output	
38		AC 24V power input (optional)	
39		DC 12V power input	
40		Digital input *1	
41		Digital output *1	
42	Power Input	IEEE 802.3af PoE Class 0	
43		DC 12V	
44		AC 24V (optional)	
45	Safety Certifications	CE, FCC, UL or any other industry standard certification	
46	Casing	IP66, IK10	
47	Cyber security	Embedded	
48	Warranty	5 Years OEM Warranty	

5MP BULLET VARI-FOCAL with 12-40mm Lens			
SL NO	Parameter	Technical Description	
1	Image Sensor	1/2.8" Progressive CMOS or Better	
2	Max. Resolution	(5MP)	
3	Lens Type	Vari-focal, Remote Focus	
4	Focal Length	f = 12 ~ 40 mm or better	
5	Iris-type	Auto -iris	
6	Day/Night	Yes	
7	Removable IR-cut Filter	Yes	
8	Minimum	0.5 Lux (Color) or better	

9	Illumination	<0.08 lux (B/W)	
10		0 Lux with IR illumination on	
11	Tilt Range	90°	
12	Rotation Range	180°	
13	Pan/Tilt/Zoom Functionalities	Applicable as per industry standards	
14	IR Illuminators	Built-in IR illuminators, effective up to100 meters or better	
15	On-board Storage	Slot type: MicroSD/SDHC/SDXC card slot	
16		Seamless Recording	
17	Video Compression	H.265, H.264, MJPEG	
18	Maximum Frame Rate	30 fps @ 2560x1920	
19		60 fps @ 1920x1080	
20	Maximum Streams	3 simultaneous streams or better	
21	S/N Ratio	50 dB or better	
22	Dynamic Range	120 dB or better	
23	Video Streaming	Adjustable resolution, quality and bitrate control	
24	Image Settings	Time stamp, text overlay, flip & mirror; Configurable brightness, contrast, saturation, sharpness, white balance, exposure control, gain, backlight compensation, privacy masks; Scheduled profile settings, video rotation, 3DNR, EIS, HLC	
25	Audio Capability	Two-way Audio (full duplex)	
26	Audio Compression	G.711, G.726	
27	Audio Interface	External microphone input	
28		External line output	
29	Users	Live viewing for up to 06 clients	

30	Protocols	As per standard Industry practice	
31	Interface	10 Base-T/100 Base-TX Ethernet (RJ-45)	
32	ONVIF	Supported S,G,T	
33	Video Motion Detection	Five-window video motion detection, human detection, time filter	
34	Edge Analytics	Intrusion detection, loitering detection, line crossing detection, unattended object detection, missingobject detection, face detection	
35	Alarm Triggers	Audio detection, camera tampering detection, cybersecurity events (bruteforce attack event, cyberattack event, quarantine event), digital input, manual trigger, motion detection, periodical trigger, recording notification, SD card life expectancy, shock detection, system boot	
36	Alarm Events	Event notification via audio clip, camera link, digital output, email, HTTP, FTP/SFTP, NAS serv er, SD card	
37		File upload via HTTP, FTP/SFTP, NAS server and MicroSD card	
38	Connectors	RJ-45 cable connector for 10/100Mbps Network/PoE connection	
39		Audio line input	
40		Audio line output	
41		DC 12V power input	
42		Digital input *1	
43		Digital output *1	
44	Power Input	IEEE 802.3af PoE Class 0	
45		DC 12V	

46		AC 24V: Max. 11 W	
47	Safety Certifications	CE, FCC, UL, EN or any other industry standard certifications.	
48	Casing	IP66, IK10	
49	Cyber security	Embedded	
50	Warranty	5 Years OEM Warranty.	

	5MP BULLET VARI-FOCAL with f = 2.7 ~ 13mm or better [Critical Locations]		
SL NO	Parameter	Technical Description	
1	Image Sensor	1/2.8" Progressive CMOS or Better	
2	Max. Resolution	(5MP)	
3	Lens Type	Vari-focal, Remote Focus	
4	Focal Length	f = 2.7 ~ 13mm or better	
5	Iris type	Auto -iris	
6	Day/Night	Yes	
7	Removable IR-cut Filter	Yes	
8	Minimum Illumination	0.5 Lux (Color) or better	
9		<0.08 lux (B/W)	
10		0 Lux with IR illumination on	
11	Tilt Range	90°	
12	Rotation Range	180°	
13	Pan/Tilt/Zoom Functionalities	48x digital zoom	
14	IR Illuminators	Built-in IR illuminators, effective up to50 meters or better	
15	On-board Storage	Slot type: MicroSD/SDHC/SDXC card slot	
16		Seamless Recording	
17	Video Compression	H.265, H.264, MJPEG	

18	Maximum Frame Rate	30 fps @ 2560x1920	
19		60 fps @ 1920x1080	
20	Maximum Streams	3 simultaneous streams or better	
21	S/N Ratio	50 dB or better	
22	Dynamic Range	120 dB or better	
23	Video Streaming	Adjustable resolution, quality and bitrate control	
24	Image Settings	Time stamp, text overlay, flip & mirror; Configurable brightness, contrast, saturation, sharpness, white balance, exposure control, gain, backlight compensation, privacy masks; Scheduled profile settings, video rotation, 3DNR, EIS, HLC	
25	Audio Capability	Two-way Audio (full duplex)	
26	Audio Compression	G.711, G.726	
27	Audio Interface	External microphone input	
28		External line output	
29	Users	Live viewing for up to 06 clients	
30	Protocols	As per standard Industry practice	
31	Interface	10 Base-T/100 Base-TX Ethernet (RJ-45)	
23	ONVIF	Supported S,G,T	
33	Video Motion Detection	Five-window video motion detection, human detection, time filter	
34	Edge Analytics	Intrusion detection, loitering detection, line crossing detection, unattended object detection, missingobject detection, face detection	

SL NO	Parameter	Technical Description	
35	Alarm Triggers	Motion detection, manual trigger, digital input, periodical trigger, recording notification, camera tampering detection, MicroSD card life expectancy	
36	Alarm Events	Event notification using digital output,HTTP, SMTP, FTP, NAS server and MicroSD card	
37		File upload via HTTP, SMTP, FTP, NASserver and MicroSD card	
38	Connectors	RJ-45 cable connector for 10/100Mbps Network/PoE connection	
39		Audio line input	
40		Audio line output	
41		DC 12V power input	
42		Digital input *1	
43		Digital output *1	
44	Power Input	IEEE 802.3af PoE Class 0	
45		DC 12V	
46	Safety Certifications	CE, FCC, UL, BIS or any other industry standard certifications.	
47	Casing	IP66, IK10	
48	Cybersecurity	Embedded	
49	Warranty	5 Years OEM Warranty.	

8MP- 250 Meter IR Speed Dome Camera			
SL NO	Parameter	Technical Description	
1	Camera Features		

No.	Parameter	Specification	
2	Image Sensor	1/1.8" Progressive CMOS or Better	
3	Max. Resolution	(8MP) or Better	
4	Lens Type	30x Optical Zoom, Auto Focus	
5	Iris type	Auto-IRIS	
6	Day/Night	Yes	
7	Removable IR-cut filter	Yes	
8	IR Illuminators	Built-in IR Illuminators up to 250 meters IR or better	
9	Minimum Illumination	0.6 Lux (Color) or better	
10		0.06 Lux (B/W) or better	
11		0 Lux with IR illumination on	
12	Pan/Tilt/Zoom Functionalities	Auto pan mode, Auto patrol mode, Mechanical auto flip	
13	Pan Speed	Preset Speed: 240deg/sec or better	
14	Pan Range	360deg endless	
15	Tilt Speed	Preset Speed: 200deg/sec or better	
16	Tilt Range	0 to 90deg (auto flip)	
17	On-board Storage	Slot type: Micro SD/SDHC/SDXC card slot	
18		Seamless Recording	
19	Video Compression	H265, H264, MJPEG	
20		30 fps @ 3840x2160	
21	Maximum Streams	3 simultaneous streams or better	
22	S/N Ratio	50 dB or better	
23	Wide Dynamic Range	120 dB or better	
24	Video Streaming	Adjustable resolution, quality and bitrate	
25	Image Settings	Adjustable image size, quality and bit rate; Time stamp, text overlay, flip & mirror; Configurable brightness, contrast, saturation, sharpness, whitebalance, exposure control, gain, backlight compensation, privacy masks, Scheduled profile settings,	

26		defog, 3DNR, EIS, HLC, anti-overexposure	
27	Audio Capability	Two-way Audio	
28	Compression	G.711, G.726	
29	Interface	External microphone input	
30		External line output	
31	Users	Live viewing for up to 06 clients	
32	Protocols	As per standard Industry practice	
33	Security	Access list, Account block, Audit log, Configurable password strength protection, Digest authentication, HTTPS, IEEE 802.1x, Secure boot, Session timeout, Signed firmware, User access log, User account management	
34	Interface	10 Base-T/100 Base-TX Ethernet (RJ-45)	
35	ONVIF	Profile G, S, T	
36	Compute Capability	built-in hardware deep learning accelerator	
37	Video Motion Detection	Smart video motion detection	
38	Edge Analytics	Object Detection: People, Vehicle (4-wheeled, 2-wheeled); Attribute Extraction: People (gender, clothing color, bag, hat), Vehicle (bike, bus, car, motorcycle,truck, color); Re-Search Extraction; Path Extraction	
39	Auto-Tracking	Auto-tracking on moving object	

40	Application	Deep learning VCA (Smart tracking advanced) Smart Motion Detection (Five-windowvideo motion detection, People detection, Vehicle detection, Time filter), Smart Tracking Advanced, Smart VCA (Intrusion detection, Loitering detection, Line crossing detection, Face detection, Unattended object detection, Missing object detection)	
41	Alarm Triggers	Camera tampering detection, cybersecurity events, digital input, manual trigger, motion detection, periodical trigger, recording notification, SD card life expectancy, smart tracking trigger, system boot	
42	Alarm Events	Event notification via audio clip, digital output, email, HTTP, FTP, NAS server, SD card, File upload via email, HTTP, FTP, NAS server, SD card	
43	Connectors	RJ-45 cable connector for Network 10/100 Mbps PoE connection*1	
44		Audio input*1	
45		Audio output*1	
46		AC/DC 24V power input*1	
47		Digital input*2	
48		Digital output*1	
49	Power Input	IEEE 802.3bt Class 6 PoE, DC 48V, AC24V (Simultaneous Power Redundancy Supported)	
50	Casing	IP66, IK10	
51	Safety Certifications	CE, FCC, UL, BIS or any other industry standard certifications.	

56	Cyber Security	Embedded	
57	Warranty	5 Years OEM Warranty.	

THERMAL AND VISUAL CAMERA	T H E R M A L A N D V I S U A L C A M E R A

SL NO	Parameter	Technical Description	
1	Image sensor	Visual: 1/2.8" progressive scan CMOS Thermal: Uncooled microbolometer 640x480 pixels, pixel size: 17 μm. Spectral range: 8–14 μm	
2	Lens	**Visual**: Varifocal, 4.3-137.6 mm, F1.4-4.0 Horizontal field of view: 58.5°–2.4° Vertical field of view: 35°–1.3° Autofocus, auto-iris	

		Thermal: 35 mm: Athermalized 35 mm, F1.2Near focus distance: 33 m (108 ft) Horizontal field of view: 17° Vertical field of view: 12.8° **Zoom**: Athermalized 35–105 mm, F1.6 Near focus distance: 22–195 m (72–640 ft) Near manual focus distance: 7m (23 ft) Horizontal field of view: 18°–6° Vertical field of view: 13.5°–4.5°	
3	Day and night	Visual: Automatically removable infrared-cut filter	
4	Minimum illumination	**Visual**: Color: 0.09 lux at 30 IRE, F1.4B/W: 0.008 lux at 30 IRE, F1.4 Color: 0.06 lux at 50 IRE, F1.4 B/W: 0.01 lux at 50 IRE, F1.4	
5	Sensitivity	Thermal: NETD < 50 mK	
6	Pan/Tilt/Zoom	Pan: 360° endless, 0.05°–120°/sTilt: -90° to +45°, 0.05°–65°/s Jerk-free movements at low speed: ±0.01°/s (at 0.05°/s) Preset accuracy: 0.05° 256 preset positions, guard tour, control queue, focus window, on-screen directional indicator, de-icing control, dynamic load balancing Visual: 32x optical zoom, 12x digital zoom, total 384x zoom, focus recall Thermal: Zoom: 3x thermal zoomand 4x digital zoom, total 12x zoom	
7	Video compression	(MPEG-4 Part 10/AVC) Baseline, Main and High Profiles (MPEG-H Part 2/HEVC) Main Profile	

		Motion JPEG	
8	Resolution	Visual: 1920x1080 HDTV 1080p to 320x180 Thermal: Sensor is 640x480. Imagecan be scaled up to 800x600 (SVGA)	
9	Frame rate	Visual: Up to 50/60 fps (50/60 Hz) inHDTV 1080p Thermal: Up to 8.3 fps and 30 fps	
10	Video streaming	Multiple, individually configurable streams in H.264, H.265 and Motion JPEG	
11	Image settings	Visual: Saturation, contrast, brightness, sharpness, Forensic WDR: up to 120 dB depending on scene, white balance, day/night threshold, tone mapping, exposurecontrol, exposure zones, defogging, compression, dynamic text and image overlay, 32 individual polygon privacy masks, electronic image stabilization Thermal: Compression, brightness,sharpness, contrast, local contrast, exposure control, exposure zones, text and image overlay, electronic image stabilization	
12	Audio streaming	Audio in, simplex Echo cancellation and noise cancellation	
13	Network Security	Password protection, IP address filtering, HTTPSc encryption, IEEE 802.1x (EAP-TLS)c networkaccess control, digest authentication, user access log, centralized certificate management, brute force delay protection, signed firmware, secure boot, signed video, secure	

		keystore (CC EAL4 certified), TPM (FIPS 140-2 certified).	
14	Audio input/output	External microphone input or line input	
15	Storage	Support for microSD/microSDHC /microSDXC card and encryption Recording to attached storage.	
16	Operating conditions	-40 °C to 55 °C (-40 °F to 131 °F) Maximum temperature (intermittent): 65 °C (149 °F) Start-up temperature: -40 °C (-40 °F) Humidity 10-100% RH (condensing) Wind load when PTZ operational 37 m/s (83 mph)f, 45 m/s (100 mph) without weather shield With IR Illuminator Kit C: 40 m/s (90mph), 52 m/s (116 mph) without weather shield Maximum effective projected area (EPA): 0.138 m2	
17	Approvals	**EMC** EN 55032 Class A, EN 55024, EN 61000-6-1, EN 61000-6-2, FCC Part 15 Subpart B Class A, VCCIClass A ITE, ICES-3(A)/NMB-3(A), CISPR 35, RCM AS/NZS CISPR 32 Class A, EN 50121-4, IEC 62236-4, EN 50498, KC KN32 Class A, KC KN35 **SAFETY** IEC/EN/UL 62368-1, IEC/EN/UL 60950-22, CAN/CSA C22.2 No. 62368-1, CAN/CSA-C22.2 No. 60950-22 **ENVIRONMENT** IEC/EN 60529 IP66, IEC 62262 IK10g, NEMA 250 Type 4x, NEMA TS 2 (2.2.7-2.2.9), ISO 21207 (Method B), IEC/EN 60068-2-1, IEC/EN 60068-2-2, IEC 60068-2-6,	

		IEC/EN 60068-2-14, IEC 60068-2-27, IEC/EN 60068-2-78, MIL-STD-810G (Method 501.5, 502.5, 505.5, 506.5, 507.5, 509.5) **NETWORK** NIST SP500-267	
18	Supported protocols	IPv4, IPv6 USGv6, ICMPv4/ICMPv6,HTTP, HTTPSc, HTTP/2, TLSc, QoS Layer 3 DiffServ, FTP, SFTP, CIFS/SMB, SMTP, mDNS (Bonjour), UPnP®, SNMP v1/v2c/v3 (MIB-II), DNS/DNSv6, DDNS, NTP, RTSP, RTP, SRTP, TCP, UDP, IGMP, RTCP, ICMP, DHCPv4/v6, ARP, SOCKS, SSH, NTCIP, LLDP, CDP, MQTT v3.1.1, Syslog, Link-Local address (ZeroConf) or any other industry standard protocols.	
19	Key Features	Dual Electronic Image Stabilization, Signed firmware, secure boot, and TPM 2.0, 360° infinite pan	
20	Application Programming Interface	Open API for software integration,and Camera Application Platform; ONVIF Profile G S, and T.	
21	Casing	IP66-, NEMA 4X- and IK10-ratedg powder coated Aluminum Color: white NCS S 1002-B Front window: visual: glass, thermal: germanium Long-life silicone wiper Weather shield: high-impact UV-stabilized thermoplastic	
22	Connectors	SFP slot (SFP module not included) e Shielded RJ45 10BASE-T/100BASE-TX/1000BASE-T I/O: 6-pin 2.5 mm terminal block for 4 configurable inputs/outputs Power: terminal block	
23	Power	20–28 V AC/DC, typical 16 W, max 204 W	

		Power loss recovery TVS 2000V, surge protection, voltage transient protection I/O connector: output power 12 V DC, max load 50 mA	
24	Warranty	5 Years OEM Warranty	

	MEMORY CARD		
Sl No	**Parameter**	**Description**	
1	Capacity	128 GB	
2	Transfer Speed	Up to 80MB/s	
3	General	Class 10 for Full HD Video Recording and Playback	
4	Safety	Waterproof, Temperature-Proof, Shockproof, and X-Ray Proof	

2. UNDER VEHICLE SCANNING SYSTEM.

Sl. No	**UVSS (DRIVER IMAGE & ANPR INTEGRATION)** **Specifications**	
	Supply & installation of Under Vehicle Scanning System, to enable inspection of any vehicle's underside through a static composite image of the vehicle, as per the details given below: -	
1	The UVSS should produce multiple angular view of high- resolution 3D COLOR images of the complete under-body of any vehicle passing over it using dual Area-scan camera- based technology.	
2	The UVSS should be capable of handling vehicles moving atdifferent speeds ranging from Zero (0) to 25 Km/hr, while the morphed composite images so captured by it should be automatically and dynamically adjusted according to the	

	speed of the vehicle using multiple induction loop-based sensors.	
3	Each of the dual imaging cameras should be of high- resolution Area-scan, GigE type with XGA resolution of (1920 x 1200) or above. The minimum specification of this camera to be :-	
	i. Camera Type	Gigabit Ethernet progressive camera	
	ii. Sensor	CMOS XGA resolution (1920 x 1200) or better	
	iii. Field of View	> 135	
	iv. Format	GiGE Vision compliant specifications	
	v. Composite Image resolution of the underside	4 megapixels or better	
	vi. Camera certification	CE or industry standard certification.	
	vii. Camera casing ingress protection rating	IP 67 or better, duly certified byNABL accredited lab	
5	The UVSS should be capable of producing a clear and undistorted image of the vehicle underside, even when a vehicle completely stops / halts over the scanning unit, i.e it must be able to produce seamless and perfect compositeimages of the underside irrespective of stoppage or non- uniform motion of the vehicle over the scanner.	
6	The UVSS should not use either a digital Line-Scan camera-based technology or any type of analog cameras to form composite image without any distortions or Fish-eye" effect.	
7	The UVSS should produce a fully scanned pre-processedready to use 3D footprint model of the vehicle's undercarriage.	
8	The UVSS should produce videos of suspicious objects that are hard to see via single view scanning systems, including visual access to cavities and niches, areas around suspensions, below the engine areas, side wall of fuel tanks & exhaust pipes etc.	

9	The UVSS must have a dynamic multi-view feature and itcan be dynamically controlled by the user. (the operatorshould be able to view the underside by hovering the mouse from left to right of the image)	
10	The UVSS must also provide a 3D video of the complete underside of any vehicle.	
11	If found anything suspicious, the UVSS should have a feature to view 3D video from left & right image in order tominimize the threat.	
12	The UVSS should have a feature to magnify (zoom) the composite image (left & right) and 3D image upto 24x inorder to facilitate a closer view of any part of the composite image.	
13	The UVSS should have a feature to play any particular/specific zoom area of 3D image.	
14	The UVSS should compare both (left & right) view with thehelp of license plate/type database of underside images.	
15	The underside illumination must be adequate and obtainedthrough a dual array of long life, LED lighting modules. Halogen or CFL based array of lighting elements for thepurpose of illumination of the underside will not be accepted.	
16	The UVSS should also provide a feature to capture the image of the driver of all RHS driven vehicles, capturedthrough a suitable driver view camera.	
17	The UVSS should capture the co passenger of the vehicleadditional to driver image and store it in respective database for post event analysis	
18	The system should have an Automated Number Plate Reading System (ANPRS) tuned to the Indian license plates, i.e. it should be able to automatically read and record a wide range of vehicle registration number plates' alpha-numeric characters, written in English. Also, the frontal image view of the vehicle to be provided in the GUI, to facilitate manual viewing of the license plate image.	

19	The Number Plate & Driver Image view cameras must have the following minimum specifications:		
20	A. Camera Specification		
	i. Effective Range	4 to 5 meters for Frontal camera& 0.5 to 1 meter for Driver camera	
	ii. Camera Resolution	25fps @ 1 megapixel or higher	
	iii. Camera gain and shutter	Adjustable 1/100 to 1/10000 sec	
	iv. Lens	10-40 mm Varifocal	
	v. Power Consumption	<12W	
	vi. Power Supply	12 V DC	
	B. Software Specification		
	i. Supported OS	Microsoft.net/Linux	
	ii. Type of Plates	Recognition for English fonts	
	iii. Image Input	Still Image or Live Video Input	
21	The UVSS must give output of all the data simultaneously i.e. the composite images, driver photos, vehicle's frontal image and its number display – all should be displayed on the monitor almost instantaneously after the vehicle crossthe unit. Also, the system should have a facility to view thecomposite image, off-line also, for all vehicles.		
22	The UVSS applications & operating software should be Microsoft.net/LINUX based. Preferably be based on open architecture on Microsoft.net /Linux platform. It must have a user-friendlyGraphical User Interface (GUI) with provision for multiple users logging of events and search facility. The UVSS GUI should be available in multi-language.		
23	The UVSS should automatically detect the make & model ofthe vehicle with Artificial Intelligence and compare the respective model from the standard library and highlight the differences of original make and present vehicle with Audio and Video alert.		

24	The UVSS should have capability to control/integrate withthird party security equipment like boom barrier/bollard/tyre killer/RFID etc.	
25	UVSS will have operating mode like free flow mode, security mode and emergency mode. System should act as per the respective mode. User (Admin) can define mode based on weekly/daily time schedule and manual overwriteshould be possible.	
26	System should have Artificial image-based comparison. System should pick the respective model even without number plate also.	
27	The UVSS system must have a facility to take back-up of allthe transactions to storage media.	
28	The overall UVSS must be CE Certified. A certificate issuedby a competent certifying agency, must be attached with the tender.	
29	The underground cameras & lighting units of the UVSS must be enclosed in a suitable all-weather-proof housing ofIP 68 equivalent or higher standard. A valid certificate in this regard, after requisite testing carried out, issued by a Govt. / NABL accredited laboratory in India, must be attached with the tender, without which the bid is liable to be rejected.	
30	The UVSS should be equipped with proper water draining mechanism and should be drain water automatically with 1HP or better pump, The PIT design should be provisioned for the system.	
31	The UVSS Should have cleaning mechanism for cleaning theSurface of camera with Compressed Air/ Water cleaning system, it should work automatically at desired intervals.	
32	The overall installed unit should be properly designed, and its structure should be able to withstand a vehicle axle-loadup to 20-Tons at any point over the structure, so as not to suffer any accidental physical damage to the unit and the components under the pit cover.	

33	The UVSS must be aesthetically designed so that it must blend seamlessly with the landscape, forming a natural look with no discomfort for the driver / passengers of thevehicle being scanned.	
34	The UVSS should capture the co passenger of the vehicleadditional to driver image and store it in respective database for post event analysis	

3. PUBLIC ADDRESS SYSTEM

- Public Address system shall be used to make live and pre-recorded announcements.
- It shall be able to broadcast messages across all locations or specific announcement could be made to a particular location supporting singlezone /multi zone operations.
- The system shall also deliver pre-recorded messages to the loud speakers attached to them for public announcements.
- The system shall contain IP Speakers (as per technical specs) and uses PoEpower that could drive the speakers.
- The system shall also contain the master control station (as per technicalspecs) that could be used to make calls to the PA Speakers and control/monitor all the components of the system.
- The system should have the capability to be used for two-way audio communication between the IP Speaker and Master control station.

Public Address System Technical		
SL. No	Parameter	
A	IP Speaker Outdoor Horn	
1	Should have the capability to control individual PAS i.e. to make an announcement at select location (1:1) or multiplelocations (1: many). The PAS should also support both, Live and Recorded announcements and music Input.	
2	IP Horn Speaker with minimum 10 Watts, Class D inbuilt amplifier	
3	Native IP connectivity, no convertors to be used	

4	Sound pressure level – 118 db	
5	Approvals and Compliances - UL 62368-1 UL Listed, FCC Part 15 Class A, ICES-003 Class A	
6	Protocols: Applicable as per Industry Standards.	
7	Transmission bandwidth – 16,000 Hz	
8	Inputs/Outputs – 2 inputs and 1 output in the speaker	
9	Support of ONVIF Profile S for unidirectional audio transmission	
11 10	IP Rating – IP66 (EN60529)	
11	Mechanical impact resistance – IK10 (EN62262)	
12	Automatic Dynamic Noise suppression to eliminate ambient noises	
13	IVC Functionality – Automatic Intelligent Volume control	
14	Internal Mic for talkback facility	
B	**Master Control Station**	

1	PA Master Controller to have 5" touch screen 720 X 1280 pixels, gooseneck microphone and illuminated PTT button.	
2	Integrated 2.5W Class D Amplifier	
3	SPL – 82 dB	
4	20KHZ speech Quality for Master Control Desk	
5	Open Duplex for natural, hands-free communication for master control desk	
6	Impact Rating IK08	
7	Certification – UL or any other industry standard certification.	

4. VIDEO MANAGEMENT SOFTWARE

UNIFIED SECURITY PLATFORM

- The Unified Security Platform (USP) shall be an enterprise class IP-enabled security software solution.
- It shall support the seamless unification of IP video management system(VMS), IP access control system (ACS), Intrusion system and Asset Management system and Third-Party Systems under a single platform.

- The Unified Security Platform user interface applications should present a unified security interface for the management, configuration, monitoring, and reporting of embedded VMS, ACS, Intrusion Panels, and associated edge devices.
- The Unified Platform must support multiple brands of edge devices for surveillance, access control & Intrusion system.
- In order to create an openness of the system. The Security Platform provider shall be different than the camera makes.

UNIFIED WEB CLIENT FOR VMS AND ACS

- The UPS shall support a unified web client for video & access control.
- The Web client shall be a thin client with no download required other than an internet web browser or standard web browser plugins.
- The Web Client shall be platform independent and run within Microsoft Internet Explorer, Firefox, Safari, and Google Chrome.

CYBERSECURITY CERTIFICATION FOR VMS AND ACS:

The software shall incorporate stronger security of security mechanism to prevent vulnerabilities, man-in-the-middle attack by providing digital certificate-based authentication between server to server & server to clients. The VMS shall have achieved UL 2900-2-3 Level 3 Cybersecurity certification.

DASHBOARDS:

- The USP shall support the ability to create multiple dashboards.
- Operators shall be allowed to view respective dashboards depending on user rights.
- A dashboard shall consist of a canvas with various widgets displayed on the canvas. All widgets should offer the ability to specify location and size to the widget, a title to the widget, a background color to the widget, and the ability to refresh periodically the content of the widget.
- Dashboard widget types shall be:
    - Image: provides the ability to display an image (JPG, PNG, GIF, BMP) on a dashboard.
    - Text: provides the ability to display a text on a dashboard. The text style shall be configurable, so font, size, color, and alignment can be specified by the user.
    - Tile: provides the ability to display any entity of the USP inside of a tile.
    - Web page: provides the ability to display a URL on a dashboard.
    - Entity Count: provides the ability to display the total number of a specific

entity type in the USP.

- o Reports: provides the ability to display the results of any saved reports in the system. The results shall be displayed either by showing the total number of results in the report, a set of top

  results from the report, or a visual graph from the data returned by the report. It shall be possible to extend the widgets of a dashboard using the SDK.This will provide the ability to develop custom widgets to the system.

- The USP shall support the following actions on a dashboard:
  - o print dashboard, export dashboard to PNG file, and automatically email a report based on a schedule and a list of one or more

    recipients.

VIDEO MANAGEMENT SOFTWARE (VMS):

- The VMS shall be available as SaaS (Software as a Service Model) as wellas perpetual licensing.

- The Platform shall support SDK (Software Development Kit) integrationfor integrating third party systems such as and more.

- The VMS shall support ONVIF - industry standard for the interface of IP-based physical security products. The VMS shall provide ONVIF S & G Compliance in order to provide more advance features of cameras.

- The VMS Module shall allow the Direct configuration of IP camera devicewith no requirement to ever directly connect via web page of IP cameraor encoder to configure these parameters: Discover on IP network and set IP Address, Frame Rate, Resolution, Motion detection: within camera or server based, Bit Rate, Key frame interval, Digital I/O, Audio Inputs/Outputs, Ability to update firmware of IP camera or encoder.
  Any configuration changes do not require the server services to berestarted.

- Unified Security Platform shall be compatible with both 32-bit and 64-bitoperating systems including latest Windows 2019 & Windows 10 support.

- The VMS shall be based on a true open architecture that shall allow foruse of non-proprietary workstation and server hardware, non-
  Proprietary network infrastructure and non-proprietary storage.

- The VMS shall offer a complete and scalable video surveillance solutionwhich allows cameras to be added on a unit-by-unit basis.

- All video streams supplied from analog cameras or IP cameras shall be digitally encoded in H.264 / H.265 or better compression formats and recorded simultaneously in real time.

- The VMS shall support configuration of individually configurable multiple streams for Live & Recording. This functionality shall also support configuration of each camera stream separately. Altering the setting of one camera shall not affect the recording & display settings of other cameras.

- The VMS shall be able to use multiple CCTV keyboards to operate the entire set of cameras throughout the system, including cameras of various manufacturers' brands, including their PTZ functionalities.

- The VMS shall be able to retrieve and set the current position of PTZ cameras using XYZ coordinates.

- The Platform shall consist of a role-based architecture, with each Server hosting one or more roles.

- The System shall be managed by the central database role that contains all the system information and component configuration.

- The Database Management Role shall authenticate users and give access to the system based on predefined user access rights or privileges, and security partition settings.

- The Database Management Role shall support the configuration of camera units, access control units, PTZ functionalities. Camera sequences, recording schedules.

- The Video Recording Role shall be responsible for managing cameras and encoders under its control and archiving video.

- The system shall have a routing role responsible for routing video and audio streams across the networks from the source to destination.

- The system shall have Health Monitoring Role for monitoring and logging health events and warnings from the various client applications, roles, and services that are part of the Security Platform The role shall also log events within the Windows Event Log, generating reports on health statistics and health history.

- The Surveillance User Interface shall able to use for monitoring of video from the cameras, transactions from access control and the events &

alarms. The Interface shall also facilitate the recorded video.

- The user interface shall provide control & monitor of IP network.
- User Interface shall facilitate the control of Pan Tilt & Zoom functionality and presets of the PTZ cameras.
- User Interface shall also facilitate the control of iris and focus of the camera.
- User Interface shall possible to perform digital zooming on the live as well as playback video.
- User Interface shall allow administrators and operators with appropriate privileges to monitor the unified security platform, run reports, and manage alarms.

- The User Interface shall support following to enhance usability and operator efficiency such as
    - Dynamically adaptive interface that adjusts in real-time to what the operator is doing.
    - A dynamic dashboard loaded with entity-specific widgets, e.g. door and camera widget.
    - Use of transparent overlays that can display multiple data in a seamless fashion.
    - Display tile menus and quick commands.
    - Consolidated and consistent workflows.
    - Tile menus and quick commands easily accessible within every display tile of the user workspace.
- The User Interface shall have task-based approach for monitoring of video, access control & alarm monitoring.
- User Interface shall have task for investigation of video bookmark, smart motion search, archive reports, audit trails and activity reporting.
- User Interface shall support a sequence of operations an operator or administrator shall execute to complete an activity. The "flow" relates to a clearly defined timeline or sequence for executing the activity.
- The user shall have full control over the user workspace through a variety of user- selectable customization options. Administrators shall also be able to limit what users and operators can modify in their workspace through privileges.

- Once customized, the user shall able to save his workspace.

- The user workspace shall be accessible by a specific user from any clientapplication on the network.

- Display tile patterns shall be customizable.

- Event or alarm lists shall span anywhere from a portion of the screen upto the entire screen, and shall be resizable by the user. The length of event or alarm lists shall be user-defined. Scroll bars shall enable the user to navigate through lengthy lists of events and alarms.

- The User Interface shall support multiple display tile patterns, e.g. 1 display tile (1x1 matrix), 16 tiles (8x8 matrix), and multiple additionalvariations.

- The User Interface shall support as many monitors as the PC video adapters and

  Windows Operating System are capable of accepting.

- The User Interface shall display of all cameras attached to the system.

- Shall support live video monitoring on each and every display tile within atask in the user's workspace.

- The operator shall be able to drag and drop a camera into a display tilefor live viewing.

- The operator shall be able to drag and drop a camera from a map into adisplay tile for live viewing.

- The User Interface shall allow operators to bookmark important eventsfor later retrieval on any archiving camera. Operators can uniquely name each bookmark in order to facilitate future searches.

- The operator shall be able to start/stop recording on any camera in thesystem, which is configured to allow manual recording, by clicking on a single button.

- The operator shall able to switch one or more video tile to switch for instant replay. This operation shall not affect live monitoring of othercameras.

- Users shall be able to take snapshots of live video and be able to saveor print the snapshots.

- The user shall be able to view the same camera multiple times in differenttiles.

- The Server Monitoring Service shall be installed on all PCs/servers

running with security platform software. In the event of a malfunction or failure, the Server Monitoring Service shall restart the failed service. As a last resort, the Server Monitoring Service shall reboot the server/PC if it unable to restart the service.

- The Platform shall support the Alarm Management functionality. The User shall have the ability to acknowledge alarms, create an incident upon alarm acknowledgement, and put an alarm to snooze. The user shall able to spontaneously trigger alarms based on something he or she sees in the system.

The Surveillance User interface's video playback capabilities shall include:

- Shall support audio and video playback of any time span.

- Shall support video playback on each and every display tile.

- Shall allow operators to switch to instant replay of the video for any archiving camera with the simple click of button.

- Shall allow the operator to select between instant synch of all video streams in playback mode allowing operators to view events from multiple angles or across several camera fields, or non-synchronous playback.

- Shall allow the operator to simultaneously view the same camera in multiple tiles at different time intervals.

- Shall allow the operator to control the playback with:
  - Pause
  - Lock Speed
  - Forward and Reverse Playback at: 1x, 2x, 4x, 6x, 8x, 10x, 20x, 40x, 100x.
  - Forward and Reverse Playback frame by frame
  - Slow Forward and Reverse Playback at: 1/8x, 1/4x, 1/3x, 1/2x.
  - Loop playback between two-time markers

- Shall display a single timeline, or optionally one timeline for each selected video stream, with which the operator can navigate through the video sequence by simply clicking on any point in the timeline.

- Shall display the level of motion at any point on a timeline.

- Shall clearly display bookmarks events on the timeline(s).

- Shall be able to query archived video using various search criteria, including but not limited to, time, date, camera, and area, among others.

- Shall provide the tool to search video and associated audio on user-defined events or motion parameters.
- Shall allow operators to define an area of the video field in which to search for motion as well as define the amount of motion that shalltrigger search results. The Surveillance User Interface shall then retrieve all archived video streams which contain motion which meetsthe search parameters. There shall be a graphical timeline where the time of each search hit shall be indicated.
- Shall allow operators to browse through a list of all bookmarks createdon the system and select any bookmarked event for viewing.
- Shall allow the user to add bookmarks to previously archived video foreasier searching and retrieval.
- Shall support digital zoom on playback video streams.
- Shall provide still image export to PNG, JPEG, GIF, and BMP format withDate and Time stamp and Camera Name on the image (snapshot).
- Shall provide tools to export video on various media such as a CD-ROM.
- Shall allow operators to load previously exported video files from theircomputer or network.
- Shall allow queries to be saved upon closing the Archive Player Application and reappear when the application is reopened.
- The Security Platform shall permit the user to select multiple entities to monitor from the Surveillance User Interface by addingthe entities one by one to the tracking list.
- The Surveillance User Interface shall provide the option to filter whichevents shall be displayed in the display tile layout and/or event list layout.
- It shall also possible to lock the display tile so that it only tracks theactivity of a specific entity.
- The user shall be permitted to start or pause the viewing of events withineach display tile.
- he User Interface shall support the ability to manually track a movingtarget with the single click of a button.
- The ability to switch from one camera view to an adjacent camera shallbe done within a single display tile.
- Switching between camera streams shall be accomplished by simply

clicking on the transparent overlay.

- Visual tracking shall be available with both live and recorded video.
- The user interface monitoring client shall able to take control of otherclient station based on the privilege level and control the tile of the other client like a video wall application.

CONFIGURATION USER INTERFACE

- o The Configuration User Interface shall allow the administrator or userswith appropriate privileges to change video configuration.
- o It shall provide the ability to change video quality, bandwidth and frame rate parameters on a per camera (stream) basis for both live and recorded video.
- o It shall provide the ability to configure brightness, contrast and hue settings for each camera on the same.
- o The Configuration user interface shall provide the capability to enable & change audio parameters, audio recording serial port configuration, I/O configuration on camera device units.
- o The Configuration User Interface shall provide the ability to set recording schedules and modes for each individual camera. The recording mode shall be:
  - Continuous
  - On motion and Manual
  - Manual only
  - Disabled

The Configuration User Interface shall support the creation of schedulesto which any of the following functional aspects can be attached:

- Video quality (for each video stream per camera)
- Recording (for each camera)
- Motion detection (for each detection zone per camera)
- Brightness, Contrast, Hue (for each camera)
- Camera sequence execution
- o The Configuration User Interface shall support creation of unlimited recording schedules and assign any camera to any schedules.
- o The Configuration User Interface shall provide the capability to set a

pan-tilt-zoom protocol to a specific Camera device serial port andallow mixing domes of various manufacturers within a system.

ARCHIVING

- The Archiver (Recording role) shall use an event and timestamp database for advanced search of audio/video archives. This databaseshall be Microsoft SQL 2008 or SQL 2012 or any similar software.

- The Archiver shall digitally sign recorded video using 248-bit RSA public/private key cryptography.

- The Archiver shall offer a plug and play type hardware discoveryservice with the following functionalities:

- The Archiver shall have the capacity to configure the key frameinterval (I-frame) in seconds or number of frames.

- The Archiver shall support configuration of pre-alarm and post-alarm recording option that can be set between one second and 5 minutes on a per camera basis.

- The Archiver shall support minimum 300 cameras or 300 Mbps of recording throughput whichever comes first in case the network is end to end multicast.

- The Archiver shall support "unit level motion detection" as well as"software level motion detection".

- Software level motion detection shall able to divide camera field of view in 6 detection zone for setting up individual motion setting in each zone and trigger an event for each zone separately.

- The Archiver shall have the capacity to communicate with Cameradevice using 128 bits SSL encryption.

- The Archiver shall have the capacity to communicate with cameradevice using HTTPS secure protocol.

- The Archiver shall have the capacity to receive multicast UDP streamsdirectly from the camera unit.

- For network topologies that restrict the camera device from sending multicast UDP streams, the Archiver shall redirect audio/video streamsto active viewing clients on the network using multicast UDP.

- The Archiver shall have the capacity to redirect audio/video stream to

active viewing clients on the network using unicast UDP or TCP.

- The user interface of the monitoring station shall support dynamically switch the Live stream from – High Resolution, Low Resolution & Live (normal). This switching shall happen based on the resolution of monitoring tile & closest stream configuration.

- The Archiver shall offer to set retention period for archive video for preset number of days. It shall also delete oldest video data if the disk is full before the retention time occurs.

- The Archiver shall allow important video sequences to be protected against normal disk cleanup routines.

- The Archiver shall keep a log and compile statistics on disk space usage.

- The Archiver shall have the capacity to down-sample video streams for storage saving purposes.

- The Archiver shall support camera unit with edge recording capabilities and offer the following capacity:
    - The ability to playback at different speeds the video recorded on the Camera device.
    - The ability to offload the video on schedule, on event or manually the video recorded on the camera device to store it on the Archiver.
    - It shall be possible to filter the video that is being offloaded using one or multiple of the following filters:
        - Time interval
        - Playback request
        - Video analytic events
        - Motion events
        - Bookmarks
        - Alarms

The Archiver shall support analytics events received from camera unit having capability of edge analytics

VMS shall support Bandwidth Control to for Live view and Playback stream to the clients.

- It shall be possible to configure number of concurrent live and

playback stream allows.

- o It shall be also possible to control the overall combined bandwidth in kbps
- o It shall be possible to limit the bandwidth consumed by live and playback video from the client software to better control the bandwidth across multiple sites. The Server software shall be able to prioritize video streaming to the client based on user level.

- VMS shall have SQL Database info log like Event Count, Source Count, Video file count, Size on disk . VMS shall have provision to set notification for Diskspace and Database usage goes set value.

- VMS shall support the backup of SQL database from VMS GUI console.

- VMS client shall show on live stream about routing information like unicast, multicast or streaming from recording server

- VMS should support Dual sign in to log in to the system administrator and client - Log in shall be permitted when two authorized persons
login. any user can login first and second user will authenticate. There shall be no restriction which user login first or second.

- VMS shall support auto lock of client after specified time with inactivity.
- VMS shall support able to give alarm if specified user is login in, log off.
- VMS shall support able to give alarm if specified user is login failed.

VMS shall support following password management policies

- o Admin shall create the user and set the password shall have provision to change the password on next login of user
- o Admin shall have provision to set the user password rule like enforce minimum characters, uppercase, lower case, numerical character, special character.
- o Admin shall set the password which can expire with specified time limit
- o There shall be possible to lock user based on schedule decided by administrator

o VMS shall provide recommendations relating to the passwords used to access the hardware units in the system. The recommendation should display if the passwords used on the units are weak, average, strong, orvery strong.

THREAT LEVEL:

The VMS should be able to create a Threat Level setting. VMS shall able tochange the threat level, so all the screen in client shall have specified with change in color GUI changes and sensitize the user that Threat level.
It shall be possible to the block or unblock some video feed for specified time, add bookmark, change the PTZ view, start recording on specified camera,
trigger alarm once threat level is activated.

VMS shall have provision to the transfer recorded video feed from recording server storage to another specified storage. VMS shall have provision to duplicate the archive video feed to another location.

VMS shall have health dashboard which shall able to graphically display followinginformation
- Hardware device online
- No of clients online and active
- Security score: Which will recommend the user about change the default login password and enforce strong password policy, update camera firmware.

VMS shall able to create the custom dashboard which will graphically display following parameters
Entity counts: Total Camera count, Total user count, Total alarm count, Total user groups created, Total number schedule created in system; This information shallbe auto refresh on specified time
Video tile for viewing cameras
Health events: Transmission loss, Camera recording problem, etc
Total active user clients logins like Desktop client login, Mobile client login

VMS shall support VMS Federation of the system from another site. Master siteshall support following features after federation
o Live view and Playback of all the cameras form child site

- Receive the alarms from child site and create event to action on form childalarms
- Remote configuration window child site console on same GUI frommaster site
- Bookmark done at master site client shall be visible to local child siteclients
- Its shall be possible to record the Child camera at Master site
- Using we client or mobile client all child cameras shall be viewed.

MOBILE CLIENT:

- VMS shall support mobile client in android and iOS
- VMS shall support Mozzila,Edge,Chrome browser based web client
- VMS shall support Maps, Alarms and Threat level activation support inMobile client

REMOTE CONTROL CLIENT:

It shall be possible to admin user group client can control remotely operator group workstations client and able to see the full screen in its own GUI console.This remote-control user client rights shall be configurable

STORAGE REDUNDANCY:

VMS Shall support the Drive mapped redundancy, if one mapped failed thenautomatically new recording shall be starting next mapped storage drive

ALARM MANAGEMENT:

- VMS shall able support alarm management system Shall support Reactivation Threshold (5 Sec) Alarm Procedure as text
- VMS shall provide recommendations relating to the firmware of the hardware units enrolled in the system. Recommendations should displayif the firmware is up to date, out of date, or if it has known security vulnerabilities.

If camera and VMS are from the same OEM, then VMS shall support other third-party camera without use of additional streaming server/ Media Server orservices. This is to ensure proposed solution is truly open architecture.

CYBER SECURITY:

- The VMS shall provide in its main user interface a visual list, showing the state of all configuration related to IT Security, thereby ensuring cyber security hardening of the system.
- The VMS Should have validated on Cyber-Security Readiness certificate from either UL or any other reputed laboratory in India or Global

CLOUD ARCHIVING

- The VMS shall support the automatic transfer of video recorded on the Archiver to the cloud, based on the age of the video.
- The Recording server shall encrypt recordings using AES-256 prior to transferring video to the cloud and maintain encryption keys local to the user's system.
- The VMS shall support TLS encryption between the on-premises Recording and the cloud.
- The VMS shall allow users to search video stored in the cloud through the same functionality used when querying video that is stored locally.
- The VMS will maintain a local cache of video downloaded from the cloud to playback recordings without requiring an additional transfer

VMS SOFTWARE UPDATE:

VMS shall support automatically update the new version of software and support following workflow

- Update your VMS products when a new release becomes available.
- Check for updates at regular intervals.
- Download update packages in the background. Updates must be manually installed.
- See when the system was last checked for updates.
- Automatically refresh the license in the background to ensure it is valid and the expiration date is updated.

MANAGEMENT SERVER FAILOVER:

- The VMS shall support native and off-the-shelf failover option

- The Standby Management server (MS) shall act as a replacement Server on hot standby, ready to take over as the acting Management Server in

case the primary Server fails. The failover shall occur in less than 1minute. No action from the user shall be required.

- The VMS shall support up to five (5) MS on standby, lined up to take overas the acting MS in a cascading fashion.

- The Standby MS shall keep its configuration database synchronized withthe primary MS.

- The Standby MS shall support disaster recovery scenarios where a servercan be located in another geographic area (or building) and only take over if all other MS become offline.

- The Standby MS shall support synchronization of the configuration databases using a backup and restore mechanism. The synchronizationperiod shall be configurable from 15 minutes to 1 week.

- The Standby Directory shall support real-time synchronization of the configuration databases using SQL Mirroring or SQL Always On.

SPECS FOR VIDEO RECORDING SERVER

A. The recording server shall be a server-class computer and shall meet thefollowing minimum requirements:

1. The manufacturer must be a Certified Solution by the Video ManagementSoftware Provider.

2. The appliance must be a turnkey solution with Video Management Softwarepre-installed

3. The appliance should be extensively tested and hardened for security toprevent malicious attack

4. The solution must have machine-learning based antivirus native to thesolution

5. The solution must have built in application to backup the video managementsoftware configuration data

6. The manufacturer of the appliance must make change to the operatingsystem to follow Microsoft Windows cybersecurity best practices

7. The solution should have Microsoft's native antivirus configured by defaultto work with the video and access control applications

8. Support for the appliance must come from the manufacture of the video management system

9. The solution must require setting of custom password on first login

10. The solution must have built in maintenance tool developed by the manufacturer of the video management system

11. The certified solution must come with guaranteed performance

14. System must come preconfigured with optimal RAID configuration for VMSsolution

5. VIDEO WALL

SPECIFCATIONS OF LARGE VIDEO SCREEN

GENERAL

1. The Video Wall arrangement including all equipment, accessories, cables, mounting structure/frame, Controllers, wall management Software, each line one large video wall etc., shall be provided andimplemented.

2. The large graphics wall shall be consisting of multiple Rear Projection modules in 3 rows and 5 columns behaving as a single logical screen. Itshould have the functionality to pre-configure and save various display layouts to be accessed at any given point of time with a simplemouse click.

3. The Display and controller should be from the manufacturer and thedisplay OEM shall have its own service center in India.

4. The display wall should be rugged and industrial nature and should beable to work in 24/7 environments.

DISPLAY UNIT

The display wall should consist of the Visual Display Unit, Mounting Stand, Display Controller and the Required Software, which should be supplied from asingle manufacturer with the following specifications:

VIDEO WALL, 55" DISPLAYS

Sl. No	Technical Specifications	
1	Overview Display	The displays shall utilize direct LED lit LCDpanel technology with a "Typical" lifetimerating of ≥100K hours, The screens shall be able to align physically auto organise the position on the videowall. All panels shall be of 55" diagonal size with bezel-less design to have seamless technology with typ. 0.3 mm mechanicalgap or less between two panels. Max. gap between Active pixels of two adjacent panels must be less than 0.6 mm	
2	Matrix	5-Columns and 3-Rows	
3	Native Resolution	1920 x 1080 or better,	
4	Aspect Ratio	16:9 Aspect Ratio	
5	Colour Processing	10 bits/colour (3 x 10 bits)	
6	Display Colours	1.07 billion Colours	
7	White point	Colour temperature up-to 10500 K	
8	Backlight	Direct LED with 500 Nits of brightness ormore	
9	Brightness	500 Cd/m2 (nits) or higher	
10	Brightness Uniformity	9 points: 98% 13 points: 95%	
11	Viewing angle	H 178°/V 178° viewing angle or greater	
12	screen "haze"	28% or greater	

13	Colour and brightness adjustment.	Each LCD Panel/ DLP must have Built-inlight and colour sensors with feedback loops to keep display performance, such as luminance and colour, uniform in time across entire display wall. The sensors must measure both brightness and colour. Human intervention should not be involved	
14	Power Supply	The LCD panels shall have the option to utilize an internal Or Remote AC-DC power supply with fully redundancy. Theresulting system shall support Auto- failover capability in case one of the internal AC-Dc would fail	
15	Central controller	A dedicated control appliance with a network interface shall constantly monitor and communicate with each LCDpanel to adjust its individual colours and brightness to a common value via a network switch and Cat 5/6 cables plugged to the RJ45 connector on eachpanel. The Software Should be able to · Switch On & off each Displays on siteand remotely · Switch On & off the entire wall on siteand remotely · Select the input interface on site and remotely · Automatically switch the to anotherinput if the currently used input is failing · The SW shall be able to perform bezel compensation	
16	Remote Management	The control of the wall shall be possiblevia a network, the control software can access all of them at the same time. The	

		available features shall be: On/Off, Brightness and Colour, Input control	
17	Service & maintainability	· The screens shall be able to auto organise the position on the videowall without much manual intervention. · The Maintenance of Display & replacement of key components like Power Supply & I/O board must be possible from front. · The Power supply & I/O board of display must be separate from display forfaster repair & replacement. · Firmware update over ethernet	
18	Design & Construction	· Modular Design – Offboard Power Supply and I/O board · Each "LCD Display" or "Panel" shall be of a "industrial" grade quality with metallic constructed fully enclosed light tight housing. The housing shall be of all-metallic construction with clear and easyaccess to the source and power connections. · Each Display should come with mount from same OEM to support autoalignment of display panels. · Fan-less design · ISO 14644-1 level 9 (acceptable dustlevel)	
19	Connectivity	2x DP1.2, 2x HDMI2.0, 2x USB, 1xDP1.2 out, 2x LAN port	
20	Colour depth	10 bits	

21	Pixel clock	25.2MHz- 540MHz	
22	Power Consumption	Max. 185 watt or less	
23	OEM Certification	EMC, CE, CB, UL, Class A EMC or BIS Equivalent	
24	HDCP compliant Inputs	V2.2 or above	
25	EMC Protection	LCD Panel/DLP Display should complywith EMC (Electro-Magnetic Compatibility) Standard Class A. Biddercan propose LCD/DLP type display.	
26	EMC Protection	Class A and follows CE, FCC or UL	
27	EMC Protection	**Emission:** EN 55032: 2012 EN 61000-3-2: 2014 EN 61000-3-3: 2013 **Immunity:** EN 55024: 2010	
28	Safety	EN 60950-1: 2006 + A11: 2009 + A1: 2010 + A12: 2011 + A2: 2013 Auto sensing of physical alignment ofvideo wall	
29	RoHS	EN 50581: 2012	
30	Solution Compatibility	The Display Modules, Display Mount, Display Controller & Software should befrom a single OEM.	
31	Country of Origin for Display & Controller	India, Manufacturer should be establishedbrand and Class 1 or 2 Supplier.	

| 32 | Quality Standard | Min. following Quality control certificationwith OEM manufacturing unit: ISO 9001:2015, ISO 14001:2015, AS9100 | |

DISPLAY CONTROLLER

The Complete Display Controller including I/O Modules and decoding unitsshall be redundant with auto switchover facility to ensure that no single failure of any controller or I/O module shall result in failure/blanking of a zone on the display wall. The display controller should have the following specifications:

1. The Controller should be in an industrial 19" rack mounted casing basedon Intel Xeon 2.1 GHz or better.

2. The minimum memory of 32 GB (standard) expandable upto 256 GBand should be DD R3 or latest type.

3. The unit should be equipped with a DVD ROM drive.

4. The system should be equipped 2x 480 GB Solid-State Disk SSD (Raid-1) Configuration or better.

5. The display controller should have dual redundant hot swappablepower supply.

6. Should have 10/100/1000Mbps Redundant Ethernet port for LANconnection.

7. Supplied with a keyboard and mouse with 20m cable extension.

8. The Display Controller should be based on Windows 10 or higher orLinux.

9. It should give multiple DVI graphics outputs to be connected to themultiple Rear Projection modules.

10. The Controller unit shall have a dual 10/100/1000 Base-T failoverEthernet interfaces.

11. Industry standard certifications should be submitted with the bid for controller.

SOFTWARE:

The software should have the following specifications:

1. The software should be able to pre configure various display layouts and access them at any time with a simple mouse click or based on the timer.

2. The software should enable the users to change the size and position of the various windows being shown on the Display Wall.

3. The software should enable various operators to access the display wall from the local keyboard and mouse of their workstation connected with the Display Controller on the Ethernet.

4. The software should copy the screen content of the workstations (showing semi static content) connected on the Ethernet with the Display Controller to be shown on the Display wall in scalable and moveable windows in real time environment.

5. The wall management software shall allow switching the video inputs.

6. The software should support open APIs for third party integration.

7. The software should have self-correction with software to perform health monitoring that allows timely detection of faults.
   a. Internal temperature
   b. Ambient temperature
   c. Humidity
   d. Cooling
   e. System Status

8. Software shall allow commands on wall level or cube level or a selection of cubes:

   a. Switching the entire display wall on/off
   b. Setting all projection modules to a common brightness target.
   c. Light source status.

6. SWITCHES

SL. No.	Parameters	Minimum specification	
		CORE/DISTRIBUTION SWITCH:	
1	Architecture	The Switching System should provide for minimum two, or more, physical Switches to operate as a single logical virtual switch with stacking bandwidth of 400Gbps.	
		The Virtual Switching System (VSS) / equivalent technology shall support virtualization of switch locally and geographically diversified locations with "split brain/dual master" avoidance functionality during stack links/modules failure.	
		VSS /equivalent technology shall support virtual-mac address for seamless switchover to potential master when master node fails	
		VSS /equivalent technology shall support seamless firmware upgrade using ISSU or rolling upgrade	
2	Switching Capacity	The Switching Capacity should be 1.5 Tbps or more. Switches should support non-blocking architecture with dual hot swappable PSU from day 1.	
3	Forwarding Capacity or Throughput	The Forwarding Capacity should be 1000 Mpps or more.	
4	Number of auto-sensing ports/Slots	Each Switching System shall have minimum 24 x 1/10G SFP+ports, 4 x 40/100G QSFP+/QSFP28 ports. Should be populated with 8 x 10G Copper Transceivers.	
		Layer 2 Functionality	
5	IEEE 802.3ad	The Switching System should support Industry Standard Link Aggregation.	
6	Jumbo Frames	The Switching System should support Jumbo Frames more than 9K Bytes on 1G and 10G ports	
7	IEEE 802.1Q	The Switching System should support Port based VLANs and Private VLANs. The Switching System should support 4K active VLANs.	
		The Switching System should support minimum 90K MAC addresses	

8	Layer 2 Scale	8 Nos. of links per link aggregation and must support morethan 64 link aggregations.	
9	Loop Prevention protocol	The Switching System must support IEEE 802.1w RSTP and IEEE 802.1s MSTP, G.8032 for fast convergence .	
Layer 3 Functionality			
10	Routing Protoco ls	The Switching System should support routing protocol IP v4 & IPV6 Static routing, OSPFv2, OSPFv3, BGPv4 and BGP4+. The Switching System should also support Multicast RoutingProtocols (IPv4 PIM). VRF-Lite, Bi-directional forwarding detection (BFD).	
11	HA & DHCP	The Switching System should support HSRP/ VRRP for Ipv4 and Ipv6. It must also support DHCP Server and Relay forIpv4 and Ipv6.	
12	No. of Route Entries	The Switching System should support minimum 40K or moreIpv4 & Ipv6 route entries combined from day 1.	
Security Features			
13	Access ControlLists	The Switching System should support Standard andExtended ACLs	
14	Various type ofACLs	The Switching System should support various type of ACLs like MAC based ACLs, Port based ACLs, VLAN based ACLs and Layer 3 ACLs. Time-based ACLs, Event-based ACLs	
15	Integrate d Security	The Switching System should support integrated security features like DHCP snooping with Option-82, Dynamic ArpInspection, IP Source Guard, Ipv6 Router Advertisements (Ras)	
16	AAA	The Switching System should support Authentication, Authorization, and Accounting (AAA), COA. It must support RADIUS and TACACS+ protocol as well.	
17	Access Control Entries	The Switching System should support up to 4K ACL rules per Switching System. It should support Security and QOS ACL's.	
18	Port Security	The Switching System should support Port-security.	
Multicast			
19	IGMP	The Switching System should support IGMP Snooping v1,v2& v3	
20	PIM	The Switching System should support Ipv4 Multicast with support, MSDP, PIM-Sparse, PIM-Dense and PIM-SSM.	
21	MLD	The Switching System should support MLD v1, MLD v2	
22	Multicast	The Switching System should support 8K	

	route Scalability	Multicast entriesfor Ipv4 and Ipv6	
23		**Management**	
		The Switching System should support Syslog, SCP, SSHv2,Telnet, OOB Management port and Console Port.	
		CLI, GUI, SNMPv1,2 & 3, switch should support OpenFlow v1.3 or higher for SDN functionality	
24	Softwa re Define d Networ k	Switch should support OpenFlow / Eqivalent SDN functionality for LAN Automation from day 1	
		AI/ML Based Centralized management platform to be proposed to automate LAN/WLAN/WAN feature set and cyber security threat prevention & visibility, AI/ML Based Centralized management platform on premisis in HA to be offered.	
		• Auto backup	
		• Auto upgrade	
		• Auto/Zero Touch recovery without any configuration/manual intervention in the replacement unit or on the centralised management platform (Plug and Play)	
		• Auto/Zero Touch provisioning without any configuration/manual intervention in the new/provisioningunit or on the centralised management platform (Plug and Play)	
		• Intent Based ACL & QoS	
		• Auto Device Discovery & Inventory Management for all connected IP Nodes	
		• Health Monitoring functionality of all switches for predictive maintenance.	
		• Auto cybersecurity threat prevention/Auto remediation onaccess switches, collaborating with various cybersecurity vendors with CEF alerts such as SNMP Traps, Syslog messages or Web API messages. MAC based, IP Based, Port	

		based, Group Based, Quarantine VLAN or log only action list to eliminate horizontal virus spread in the LAN/WLAN.	
25	**Licenses**	Licenses required to run all the above features must be included from day one.	
		Redundancy	
26	Power Supply Redundanc y	The Switching System should be configured with Redundant Power Supply Units (PSUs), Hot-swappable units, providing 1:1 power redundancy	
27		**Certification**	
		UL, CUL, EN, ROHS, FIPS/FIPS 140-2	
		IPv6 Ready logo certified from day one or any other industry standard certification.	
		Environment	
		Others	
28	Mounting	Switching System must be rack mountable. Rack mounting kits and accessories should be supplied	
29	Cables & Accessori es	All necessary cables, stacking modules/Cables, power & accessories should be supplied	
		For ease of integration, all switches, SFP Modules shall be from same OEM. Same modular operating system shall be supported across Core, Distribution, Access Layer Switches along with standard CLI / similar CLI	

LAYER 2 : 24 PORT POE SWITCH:			
SL. No.	Parameters	Minimum specification	
1	Architecture	The Switching System should provide for minimum two, or more, physical Switches to operate as a single logical virtual switch with stacking bandwidth of 40Gbps.	
		The Virtual Switching System (VSS) / equivalent technology shall support virtualization of switch locally and geographically diversified locations with "split brain/dual master" avoidance functionality during stack links/modules failure.	
		VSS /equivalent technology shall support virtual-mac address for seamless switchover to potential master when	

		master node fails	
		VSS /equivalent technology shall support seamless firmware upgrade using ISSU or rolling upgrade	
2	Switching Capacity	The Switching Capacity should be 128 Gbps or more. Switches should support non-blocking architecture with dual PSU from day 1.	
3	Forwarding Capacity or Throughput	The Forwarding Capacity should be 95 Mpps or more.	
4	Number of auto-sensing ports/Slots	Each Switching System shall have minimum 24 x 10/100/1000 Base-T PoE+ ports with Minimum 740W POE Budget with dual PSU, 4 x 1/10G SFP+ ports. Should be populated with 2 x 10G LR Transceivers.	
	Layer 2 Functionality		
5	IEEE 802.3ad	The Switching System should support Industry Standard Link Aggregation.	
6	Jumbo Frames	The Switching System should support Jumbo Frames more than 9K Bytes on 1G and 10G ports	
7	IEEE 802.1Q	The Switching System should support Port based VLANs and Private VLANs. The Switching System should support 4K active VLANs.	
8	Layer 2 Scale	The Switching System should support minimum 16K MAC addresses	
		8 Nos. of links per link aggregation and must support more than 64 link aggregation.	
9	Loop Prevention protocol	The Switching System must support IEEE 802.1w RSTP and IEEE 802.1s MSTP, G.8032 for fast convergence .	
10	Uninterrupted POE	The switching system should support continuous power supply to PD devices even when the switch reboot after upgrade	
	Layer 3 Functionality		
11	Routing Protocols	Static, RIP/OSPF	
	Security Features		
12	Access Control Lists	The Switching System should support Standard and Extended ACLs	
13	Various type of ACLs	The Switching System should support various type of ACLs like MAC based ACLs, Port based ACLs, VLAN based ACLs and	

		Layer 3 ACLs. Time-based ACLs, Event-based ACLs	
14	Integrate d Security	The Switching System should support integrated security features like DHCP snooping with Option-82, Dynamic ArpInspection, IP Source Guard, Ipv6 Router Advertisements (Ras)	
15	AAA	The Switching System should support Authentication, Authorization, and Accounting (AAA), COA. It must support RADIUS and TACACS+ protocol as well.	
16	Access Control Entries	The Switching System should support up to 1K ACL rules per Switching System. It should support Security and QOS ACL's.	
17	Port Security	The Switching System should support Port-security.	
	Multicast		
18	IGMP	The Switching System should support IGMP Snooping v1,v2& v3	
19	PIM	The Switching System should support Ipv4 Multicast with support, MSDP, PIM-Sparse, PIM-Dense and PIM-SSM.	
20	MLD	The Switching System should support MLD v1, MLD v2	
21	Multicast route Scalability	The Switching System should support 1K Multicast entries for Ipv4 and Ipv6	
22	**Management**		
		The Switching System should support Syslog, SCP, SSHv2,Telnet and Console Port.	
		CLI, GUI, SNMPv1,2 & 3, switch should support OpenFlow v1.3 or higher for SDN functionality	
23	Softwa re Define d Networ k	Switch should support OpenFlow / Eqivalent SDN functionality for LAN Automation from day 1	
		AI/ML Based Centralized management platform to be proposed to automate LAN/WLAN/WAN feature set and cyber security threat prevention & visibility, AI/ML Based	

		Centralized management platform on premises in HA to be offered.	
		• Auto backup	
		• Auto upgrade	
		• Auto/Zero Touch recovery without any configuration/manual intervention in the replacement unit or on the centralised management platform (Plug and Play)	
		• Auto/Zero Touch provisioning without any configuration/manual intervention in the new/provisioning unit or on the centralised management platform (Plug and Play)	
		• Intent Based ACL & QoS	
		• Auto Device Discovery & Inventory Management for all connected IP Nodes	
		• Health Monitoring functionality of all switches for predictive maintenance.	
		• Auto cybersecurity threat prevention/Auto remediation on access switches, collaborating with various cybersecurity vendors with CEF alerts such as SNMP Traps, Syslog messages or Web API messages. MAC based, IP Based, Port based, Group Based, Quarantine VLAN or log only action list to eliminate horizontal virus spread in the LAN/WLAN.	
24	**Licenses**	Licenses required to run all the above features must be included from day one.	
		Redundancy	
25	Power Supply Redundancy	The Switching System should be configured with Redundant Power Supply Units (PSUs) providing 1:1 power redundancy	
		Certification	
26		UL, CUL, EN, ROHS, FIPS/FIPS 140-2	
27		IPv6 Ready logo certified from day one or any other industry standard certification.	
		Environment	
		Others	
28	Mounting	Switching System must be rack mountable. Rack mounting kits and accessories should be supplied	
29	Cables & Accessories	All necessary cables, stacking modules/Cables, power & accessories should be supplied	

		For ease of integration, all switches, SFP Modules shall be from same OEM. Same modular operating system shall be supported across Core, Distribution, Access Layer Switches along with standard CLI / similar CLI	

8 PORT INDUSTRIAL GRADE SWITCH:			
SL. No.	**Parameters**	**Minimum specification**	
1	Port Density & Redundancy	8 x Gigabit Port	
		2 x SFP Port	
2	PoE Standard	8x IEEE 802.3af/ IEEE 802.3at or better on all ports simultaneously	
3	Mac address support	Should support at least 16K mac address	
4	Switching Capacity	20 GB or better	
5	POE Budget	180W	
6	**Layer 2 Functionality**		
7	IEEE 802.3ad	The Switching System should support Industry Standard Link Aggregation.	
8	Jumbo Frames	The Switching System should support Jumbo Frames more than 9K Bytes on 1G ports	
9	IEEE 802.1Q	The Switching System should support Port based VLANs and Private VLANs. The Switching System should support 2K active VLANs.	
10	Layer 2 Scale	The Switching System should support minimum 16K MAC addresses	
		8 Nos. of links per link aggregation and must support more than 32 link aggregation.	
11	Loop Prevention protocol	The Switching System must support IEEE 802.1w RSTP and IEEE 802.1s MSTP, G.8032 for fast convergence .	
12	Uninterrupted POE	The switching system should support continuous power supply to PD devices even when the switch reboot after upgrade	
	Security Features		
13	Access Control Lists	The Switching System should support Standard and Extended ACLs	
14	Various type of ACLs	The Switching System should support various type of ACLs like MAC based ACLs, Port based ACLs, VLAN based ACLs and Layer 3 ACLs. Time-based ACLs, Event-based ACLs	

15	Integrated Security	The Switching System should support integrated security features like DHCP	
		snooping with Option-82, Dynamic Arp Inspection, IP Source Guard, Ipv6 Router Advertisements (Ras)	
16	AAA	The Switching System should support Authentication,Authorization, and Accounting (AAA), COA. It must support RADIUS and TACACS+ protocol as well.	
17	Access Control Entries	The Switching System should support ACL 256 rules per Switching System. It should support Security andQOS ACL's.	
18	Port Security	The Switching System should support Port-security.	
Multicast			
19	IGMP	The Switching System should support IGMP Snooping v1,v2 & v3	
20	MLD	The Switching System should support MLD v1, MLDv2	
21	Multicast route Scalability	The Switching System should support 256 Multicastentries for Ipv4 and Ipv6	
22	**Management**		
		The Switching System should support Syslog, SCP,SSHv2, Telnet and Console Port.	
		CLI, GUI, SNMPv1,2 & 3, switch should support OpenFlow v1.3 or higher for SDN functionality	
23	Software Defined Network	Switch should support OpenFlow / Eqivalent SDNfunctionality for LAN Automation from day 1	
		AI/ML Based Centralized management platform to beproposed to automate LAN/WLAN/WAN feature set and cyber security threat prevention & visibility, AI/ML Based Centralized management platform on premisis in HA to be offered.	
		• Auto backup	
		• Auto upgrade	
		• Auto/Zero Touch recovery without any configuration/manual intervention in the replacement unit or on the centralised management platform (Plug and Play)	

		• Auto/Zero Touch provisioning without anyconfiguration/manual intervention in the new/provisioning unit or on the centralised management platform (Plug and Play)	
		• Intent Based ACL & QoS	
		• Auto Device Discovery & Inventory Management forall connected IP Nodes	
		• Health Monitoring functionality of all switches for predictive maintenance.	
		• Auto cybersecurity threat prevention/Auto remediation on access switches, collaborating with various cybersecurity vendors with CEF alerts such asSNMP Traps, Syslog messages or Web API messages.MAC based, IP Based, Port based, Group Based, Quarantine VLAN or log only action list to eliminate horizontal virus spread in the LAN/WLAN.	
24	Enclosure Rating	IP 30 or equivalent Industrial Grade Rating	
Redundancy			
25	Power Supply Redundancy	The Switching System should be configured with Redundant Power Supply Units (PSUs) providing 1:1 power redundancy	
26	**Certification**		
		UL, CUL, EN, ROHS, FIPS-180	
		IPv6 Ready logo certified from day one	
27	EMC Standards	EN 55035, EN/IEC 61000-3-2, EN/IEC 61000-3-3, EN/IEC 61000-4-2, EN/IEC 61000-4-3, EN/IEC 61000-4-4, EN/IEC 61000-4-5, EN/IEC 61000-4-6, EN/IEC 61000-4-8, EN/IEC 61000-4-8, EN/IEC 61000-4-11,EN/IEC 61000-4-29 EN55032	
Environment			
Others			
28	Mounting	Switching System must be rack mountable/DIN Rail.	
29	Cables & Accessories	All necessary cables, stacking modules/Cables, power& accessories should be supplied	
		For ease of integration, all switches, SFP Modules shall be from same OEM. Same modular operating system shall be supported across Core, Distribution,Access Layer Switches along with standard CLI /	

		similar CLI	

4 PORT INDUSTRIAL GRADE SWITCH			
SL. No.	Parameters	Minimum specification	
1	Port Density & Redundancy	4 x Gigabit Port	
		2 x SFP Port	
2	PoE Standard	8x IEEE 802.3af/ IEEE 802.3at or better on all ports simultaneously	
3	Mac address support	Should support at least 16K mac address	
4	Switching Capacity	12 GB or better	
5	POE Budget	240W	
6	**Layer 2 Functionality**		
7	IEEE 802.3ad	The Switching System should support Industry Standard Link Aggregation.	
8	Jumbo Frames	The Switching System should support Jumbo Frames more than 9K Bytes on 1G ports	
9	IEEE 802.1Q	The Switching System should support Port based VLANs and Private VLANs. The Switching System should support 2K active VLANs.	
10	Layer 2 Scale	The Switching System should support minimum 16K MAC addresses	
		8 Nos. of links per link aggregation and must support more than 32 link aggregation.	
11	Loop Prevention protocol	The Switching System must support IEEE 802.1w RSTP and IEEE 802.1s MSTP, G.8032 for fast convergence .	
	Uninterrupted POE	The switching system should support continuous power supply to PD devices even when the switch reboot after upgrade	
14	**Security Features**		
	Access Control Lists	The Switching System should support Standard and Extended ACLs	
15	Various type of ACLs	The Switching System should support various type of ACLs like MAC based ACLs, Port based ACLs, VLAN based ACLs and Layer 3 ACLs. Time-based ACLs, Event-based ACLs	

	Integrated Security	The Switching System should support integrated security features like DHCP snooping with Option-82, Dynamic Arp Inspection, IP Source Guard, Ipv6 Router Advertisements (Ras)	
16	AAA	The Switching System should support Authentication,Authorization, and Accounting (AAA), COA. It must support RADIUS and TACACS+ protocol as well.	
	Access Control Entries	The Switching System should support ACL 256 rules per switching System. It should support Security andQOS ACL's.	
	Port Security	The Switching System should support Port-security.	
Multicast			
	IGMP	The Switching System should support IGMP Snooping v1,v2 & v3	
	MLD	The Switching System should support MLD v1, MLDv2	
	Multicast route Scalability	The Switching System should support 256 Multicastentries for Ipv4 and Ipv6	
Management			
		The Switching System should support Syslog, SCP,SSHv2, Telnet and Console Port.	
		CLI, GUI, SNMPv1,2 & 3, switch should support OpenFlow v1.3 or higher for SDN functionality	
	Software Defined Network	Switch should support OpenFlow / Equivalent SDN functionality for LAN Automation from day 1	
		AI/ML Based Centralized management platform to be proposed to automate LAN/WLAN/WAN feature set and cyber security threat prevention & visibility, AI/ML Based Centralized management platform on premises in HA to be offered.	
		• Auto backup	
		• Auto upgrade	
		• Auto/Zero Touch recovery without any configuration/manual intervention in the replacement unit or on the centralised management platform (Plug and Play)	
		• Auto/Zero Touch provisioning without any configuration/manual intervention in the new/provisioning unit or on the centralized management platform (Plug and Play)	

		• Intent Based ACL & QoS	
		• Auto Device Discovery & Inventory Management for all connected IP Nodes	
		• Health Monitoring functionality of all switches for predictive maintenance.	
		• Auto cybersecurity threat prevention/Auto remediation on access switches, collaborating with various cybersecurity vendors with CEF alerts such as SNMP Traps, Syslog messages or Web API messages. MAC based, IP Based, Port based, Group Based, Quarantine VLAN or log only action list to eliminate horizontal virus spread in the LAN/WLAN.	
	Enclosure Rating	IP 30 or equivalent Industrial Grade Rating	
	Redundancy		
	Power Supply Redundancy	The Switching System should be configured with Redundant Power Supply Units (PSUs) providing 1:1 power redundancy	
	Certification		
		UL, CUL, EN, ROHS, FIPS-180	
		IPv6 Ready logo certified from day one	
	EMC Standards	EN 55035, EN/IEC 61000-3-2, EN/IEC 61000-3-3, EN/IEC 61000-4-2, EN/IEC 61000-4-3, EN/IEC 61000-4-4, EN/IEC 61000-4-5, EN/IEC 61000-4-6, EN/IEC 61000-4-8, EN/IEC 61000-4-8, EN/IEC 61000-4-11,EN/IEC 61000-4-29 EN55032	
	Environment		
	Others		
	Mounting	Switching System must be rack mountable/DIN Rail.	
	Cables & Accessories	All necessary cables, stacking modules/Cables, power & accessories should be supplied	
		For ease of integration, all switches, SFP Modules shall be from same OEM. Same modular operating system shall be supported across Core, Distribution, Access Layer Switches along with standard CLI / similar CLI	

FIBER ACCESSORIES			
SL. No.	Parameters	Minimum specification	
S/N	Parameter	Specifications	
1	Fiber Type	SMF	
2	Connector Type	LC duplex	
3	Protocol Support	Gigabit Ethernet	
4	Switching Capacity	**1.25 Gbps or better**	
5	Transceiver type	Single Mode	
6	Max. Distance	10 Kms	
7	Wave length Tx/Rx (nm)	1310 nm	
8	Compatibility	SFP Module shall be preferably from the same OEMas the camera manufacturer to ensure compatibility	

S/N	Parameter	Specifications	
1	Fiber Type	SMF	
2	Connector Type	LC duplex	
3	Protocol Support	Gigabit Ethernet	
4	Switching Capacity	**10 Gbps or better**	
5	Transceiver type	Single Mode	
6	Max. Distance	10 Kms	
7	Wave length Tx/Rx (nm)	1310 nm	
8	Compatibility	SFP Module shall be preferably from the same OEMas the camera manufacturer to ensure compatibility	

LAYER 2 : 24 PORT NON-POE SWITCH:			
SL. No.	Parameters	Minimum specification	
1	Switching Capacity	The Switching Capacity should be 56 Gbps or more. Switchesshould support non-blocking architecture.	
2	Forwarding Capacity or Throughput	The Forwarding Capacity should be 41Mpps or more.	
3	Number of auto-sensing ports/Slots	Each Switching System shall have minimum 24 x 10/100/1000Base-T ports, 4 x 100/1000 SFP ports.	
		Layer 2 Functionality	
4	IEEE 802.3ad	The Switching System should support Industry Standard LinkAggregation.	

5	Jumbo Frames	The Switching System should support Jumbo Frames more than9K Bytes on 1G	
6	IEEE 802.1Q	The Switching System should support Port based VLANs and Private VLANs. The Switching System should support 2K active VLANs.	
7	Layer 2 Scale	The Switching System should support minimum 16K MACaddresses	
		8 Nos. of links per link aggregation and must support more than 32 link aggregation.	
8	Loop Prevention protocol	The Switching System must support IEEE 802.1w RSTP and IEEE802.1s MSTP	
	Security Features		
9	Access ControlLists	The Switching System should support Standard and ExtendedACLs	
10	Various type ofACLs	The Switching System should support various type of ACLs likeMAC based ACLs, Port based ACLs, VLAN based ACLs and Layer 3 ACLs. Time-based ACLs, Event-based ACLs	
11	Integrated Security	The Switching System should support integrated security features like DHCP snooping, Dynamic Arp Inspection, IP SourceGuard, Ipv6 Router Advertisements (Ras)	
12	AAA	The Switching System should support Authentication, Authorization, and Accounting (AAA), COA. It must support RADIUS and TACACS+ protocol as well.	
13	Access Control Entries	The Switching System should support up to 256 ACL rules perSwitching System. It should support Security and QOS ACL's.	
14	Port Security	The Switching System should support Port-security.	
	Multicast		
15	IGMP	The Switching System should support IGMP Snooping v1,v2 & v3	
16	PIM	The Switching System should support Ipv4 Multicast withsupport	
17	MLD	The Switching System should support MLD v1, MLD v2	
18	Multicast route Scalability	The Switching System should support 256 Multicast entries for Ipv4 and Ipv6	
19	**Management**		
		The Switching System should support Syslog, SCP, SSHv2, Telnet and Console Port. CLI, GUI, SNMPv1,2 & 3	
20	Software		

	Define d Networ k	• Auto backup	
		• Auto upgrade	
		• Auto/Zero Touch recovery without any configuration/manualintervention in the replacement unit or on the centralised management platform (Plug and Play)	
		• Auto/Zero Touch provisioning without any configuration/manual intervention in the new/provisioning unit or on the centralised management platform (Plug and Play)	
		• Intent Based ACL & QoS	
		• Auto Device Discovery & Inventory Management for all connected IP Nodes	
		• Health Monitoring functionality of all switches for predictive maintenance.	
		• Auto cybersecurity threat prevention/Auto remediation on access switches, collaborating with various cybersecurity vendors with CEF alerts such as SNMP Traps, Syslog messages or	
		Web API messages. MAC based, IP Based, Port based, GroupBased, Quarantine VLAN or log only action list to eliminate horizontal virus spread in the LAN/WLAN.	
	Certification		
21		UL, CUL, EN, ROHS, FIPS/FIPS 140-2	
22		IPv6 Ready logo certified from day one	
	Environment		
	Others		
23	Mounting	Switching System must be rack mountable. Rack mounting kitsand accessories should be supplied	
24	Cables & Accessories	All necessary cables, stacking modules/Cables, power & accessories should be supplied	
		For ease of integration, all switches, SFP Modules shall be from same OEM. Same modular operating system shall be supported across Core, Distribution, Access Layer Switches along with standard CLI / similar CLI	

SL. No.	Parameters	Minimum specification	
		LAYER 2 : 8 PORT NON-POE SWITCH	
1	Switching Capacity	The Switching Capacity should be 20 Gbps or more. Switches should support non-blocking architecture.	
2	Forwarding Capacity or Throughput	The Forwarding Capacity should be 14Mpps or more.	
3	Number of auto-sensing ports/Slots	Each Switching System shall have minimum 8 x 10/100/1000 Base-T ports, 2 x 100/1000 SFP ports.	
		Layer 2 Functionality	
4	IEEE 802.3ad	The Switching System should support Industry Standard Link Aggregation.	
5	Jumbo Frames	The Switching System should support Jumbo Frames more than 9K Bytes on 1G	
6	IEEE 802.1Q	The Switching System should support Port based VLANs and Private VLANs. The Switching System should support 2K active VLANs.	
7	Layer 2 Scale	The Switching System should support minimum 16K MAC addresses	
		8 Nos. of links per link aggregation and must support more than 32 link aggregation.	
8	Loop Prevention protocol	The Switching System must support IEEE 802.1w RSTP and IEEE 802.1s MSTP	
		Security Features	
9	Access Control Lists	The Switching System should support Standard and Extended ACLs	
10	Various type of ACLs	The Switching System should support various type of ACLs like MAC based ACLs, Port based ACLs, VLAN based ACLs and Layer 3 ACLs. Time-based ACLs, Event-based ACLs	

11	Integrate d Security	The Switching System should support integrated security features like DHCP snooping, Dynamic Arp Inspection, IP Source Guard, Ipv6 Router Advertisements (Ras)	
12	AAA	The Switching System should support Authentication, Authorization, and Accounting (AAA), COA. It must support RADIUS and TACACS+ protocol as well.	
13	Access Control Entries	The Switching System should support up to 256 ACL rules per Switching System. It should support Security and QOS ACL's.	
14	Port Security	The Switching System should support Port-security.	
	Multicast		
15	IGMP	The Switching System should support IGMP Snooping v1,v2 & v3	
16	PIM	The Switching System should support Ipv4 Multicast with support	
17	MLD	The Switching System should support MLD v1, MLD v2	
18	Multicast route Scalability	The Switching System should support 256 Multicast entries for Ipv4 and Ipv6	
19	**Management**		
		The Switching System should support Syslog, SCP, SSHv2, Telnet and Console Port. CLI, GUI, SNMPv1,2 & 3	
20	Softwa re Define d Network	• Auto backup	
		• Auto upgrade	
		• Auto/Zero Touch recovery without any configuration/manual intervention in the replacement unit or on the centralised management platform (Plug and Play)	
		• Auto/Zero Touch provisioning without any configuration/manual intervention in the new/provisioning unit or on the centralised management platform (Plug and Play)	
		• Intent Based ACL & QoS	
		• Auto Device Discovery & Inventory Management for all connected IP Nodes	
		• Health Monitoring functionality of all switches for predictive maintenance.	

6		• Auto cybersecurity threat prevention/Auto remediation on access switches, collaborating with various cybersecurity vendors with CEF alerts such as SNMP Traps, Syslog messages orWeb API messages. MAC based, IP Based, Port based, Group Based, Quarantine VLAN or log only action list to eliminate horizontal virus spread in the LAN/WLAN.	
		Certification	
21		UL, CUL, EN, ROHS, FIPS/FIPS 140-2	
22		IPv6 Ready logo certified from day one or any other industry standard certification.	
		Environment	
		Others	
24	Mounting	Switching System must be rack mountable. Rack mounting kits and accessories should be supplied	
25	Cables & Accessori es	All necessary cables, stacking modules/Cables, power &accessories should be supplied	
		For ease of integration, all switches, SFP Modules shall be from same OEM. Same modular operating system shall be supported across Core, Distribution, Access Layer Switches along with standard CLI / similar CLI	

NETWORK MANAGEMENT SOFTWARE		
SL. No.	**Specificat ion**	
1	The NMS/SDN controller shall ensure a single-pane-of-glass interface to the entire network for the management. It should be logged in from single console (CLI & GUI) to allow administrator to configure common parameters such as VLAN, Syslog, SNMP,QOS, ACL, Scripts & User/Passwords etc. to be executed in one go to eliminate human error while configuring multiple LAN switches/Group of LAN switches.	
2	The NMS/SDN controller dashboard should show the network details, status, eventinformation, and topology map.	
3	Centralized management appliance/ Solution or SDN Controller must providenecessary reports for compliance and audit.	
4	NMS/SDN controller shall be able to show critical issues like internal security threats,link tampering, network loops, environmental alarms, and failed nodes.	
5	Solution should store historical data to provide anomalies and trending informationof each resource (environment, configuration & operational) and graphing of parameters, which can help to debug over a period of time.	
6	NMS/SDN controller should be able to highlight the issues on the	

	network map and in the event log.	
7	NMS/SDN controller shall provide simple navigation with the ability to manage and monitor network device easily.	
8	The NMS/SDN controller should be able to show the colour-coded traffic map to provide visual network utilization and bandwidth across all links, with constant updates.	
9	Simplify network management by creating and editing VLANs across multiple switches. The colour coded VLAN map highlights network connectivity, showing data paths of various business applications.	
10	NMS/SDN controller shall be able to show the colour coded VLAN map highlighting the network connectivity, showing the data paths for your important business applications	
11	NMS/SDN controller shall have the capability to manage the switches centrally from headquarter and keep synchronizing the running configuration of switches deployed across remote locations for up-to-date network configuration records	
12	The NMS/SDN controller shall ensure Zero-touch provisioning, Zero-touch recovery of the failed switch at a remote location with its last configuration along with the capability to automatically and centrally upgrade firmware upgrades.	
13	It should be regularly taking configuration, Firmware, Scripts & Licenses files backup in SD card/USB drive/ Files servers etc. to ensure latest backup is available all time centrally to recover the failed LAN switches which will minimize the MTTR (Mean time to restore) for higher network availability of 99.99% and more.	
14	The NMS/SDN controller shall have health monitoring for preventive maintenance to monitor various parameters such as CPU, temp, flash, RAM etc.	
15	Solution should provide ongoing mechanism to find configuration deviation, security risk & non-compliances against segmentation rules by assessing current configuration, network security policies and generate alerts for any deviation to	

		provide assurance. It should be able to get integrated with SMTP for email alert &notification.	
16		The NMS/SDN controller shall have intent-based Access control list and QoS to deploy complex ACL/QoS across the LAN devices from single-pane-of-glass interface	
17		Solution should provide ongoing mechanism to find configuration deviation, securityrisk & non-compliances against segmentation rules by assessing current configuration, network security policies and generate alerts for any deviation to provide assurance.	
18		Solution should provide network visibility and historical analysis between any two- time series to identify any issue. It should include software recommendation & bestpractices based on platforms and running configuration in network.	
19		Centralized management appliance/ solution or SDN Controller should provide dynamic device inventory of the Fabric as well as current network topology of the fabric.	
20		The NMS/SDN controller shall be integrated with various 3rd party cybersecurity UTM/NGFW/IPS/End point security solutions with CEF messages such as syslog/SNMPTraps/Web API to isolate infected IP devices connected to LAN/WLAN automatically by enforcing the whitelist & blacklist policies.	
21		Software provided to have 5 years OEM support including software/firmwareupdates support & subscription.	

7. SERVERS

DATABASE SERVER TECHNICAL SPECIFICATION			
SL. No	Parameter	Technical Specification	
1	Processor	Minimum Dual Processor with 12 Core or better Processor with Base Frequency. 2.4 GHz.	
2	RAM	Min 64 GB and extendable up to 128 GB	
3	Storage	2 x 240 GB SSD/NVME configured as RAID1 for OS	
		4X 600GB SAS 12G minimum 10K RPM or better on RAID 6 with usable space	
4	Network Interface	2 Nos 1 Gbps and 2 Nos 10Gbps Ethernet ports & 2 Nos of 10Gbps SFP+ port with Transceivers	
5	Graphics	1GB or better Graphic Card	
6	HBA interface	32Gb 2-port Fibre Channel Host Bus Adapter	
7	Operating System & License	The bidder shall provide "proven latest" licensed Operating system & Database to meet the requirement of the project. Necessary licensing document shall be submitted & also license shall be	

		perpetual & provided in the name of NMPA, Mangalore.	
9	Power Supply	Minimum 1600watts Dual Redundant Power Supply	
10	Optical Drive	DVD +/-RW Internal	
11	Keyboards and Mouse	USB type	
12	USB port	Minimum 4 Nos USB ports	
13	Form Factor	Rack Type	
14	Expandable	RAM & HDD upgradable	
14	Additional Features	Configuration upgrades should only with Cryptographically signed firmware, Secure Boot, Secure Erase etc.	
15	Warranty	5 Years warranty with 24x7 Support	

RECORDING SERVER TECHNICAL SPECIFICATION			
SL.No	Parameter	Technical Specification	
1	Processor	Minimum Dual Processor with 12 Core or better Processor with Base Frequency. 2.4 GHz.	
2	RAM	Min 64 GB and extendable up to 128 GB	
3	Storage	2 x 240 GB SSD/NVME configured as RAID1 for OS	
		4X 600GB SAS 12G minimum 10K RPM or better on RAID 6 with usable space	
4	Network Interface	2 Nos 1 Gbps and 2 Nos 10Gbps Ethernet ports & 2 Nos of 10Gbps SFP+ port with Transceivers	
5	Graphics	1GB or better Graphic Card	
6	HBA interface	32Gb 2-port Fibre Channel Host Bus Adapter	
7	Operating System & License	The bidder shall provide "proven latest" licensed Operating system to meet the requirement of the project. Necessary licensing document shall be submitted & also license shall be perpetual & provided in the name of NMPA, Mangalore.	
9	Power Supply	Minimum 1600watts Dual Redundant Power Supply	
10	Optical Drive	DVD +/-RW Internal	
11	Keyboards and Mouse	USB type	
12	USB port	Minimum 4 Nos USB ports	
13	Form Factor	Rack Type	
14	Expandable	RAM & HDD upgradable	
14	Additional Features	Configuration upgrades should only with Cryptographically signed firmware, Secure Boot, Secure Erase etc.	

15	Warranty	5 Years warranty with 24x7 Support	

FAILOVER RECORDING SERVER TECHNICAL SPECIFICATION			
SL.No	Parameter	Technical Specification	
1	Processor	Minimum Dual Processor with 12 Core or better Processor with Base Frequency. 2.4 GHz.	
2	RAM	Min 64 GB and extendable up to 128 GB	
3	Storage	2 x 240 GB SSD/NVME configured as RAID1 for OS	
		48TB SAS 12G minimum 10K RPM or better on RAID 6 with usable space	
4	Network Interface	2 Nos 1 Gbps and 2 Nos 10Gbps Ethernet ports & 2 Nos of 10Gbps SFP+ port with Transceivers	
5	Graphics	1GB or better Graphic Card	
6	HBA interface	32Gb 2-port Fibre Channel Host Bus Adapter	
7	Operating System & License	The bidder shall provide "proven latest" licensed Operating system to meet the requirement of the project. Necessary licensing document shall be submitted & also license shall be perpetual & provided in the name of NMPA, Mangalore.	
9	Power Supply	Minimum 1600watts Dual Redundant Power Supply	
10	Optical Drive	DVD +/-RW Internal	
11	Keyboards and Mouse	USB type	
12	USB port	Minimum 4 Nos USB ports	
13	Form Factor	Rack Type	
14	Expandable	RAM & HDD upgradable	
14	Additional Features	Configuration upgrades should only with Cryptographically signed firmware, Secure Boot, Secure Erase etc.	
15	Warranty	5 Years warranty with 24x7 Support	

UVSS SERVER TECHNICAL SPECIFICATION			
SL. No	Parameter	Technical Specification	
1	Processor	Minimum Dual Processor with 12 Core or better Processor with Base Frequency. 2.4 GHz.	
2	RAM	Min 64 GB and extendable up to 128 GB	
3	Storage	2 x 240 GB SSD/NVME configured as RAID1 for OS	
		24TB SAS 12G minimum 10K RPM or better on RAID 6 with usable space	
4	Network Interface	2 Nos 1 Gbps and 2 Nos 10Gbps Ethernet ports & 2 Nos of 10Gbps SFP+ port with Transceivers	
5	Graphics	1GB or better Graphic Card	

6	HBA interface	32Gb 2-port Fibre Channel Host Bus Adapter	
7	Operating System & License	The bidder shall provide "proven latest" licensed Operating system to meet the requirement of the project. Necessary licensing document shall be submitted & also license shall be perpetual & provided in the name of NMPA, Mangalore.	
9	Power Supply	Minimum 1600watts Dual Redundant Power Supply	
10	Optical Drive	DVD +/-RW Internal	
11	Keyboards and Mouse	USB type	
12	USB port	Minimum 4 Nos USB ports	
13	Form Factor	Rack Type	
14	Expandable	RAM & HDD upgradable	
14	Additional Features	Configuration upgrades should only with Cryptographically signed firmware, Secure Boot, Secure Erase etc.	
15	Warranty	5 Years warranty with 24x7 Support	

VA SERVER TECHNICAL SPECIFICATION			
SL.No	Parameter	Technical Specification	
1	Processor	Minimum Dual Processor with Gold 6430,2.1Ghz 32core/64T or better Processor with Base Frequency. 2.4 GHz.	
2	RAM	Min 256 GB RAM or more	
3	Storage	2 x 240 GB SSD/NVME configured as RAID1 for OS	
		24TB SAS 12G minimum 10K RPM or better on RAID 6 with usable space	
4	Network Interface	2 Nos 1 Gbps and 2 Nos 10Gbps Ethernet ports & 2 Nos of 10Gbps SFP+ port with Transceivers	
5	Graphics	GPU NVidia L4 or Higher Graphic Card	
6	HBA interface	32Gb 2-port Fibre Channel Host Bus Adapter	
7	Operating System & License	The bidder shall provide "proven latest" licensed Operating system to meet the requirement of the project. Necessary licensing document shall be submitted & also license shall be perpetual & provided in the name of NMPA, Mangalore.	
9	Power Supply	Minimum 1600watts Dual Redundant Power Supply	
10	Optical Drive	DVD +/-RW Internal	
11	Keyboards and Mouse	USB type	

12	USB port	Minimum 4 Nos USB ports	
13	Form Factor	Rack Type	
14	Expandable	RAM & HDD upgradable	
14	Additional Features	Configuration upgrades should only with Cryptographically signed firmware, Secure Boot, Secure Erase etc.	
15	Warranty	5 Years warranty with 24x7 Support	

NMS,AD,DHCP & AV SERVER TECHNICAL SPECIFICATION			
SL.No	Parameter	Technical Specification	
1	Processor	Minimum Dual Processor with 12 Core or better Processor with Base Frequency. 2.4 GHz.	
2	RAM	Min 64 GB and extendable up to 128 GB	
3	Storage	2 x 240 GB SSD/NVME configured as RAID1 for OS	
		4X 600GB SAS 12G minimum 10K RPM or better on RAID 6 with usable space	
4	Network Interface	2 Nos 1 Gbps and 2 Nos 10Gbps Ethernet ports & 2 Nos of 10Gbps SFP+ port with Transceivers	
5	Graphics	1GB or better Graphic Card	
6	HBA interface	32Gb 2-port Fibre Channel Host Bus Adapter	
7	Operating System & License	The bidder shall provide "proven latest" licensed Operating system to meet the requirement of the project. Necessary licensing document shall be submitted & also license shall be perpetual & provided in the name of NMPA, Mangalore.	
9	Power Supply	Minimum 1600watts Dual Redundant Power Supply	
10	Optical Drive	DVD +/-RW Internal	
11	Keyboards and Mouse	USB type	
12	USB port	Minimum 4 Nos USB ports	
13	Form Factor	Rack Type	
14	Expandable	RAM & HDD upgradable	
14	Additional Features	Configuration upgrades should only with Cryptographically signed firmware, Secure Boot, Secure Erase etc.	
15	Warranty	5 Years warranty with 24x7 Support	

1. NTP SERVER

NTP Server			
Sl.No.	Parameter	Specification	
1.1	Inputs	GNSS (GPS, GLONASS, Galileo & Beidou)	
1.2	Outputs	NTP, PPS, 10MHz	
1.3	Ethernet Ports	1x Mgmt RJ45 1x 1G SFP 1x 1G RJ45	
1.4	GNSS Antenna	SMA	
1.5	Protocols	NTP, SNTP, IPv4, IPv6, Telnet, SFTP, SSH, RADIUS, TACACS+, SNMP, DAYTIME, TIME	
1.6	Network Management	SNMPv2, HTTPS, CLI	
1.7	User Interfaces CLI	Monitoring and Management	
1.8	Web UI	Monitoring and Management	
1.9	Time of day accuracy	15ns (1-sigma) from UTC	
1.1	Frequency accuracy	1.16×10^{-12} (one day ave.)	
1.11	Holdover	$<1 \times 10^{-10}$ /24hrs	
1.12	Time accuracy Tracking to PRC	<15ns (locked)	
1.13	Holdover	< ±1.5µs/4hrs (7 days locked)	
1.14	NTPv4 Stratum-1 server configuration	2500 tps	
1.15	Surveyed accuracy	3m Horizontal, <5m Vertical	
1.16	Size Dimensions in cm (L x W x H)	20.8 x 20 x 4.4 (19" half-rack x 1U)	
1.17	Weight	< 3Kg (6 lb)	
1.18	DC Power, dual feed	-36VDC to -72VDC	
1.19	AC Power	110V / 220 V (adapter incl.)	
1.2	Current consumption	330mA (max)	
1.21	Power consumption	5W average, 10W maximum	
1.22	Operating Conditions	-40°C to +85°C	

	Temperature		
1.23	Humidity	5%-95% RH non-condensing (+60°C)	
1.24	Safety & Environmental	UL / CSA 60950-1 EN: 60950-1, 300019 CE, CISPR22 class A GR-63; Level 3 ETSI (EN55022/EN55024) EN 300019, Class T3.2	
1.25	Electrical	EMC, ESD Immunity & susceptibility FCC Part 15 Class B / ICES 003 Class-B Korea KN32 / KN35 Class A	
1.26	EN	301 489-1, EN 301 489-19 EN 303 413	
1.27	IEEE	1613-1	
1.28	Telcordia	GR-1089	
1.29	Product Compliant with directive	2014/53/EU (RED Directive) 2011/65/EU (RoHS2 Directive) 2012/19/EU (WEEE Directive)	

2. Storage SYTEM & ACCESSORIES

STORAGE SYSTEM			
Sl No	Parameter	Functionality	
1	Operating System & Clustering Support	1. The storage array should support industry-leading Operating System platforms including: Windows 2016 / 2019 / 2022, VMware and Linux. 2. Offered Storage Shall support all above operating systems in Clustering.	
2	Capacity	1. The Storage Array shall be offered with 2PB usable capacity with dual drive failure protection.	
3	Front-end Ports & Back-end Ports	1. Offered Storage system shall be supplied with 4 *16Gbps FC ports per controller 2. Offered storage system shall support 12G SAS Back-end connectivity.	
4	Architecture	The storage array should support dual, redundant, hot-pluggable, active-active array controllers for high performance and reliability	
5	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.	
6	Disk Drive Support	1. Storage system shall support Enterprise SAS spinning drives, SSD and near line SAS / 7.2K RPM drives. 2. Offered storage array shall also have support for FIPS 140-2 validating self-encrypted drives.	

7	Cache	1. Offred Storage Array shall be given with Minimum of 12GB cache per controller in a single unit. 2. Cache shall be backed up in case of power failure for indefinite time either using batteries or capacitors or any other equivalent technology. 3. Offered Storage shall also have optional support for Flash cache using SSD / Flash drives.	
8	Raid Support	1. Offered Storage Subsystem shall support Raid 1 , 10, 5 and Raid 6 2. All Raid Sets shall support thin provisioning. Vendor shall offer the license of thin provisioning for complete supported capacity of the array. 3. Raid processing shall be offloaded to a dedicated ASIC instead of CPU. In case vendor is not supporting it then vendor shall ensure that additional 12GB cache per controller is configured to offset the raid processing workload.	
9	Point in time and clone copy	1. Offered Storage array shall be configured with array-based Snapshot and clone functionality and shall be configured for minimum of 512 snapshot licenses. 2. Offered Storage array shall support at-least 512 points in time copies (Snapshots) and 128 volume / Clone copies	
10	Replication	1. Offered storage subsystem shall support storage-based replication to DR location. License for maximum supported capacity of the array shall be offered. 2. Offered storage subsystem shall support replication to multiple storage array of the same family in fan-out mode. At least 1:4 mode shall be supported.	
12	Data Tiering	Offered Storage shall also be configured for Sub-Lun Data tiering in real time fashion across different type of drives within a given pool like SSD, SAS, NL-SAS etc. License shall be configured for maximum supported capacity of the array.	
13	Global and dedicated Hot Spare	1. Offered Storage Array shall support Global hot Spare for offered Disk drives. 2. At least 1 Global hot spare drive shall be configured for every 30 drives. 3. Offered storage array shall have the support for distributed hot spare	
14	Logical Volume & Performance	1. Storage Subsystem shall support minimum of 512 Logical Units. Storage Array shall also support creation of more than 120TB volume at controller level. 2. Offered Storage shall have inbuilt performance	

		management software. Configuration Dashboard shall show overall IOPS and MB/sec performance.	
15	Load Balancing & Muti-path	Multi-path and load balancing software shall be provided, if vendor does not support MPIO functionality of Operating system.	
16	SAN switch	Dual SAN switches each san switch configured with 24 x 16Gbps FC ports, 24 x 15M LC-LC cables, 24 x 5M LC-LC cables	
17	support	5YR 24 x 7 support	

8.   VIDEO ANALYTICS APPLICATION

SL NO	Video Analytics Specifications	
	Technical Specifications	
	GENERAL/VIDEO ANALYTIC PLATFORM	
1	The Platform should be single Video Analytics Platform/Engine which will have different Video Analytics modules like PPE, Advance Intrusion, FRS, ANPR, Person Tracking, Scene Change, People Count, Object Search video analytics on the same platform.	
2	The platform should be Server based with compute or Video Analyticsengine using GPU (Preferred NVidia GPU CARDS or better).	
3	The Application should use LINUX/UBUNTU/RED HAT OS as performance and accuracy is better.	
4	The Planform should be easy to install (PLUG AND PLAY) system.	
5	The platform should have alert options like HTTP, Integration to Various VMS's. The Platform should seamlessly connect to 3rd Party Applications(Software) through HTTP and 3rd Party Hardware through Webrelay/Controller which will convert the Digital Input (HTTP) to Dry Contact (NO/NC/C).	
6	Other functions like Camera Health Monitoring, GOOGLE MAP/FLOOR PLANIntegration (Using Lat-Long Coordinates) to view exact location of Alert.	
7	Platform should have Mobile Application (IOS/Android) to View the alerts on Mobile Phone.	
8	The platform should have different options to connect to the camera (RTSPStream, Connection through VMS, Connection through NVR's).	
9	THE PLATFORM SHOULD HAVE FUNCTIONS LIKE OBJECT TRACKING/ PEOPLE TRACKING etc.	

10	API's for Integration to any 3rd Party application should be readily available and shared when required	
11	Forensic Search/Object Search should be a default Video Analytics withAccuracies of over 95% and should be PLUG and PLAY.	
12	Over 40 different types of Objects which includes HUMAN ATTRIBUTES likeColour of cloths, Face Detection, Vehicles (Types of Vehicles, colour of	
	Vehicles etc), Animals and Different Objects (30 + Objects) Should beavailable.	
13	In case Object is not available then the training / adding the object should be possible	
14	Integrated to major VMS like Milestone, Genetec, Digifort, Nx optix, Qognify etc	
15	User Management: A complete user management configuration to beprovided, system should have capability to provide access to camera through user management	
16	System to be highly scalable and single dashboard integration should be possible	
17	Should have the feature of Remote health monitoring of the cameras as in-built feature.	
18	Object/People Cross Camera Tracking Functionality	
19	Local or remote processing of video analytics	
20	Should be able to connect to multiple external devices and video streams	
21	Platform should have capability to do forensic search and also track people , vehicle and animal by color of the dress or color	
22	System should save all meta data of objects like people, vehicle, anaimalinfor 2 months, in case of failure of storage or vms, the meta data should be able to give a clear images of the incident in forensic search	
23	Integration to VMS : System should be integrated with Existing VMS and allalerts are to be pushed to Existing VMS	
24	System should provide N+1 redundancy, Software license to redundant, in the event of outage, camera stream of failure server can be assigned to redundant server	
25	Flexibility to host on cloud and on-premises	
	DASHBOARD :	
1	Customized dashboard, system should be capable to provide multipledashboard option and can be easily customized at no	

	cost	
2	Dashboard should have All the alerts count displayed on charts , it should display alert for Camera Abnormality , object counting , face recognition count, object count , vehicle count , people count and other data generated by analytics should be customized in dashboard	
3	Dashboard to be part of analytics server as a single application	
	COUNTING APPLICATION	
1	Counting application can count People, in, out and occupancy	
2	Counting application can count Vehicle, vehicle in, vehicle out, vehicle occupancy	
3	Counting application can also alert if people or vehicle or animal moving in wrong direction	
4	Counting application has capability to give a consolidated count and occupancy of multiple cameras in both dashboard and xls export	
5	Counting application can also provide people and vehicle dwell time	
	AUTOMATED NUMBER PLATE RECOGNITION (ANPR)	
1	The ANPR System shall be able to capture image of driver of vehicle along with number plate of vehicle	
2	The system should suitable to capture number plate of any type of vehicle	
3	ANPR should be able to detect vehicle number plates of 2 wheeler, 4 wheeler , bus, truck and other vehicles. The detection of 4-wheeler shouldbe more than 90% and 2 wheeler should be more than 80% accuracy. The same should be demonstrated in day and night times to the customer. It should be able to identify the vehicle type, colour of the vehicle. ANPR system should provide option to integrate to boom barrier if required. Should be able to read English number plates.	
4	The ANPR Application shall allow the user to Protect a Read or Hit from deletion for a configurable period of time.	
5	The ANPR Application shall allow the user to correct a Plate Read manually.	
6	The ANPR Application shall present the user with a Simple Wizard for Hotlist creation.	
7	The ANPR Application shall allow the user to create a Hotlist without theneed for any attribute information other than license plate number.	
8	The ANPR Application shall allow the user to search the configured hotlists for any data in any of the specified fields.	
9	The ANPR Application shall allow the user to generate a read reportspecifically targeted to those reads that generated a	

	hit.	
10	The ANPR Application shall allow for map-based viewing of real-time read monitoring. This feature should be made available with integration with the Video Intelligence Application.	
11	The ANPR Application shall allow the user to search for full or partial license plate numbers.	
12	The ANPR Application shall allow the user to search for a license plate by using wildcards.	
13	Shall have an option to search vehicles by	
	a) Vehicle colour	
	b) Vehicle colour +license plate	
	c) Vehicles make and type	
	d) Date & time	
	e) Location	
	f) Type of Vehicle	
14	The system should be able to detect if there is any vehicle in the camera view without a properly installed number plate or no number plate at all.	
15	The system should have capability to let the user search for all such vehicle through a UI based filtering system	
16	The user should be able to search and track any such vehicle using variousvehicle search criteria as mentioned in the point above.	
	PERIMETER INTRUSION	
1	Support multiple ROIs of any shape for different types of objects in the same frame	
2	Support different sensitivity levels to balance between detection speed and detection certainty	
3	High performance in daytime, nighttime, indoors and outdoors	
4	Decrease false alarms by orders of magnitude	
5	Support intrusion detection based on object type, colors, quantities, and time frame	

6	Advance Intrusion System Video Analytics should be PLUG AND PLAY withAccuracies of more than 95% (With Camera installation as per recommendation from Video Analytics OEM and Global Best Practises).	
7	The Intrusion System should be able to identify different objects like PEOPLE, ANIMAL, VEHICLES, CELL PHONE etc.	
8	The Intrusion System should allow to create multiple 3D ROI's (Region of Interest) and user defined Intrusion parameters like Intrusion of People, Intrusion of Vehicle etc. Advance Intrusion System which should include crowd detection, trip wire, Object Search, Intrusion Scheduling, Different types of Intrusion like Animal, Person, Vehicle and Objects (Remarks -Bike Entry, Man Movement, Face Detection)	
9	Intrusion System has to detect the presence of unauthorized people, animalor objects which are training with more than 98% accuracy	
10	AI detects intruders in any specified Region of Interest (ROI)—even in low- light conditions	
11	System to sends real-time alerts that include when the subject entered theROI and a map of the specific location of the object based on the camera's location. When target objects change location, system should tracks the object on the map based on changed location data	
12	Filters images to identify only human faces and specified objects	
13	Maps objects/persons of interest and provides real-time tracking based on time and location	
14	Provides immediate alerts when change is detected and parameters are met	
	VIDEO SEARCH/OBJECT SEARCH	
1	Forensic Search/Object Search should be a default Video Analytics withAccuracies of over 95% and should be PLUG and PLAY.	
2	This Analytics should be available with the single Video Analytics Platform.Digital Zoom, Alert Management should be available.	
3	Over 40 different types of Objects which includes HUMAN ATTRIBUTES likeColour of cloths, Face Detection, Vehicles (Types of Vehicles, colour of Vehicles etc), Animals and Different Objects (30 + Objects) Should be available.	
4	In case Object is not available then the training / adding the object should be possible	
5	Obtain instant search result in videos in less than 1 second	
6	Thumbnail search result view on map and export to Excel file	

7	Seamless integration of video analytics module as video analytics is not a separate software application. No manual synchronization and maintenance is needed	
8	Flexible architecture to quickly support customized Video Analytics Feature	
9	Capability to filter large amounts of video and support display of time line, Customizable Site Map,	
10	Detect Crowd and give alert if the crowd is able a set threshold	
	FACE RECOGNITION APPLICATION & FACE SEARCH	
1	The facial recognition system shall be enabled at cameras identified by the purchaser. These cameras identified shall be installed at critical locations as identified by purchaser.	
2	Face Recognition System (FRS) shall be designed for identifying or verifying aperson from various kinds of photo inputs from digital image file to video source as well as identify age and gender from visible faces. Subsequently, this data can be used for further analytics.	
3	The system shall use the Artificial Intelligence based Deep learning mechanism for detection, search and recognition solution that uses a storeddatabase of faces to detect, recognize and record people's faces that appear in a camera's field of view for facial recognition.	
4	The system should not only generate results with maximum possible accuracy but should also be able to detect and identify objects of interestlike weapons (gun and Rifle), vehicles (based on type and color). The system should be able to search, analyze and correlate occurrences of objects of interest in multiple camera streams. The system should also beable to generate alerts based on business rules (severity, time, location)	
5	The System should have a open architecture and API to integrate to other platform	
6	As soon as a match is found, the system should be able to identify the source of the matched image	
7	Capability to provide a map view of cameras and alert	
8	Capture face images from CCTV feed and generate alerts if a blacklist match is found.	
9	Search photographs from the database matching suspect features.	
10	Match suspected criminal face from pre-recorded video feeds obtainedfrom CCTVs deployed in various critical identified locations, or with the video feeds received from private or other public organization's video feeds.	

11	Enable Handheld mobile with app to capture a face on the field and get thematching result from the backend server.	
12	The facial recognition system should be able to accept pre-recorded videosfor processing. Users should be able to process offline videos available with them for matches against suspect databases.	
13	Should detect all faces in the video feed	
14	Gender Identification and Age Identification	
15	The facial recognition system should be able to integrate with IP Video Cameras as required in the solution and shall be able to identify multiple persons of interest in real-time, through leading-edge face recognition technology. The system shall be able to recognize subjects appearing simultaneously in multiple live video streams retrieved from IP surveillance cameras.	
16	The user interface of the facial recognition system should have a reportmanagement tool without installation of any additional client software.	
17	The system must be accessible & operable from a web-based interface compatible with all leading browsers. Owing to its web-based interface thefacial recognition system should be accessible from virtually unlimited concurrent clients at any given time.	
18	The algorithm for facial recognition or the forensic tool should be able to recognize partial faces with varying angles.	
19	The system should be able to detect multiple faces from live single video feed	
20	Face detection algorithms, modes and search depths should be suitable fordifferent environments such as fast detection, high accuracy etc. The FRS system shall use of GPU technology instead of Traditional CPUs, to greatly improve the computational performance in crowded environments.	
21	The system should be able to identify and authenticate based on individual facial features	
22	The system should be compatible with the video management system being proposed by the system integrator	
23	User management should be in build and should be able to give access to only few sets of people	
24	Alert Mechanism, system should be able to send alerts through email, mobile	
25	Track person from one camera to others and display in a map view	
26	System should have a android and ios app	
	VEHICLE COUNTING	
1	System should have capability to count and classify vehicle	

2	System should have all history data to show count of vehicle by classification, by daily, monthly, yearly	
3	System should have capability to provide count for combination of cameras	
4	System should have capability to trigger Realtime alert	
5	System should have capability to provide Realtime alert for vehicle movingin wrong direction, vehicle parked in non-parking area	
6	system should have capability to show the detection alert in a map view on a live map	
7	System should have capability to show count in both direction	
8	System should have capability to draw n number of line for counting in a single camera view	
9	System should have capability to send http alert , via email , mobile app	
	PEOPLE COUNTING	
1	System should have capability to count and provide occupancy	
2	System should have all history data to show count of people by hourly, daily, monthly, yearly	
3	System should have capability to provide count for combination of cameras,	
4	System should have capability to trigger Realtime alert	
5	System should have capability to track people	
6	System should have capability to provide Realtime alert for people moving in wrong direction	
7	System should have capability to detect loitering in a region and send alert	
8	system should have capability to show the detection alert in a map view on a live map	
9	System should have capability to show count in both direction	
10	System should have capability to draw n number of line for counting in a single camera view	
11	System should have capability to send http alert, via email , mobile app	

9. WORKSTATIONS ANALYTICS

		CLIENT WORKSTATION	
SL. No	Parameter	Technical Specification	
1	Processor	Minimum i9 Processor ,19.25M Cache, 3.70 GHz ,12th Gen processor or higher	
2	RAM	32 GB or more	
3	Internal storage	512GB NVMe Hard Disk,2TB SSD	
4	Network Interface	1x10/100/1000 Mbps	
5	Graphics	16 GB Graphic Card or better	
6	Operating System	Microsoft Windows 10 / latest (64 bit) License Copy would be in the name of NMPA	
7	Optical Drive	DVD +/-RW Internal	
8	Keyboards and Mouse	USB type	
9	USB port	Minimum 4 Nos USB ports	
10	Form Factor	Tower type	
11	Expandable	RAM & HDD upgradable	

10. WIRELESS RADIO'S

		WIRELESS RADIO- POINT-TO-POINT SPECIFICATION	
Sl. No.	Features	Description	
1	Frequency Band Support	Radio System should operate in India ISM Band (5 GHz)unlicensed frequency band as per WPC Regulation Notification No. G.S.R.1048[E]	
2	LOS, nLOS operation	Radio Must support LOS, nLOS condition with iOFDM	
3	Throughput	System should support more than 1 Gbps aggregate throughput	
4	Channel Bandwidth	Radio must support 20 MHz / 40 / 80 MHz	
5	Spectral Efficiency	Should support more than 8 bps/Hz	
6	Channel Selection	Fixed frequency support and Automatic Channel Selection without affecting the active traffic	
		Continual Self-optimization to avoid interference	
7		Should support up to 26 dBm or better, can vary with modulation and settings	

	Max Output Power at Antenna port		
8	Modulation	OFDM, MIMO supported with QPSK, 16-QAM, 64-QAM, 256 QAM / MCS 0 TO MCS 9 with Forward Error Correction (FEC)	
9	Duplex Scheme	Time Division Duplex (TDD)	
10	Receiver Sensitivity	-90 dBm	
11	Distance Coverage	Support up to 50 Kms	
12	VLAN Support	VLAN support based on IEEE 802.1Q	
13	Security	FIPS 197 compliant AES 128-bit Encryption	
		Identity-Based user account	
		Configurable password rules	
		User Authentication and Radius Support	
14	Bandwidth	System should be able to configure symmetric & asymmetric bandwidth.Upload and download percentage should be user configrable.	
15	MIMO	Physical Layer 2x2 MIMO	
16	Interfaces	Should have 1 Gigabit Ethernet and 1 SFP port	
17	IPv6 support	System must support IPv6/IPv4 Dual stack support	
18	Spectrum analyzer mode	Built in Online Spectrum analyzer. Running spectrum should not affect the link performance	
19	Support for Dynamic Channel Selection	System should support Dynamic Channel Selection to deliver the hitless performance. There must not be any outage in case of switching frequency channel	
20	Deployment tools	Built-in e-alignment using GUI on Radio to assist in installation	
21	Management	IPv6/IPv4 dual-stack management support SNMPv2 and SNMPv3, HTTPS	
22	Quality of Service	Should support as per 802.1p / DiffServ	
23	ARQ	System should have the support of ARQ	
24	Ethernet Latency	Latency should be below 20ms	
25	Antenna Type	Radio must have Integrated antenna of at least 22dBi gain to avoid RF Cable/connector issues increasing the downtime	
26	GPS synchronization	System should support GPS synchronization technique to eliminate mutual interference	

27	Wind survival	Minimum 200 km/h	
28	Protection	IP66 and IP67	
29	Certificates	FCC Part 15E ; RSS 247 Issue 2; EN 302 502; EN 301 893	
		Safety: UL60950-1/22; IEC60950-1/22; EN60950-1.22; CSA-C22.2 No. 60950-1/22	
		EMC: US Part 15B, Canada RSS-GEN, Europe – EN 301 489-1 and -17	

WIRELESS RADIO- POINT-TO-MULTIPOINT BASE STATION RADIO SPECIFICATION			
SL. No.	Features	Description	
1	Frequency	Radio System should operate in India ISM Band (5 GHz) unlicensed frequency band as per WPC Regulation Notification No. G.S.R.1048[E]	
2	LOS, nLOS operation	Should support *Line of sight* / near *Line of sight*	
3	Channel Bandwidth	20 MHz, 40 MHz & 80 MHz	
4	Channel spacing	Should be 5 MHz or better	
5	Max Output Power at Antenna port	Should support 27 dBm or better; user configurable in 1 dBm steps	
6	Modulation	OFDM, MIMO supported with BPSK, QPSK, 16-QAM, 64-QAM, 256 QAM with Forward Error Correction (FEC)	
		Should support automatic adaptive modulation	
7	Architecture	Base Station: 90º / 120º Dual polarized sectoral antenna	
		Single CAT5e / CAT6 Cable between IDU & ODU	
8	Distance Coverage	Product should be capable of providing communication to minimum 15 KMs	
9	CPE supported per Base station	Should support at least 60 CPEs	
10	Transmit Power	Should support Automatic Transmit Power Control (ATPC) by Base Station	
11	Bandwidth restriction	Should support the MIR/CIR configuration to ensure SLA	
12	Ethernet Latency	Should be less than 20 ms	
13	DHCP	Should support DHCP client	
14	Protocol Filtering	System should support the protocol filtering based on interface	
15	Broadcast Rate Limit	System must be able to limit broadcast rate	
16	Link Test Utility	Should support the inbuilt link test utility to calculate the throughout and efficiency of link	

17	Security	Should support 128-bit AES encryption	
		Should support Layer 2 firewall to allow/deny based on VLAN, Ethertype, Source and Destination MAC address in wireless/Ethernet port	
		Should support Layer 3 firewall to allow/deny based on IP address, Network and DSCP/TOS.	
		System should have option to use RADIUS authentication for better security and protection from intruder	
18	Throughput	Should provide more than 500 Mbps aggregate Ethernet throughput	
19	Spectral Efficiency	Minimum 7 bits/Hz or better	
20	Bandwidth allocation	System should be able to configure symmetric & asymmetric bandwidth	
21	Interference mitigation via GPS Synchronizatio n	System should support GPS synchronization technique to eliminate interference in collocated scenario	
22	Interfaces	Should support 100/1000Base(T) Full Duplex, rate auto negotiated, 802.3at compliant	
23	Management	System should have support of protocols: IPv4/ IPV6, UDP, TCP, IP, ICMP, SSH, SNMPv2c, HTTPs, , IGMP Snooping, LLDP, DHCP, RADIUS, NTP	
		System should have support of Network Management with HTTPs, SSH, SNMPv2c	
24	VLAN	System should have the support of VLAN based on IEEE 802.1Q with 802.1p priority	
25	Priority Management	System should provide option to define priority for management and data traffic	
26	QoS	Should support at least 3 queues or better with packet classification by DSCP, COS, VLAN ID, IP & MAC address, Broadcast, Multicast and CPE Priority	
27	Error Correction	Forward Error Correction coding and ARQ should be supported	
28	Performance Statistics	System should provide detailed statistics of Wireless and LAN Interface	
		System should have the option of uploading syslog data to Syslog Server	
29	Tools	Should support Spectrum scanner / monitor to analyze the interference	
		Should have inbuilt tools like Ping, Traceroute to get help in troubleshooting	
30	Power Consumpti	Should not exceed 15 W	

	on		
31	Surge Suppression	Should have inbuilt surge protection	
32	Enclosure	IP67 or better	
33	WPC Approval	System must be approved from WPC - ETA certificate to besubmitted	
34	Certification	FCC CFR 47 Part 15 Class B	
		IC RSS-210 Issue 8, Annex 8 (or latest)IC RSS247 Issue 1 (May 2015)	
		ETSI EN302 502 v2.1.1ETSI EN301 893 v2.1.1	
		EMC: EN 301 489-1	
		Safety: International CB certified and certified to IEC 60950-1:2005 (modified) plus EN60950-1:2006 + A1:2010	

Sl. No.	Features	Description	
top	WIRELESS RADIO- POINT TO MULTIPOINT SUBSCRIBER RADIO SPECIFICATION		
1	Frequency	Frequency supported should be according to unlicensed frequency band approved by WPC in 5 GHz	
2	NLOS, nLOS operation	Should support *Line of sight / near Line of sight*	
3	Channel Bandwidth	5 MHz, 10 MHz, 20 MHz, 40 MHz & 80 MHz	
4	Channel spacing	Should be 5 MHz or better	
5	Max Output Power at Antenna port	Should support 27 dBm or better; user configurable in 1 dBm steps	
6	Modulation	OFDM, MIMO supported with BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM with Forward Error Correction (FEC)	
		Should support automatic adaptive modulation	
7	Architecture	Should support 19 dBi Integrated antenna	
		Single CAT5e / CAT6 Cable between IDU & ODU	
8	Distance Coverage	Product should be capable of providing communication minimum 5 KMs	
9	Transmit Power	Should support Automatic Transmit Power Control (ATPC) by Master Radio	
10	Bandwidth restriction	Should support the MIR/CIR configuration to ensure SLA	
11	Ethernet Latency	Should be less than 20 ms	
12	DHCP	Should be able to serve as DHCP Server and DHCP client	
13	Protocol Filtering	System should support the protocol filtering based on interface	
14	Broadcast Rate Limit	System must be able to limit broadcast rate	
15	Link Test Utility	Should support the inbuilt link test utility to calculate the throughout and efficiency of link	
16	Security	Should support 128 bit AES encryption	
17	Throughput	Should provide over 500 Mbps aggregate Ethernet throughput	
18	Spectral Efficiency	Minimum 7 bits/Hz or better	
19	Bandwidth allocation	System should be able to configure symmetric & asymmetric bandwidth	
20	Interfaces	Should support 100/1000Base(T) Full Duplex, rate auto negotiated	
		System should have support of protocols: IPv4/IPv6, UDP, TCP, ICMP, SSH, SNMPv2c, HTTPs, STP, IGMP,	

21	Management	LLDP, DHCP, RADIUS, NTP	
		System should have support of Network Management withIPv4/IPv6, HTTP, HTTPs, SSH, SNMPv2c, SysLog	
22	VLAN	System should have the support of VLAN based on IEEE 802.1Qwith 802.1p priority	
23	Priority Management	System should provide option to define priority for management and data traffic	
24	QoS	Should support at least 3 queues or better with packetclassification	
25	Error Correction	Forward Error Correction coding and ARQ should be supported	
26	Performance Statistics	System should provide detailed statistics of Wireless and LANInterface	
		System should have the option of uploading syslog data to SyslogServer	
27	Tools	Should support Spectrum scanner / monitor to analyze theinterference without disturbing the active traffic	
		Should have inbuilt tools like Ping,Traceroute to get help introubleshooting	
28	Power Consumption	Should not exceed 12W	
29	Surge Suppression	Should have inbuilt surge protection	
30	Enclosure	IP67 or better	
31	WPC Approval	System must be approved from WPC - ETA certificate to besubmitted	
32	Certification	FCC / IC / CE / BIS	
		FCC Part 15 Class B	
		IC RSS-210 Issue 8, Annex 8 (or latest)IC RSS247 Issue 1 (May 2015)	
		ETSI EN302 502 v2.1.1ETSI EN301 893 v2.1.1	

11. MAST'S

	9 MTRS GALVANIZED TUBULAR GI POLE		
SL. No	Technical Specification		
1	LENGTH: 9Mtr, Galvanization thickness: 90 Micron. The Poles should be erected with proper civil works i.e., concrete foundation base of suitable depth below the ground level.		
2	The pole and its construction can withstand wind speeds up to 150 km/h. The projected pipe should withstand at least 10 Kg of weight at top of the pole.		
3	Suitable nuts, bolts, clamps for camera fixing should be provided		
4	The Poles shall be in single section, there shall not be any circumferential weld joint.		
5	The poles shall be hot dip galvanized as per IS2629		
6	The Poles shall be bolted on a foundation with a set of four foundation bolts for greater rigidity.		
7	The galvanized mounting bracket shall be supplied along with the Poles for installation of the surveillance cameras		
8	The bracket shall have one coat of anticorrosion paint before dispatch to site and two coats of approved make and shade of enamel paint.		
9	Suitable openings for running the PoE Cable, earthing wire within the Pole should be available. No cables of camera should be projected outside after installation of cameras.		
10	EARTHING: Pipe Earthing should be provided.		
	ENCLOSURE		

11	9U IP55 Weatherproof Floor Standing Outdoor Cabinet With 2 FAN Filter , Power Distribution through 6 Socket of each 5 AMP, 1 x cantilever Shelf, 2xadjustable Fix Shelf Compatible With Rack Depth, Fresh Air Filter With Louvers Outside, 2 IP Rated Cam Lock & 1 Swing Lock , Pad Lock provision, Galvanized Steel Structure 1.2mm With Polyester UV Protected Powder Coating, Adjustable Mounting Channels 1.5mm thick, 3 Pair Depth Channel Directly welded On rack Body, Integrated Slop type Canopy On Top With lifting hook/eyebolt , Cabel Entry Through PG 29 Glands x 8, EPDM Gasket on Rack Opening, IEC 60529 IP55 Certified With From NABL Accredited Lab, Quality Confirms to ISO 9001:2015, ISO 14001:2015, IEC 62321:2013 RoHS Test Report as perdirective 2011/65/EU.	
12	CERTIFICATION: Lab Certified By NABL Accredited Laboratory-STQC , Quality Confirms to ISO 9001:2015, ISO 14001:2015	

12. TOWER'S

35 MTRS TOWER			
SL. No	Parameter	Technical Specification	
1	Tower Type	Triangular Hot Dip Galvanized (HDG)	
2	Height	35 Meters	
3	Base Plate	Required	
4	Extension Arms	For Mounting Antenna & Radio Modem.	
5	Lighting Arrestors	Required	
6	Grounding Earth & etc	Required	
7	Foundation	Civil Work with excavation for Foundation with necessary Concreting & erecting of Tower.	
8	Tower Drawing	Tower required to site condition to be designed andDetail Diagram has to be submitted as per site requirement for approval from the NMPT before commencement of work (For reference tower general arrangement drawing is enclosed)	
9	Tower Erection	As per the site location provided and towers base foundation to be designed to sustain wind speed of minimum 200 KMPH.	
	ENCLOSURE		
10	TYPE	15 U Outdoor Floor+Pad Mount Free Standing	
11	Cabinet	IP55 Network Cabinet with 600mm Depth	
12	Accessories	4 FAN , 1 Cable manager, 2adjustable Stationary Shelf For UPS/Inverter , 1 Hardware	

13	PDU's	2 x PDU 6 Socket 5 AMP With On/off switch and Fuse	
14	ENCLOSUR E FEATURES	Galvanized Steel Cabinet With Powder Coating , Canopy On Top With backside Slop & 50mm Extra Coverage For all round Corner ,Cable Entry Gland PGPG 29 x 5 ,Front Door With IP Gasket ting For Prevention of water & Dust ,Fan Mounted On Top Cover With Ventilation , IP55 Certifications, ,Galvanized Steel 1.2mm Thick Body Structure	

13. CABLES

POWER CABLE		
SL .N o	Technical Specification	
1	3 core, 2.5sq mm copper conductor, PVC insulated, armoured, cable conforming to IS:5831(Part-I) with FRLS PVC outer sheath. The cable shall have marking of length at each meter. The cables shall have identification tags of connections at each end and such details shall be submitted along with documentation.	

CAT6A F/UTP Cable			
Sl.No .	Parameters	Requirement	
1	Type	Category 6A Shielded Twisted Pair 4 pair cable shall be compliant with ANSI/ TIA/ EIA- 568- 2- D Additional Transmission Performance Specifications for 4-pair Category 6A Cabling IEEE 802.3bt PoE Applications.Certificates for the same has to be submitted.	
	a)	Category 6A FUTP cables shall extend between the work area location and itsassociated telecommunications closet and consist of 4 pair, 23 AWG, UTP.	
	b)	Supports ultrahigh speed data networks such as 10 BASE-T, 100BASE-T, 1000BASE-TX and 10G BASE-T (Gigabit	
		Ethernet) and beyond.	

2	Jacket:	Jacket LSZH and Should comply to LSZH332.1, IEC 60754-2 and IEC 61034-2.		
3		Incorporates central spine (HDPE) maintaining pair separation during installation to ensure premium performance after installation.		
4	Mechanical Characteristics	Construction: 4 twisted pairs separated by internal X shaped, 4 channels, polymer spine / full separator (HDPE).		
		Conductor Solid Copper		
		Conductor Diameter 0.56±0.005mm(23 AWG)		
		Insulation: Polyolefin/polyethylene		
		Operation Temperature range -20°C to75°C		
5	Electrical Characteristics	DC Resistance: 9.38Ohm/100m		
		DC Resistance Unbalance: Less than 5%		
		Capacitance Unbalance: 330PF/100m		
		Mutual Capacitance: 5.6nF/100m		
		Delay Skew: 536ns/100m		
		Worse Case Cable skew: 45ns/100m		
		Impedance: 100 Ohm +/- 15		
		NVP: 69%		
		Dielectric Strength: 1.5KV AC / 2.5KV DC		
6	Shield	Al Mylar Foil		
7	Nominal Outside Diameter	6.60 ± 0.30mm		
8	Packing	305mtr Roll in wooden reel		
9	Marking	Sequential marking at every one meter		
10	Colour	Grey		
11	ROHS/ELV	Compliant		

OFC CABLE				
12 Fiber outdoor armoured SM cable, OS2				
SL.No.	Parameter	Requirement		

1	Cable Type	12 fiber Single Mode, Armoured, Loose- tube, Gel filled cable complying to ISO/IEC11801-1, EN50173,ANSI/TIA 568-D.3; ITU G.652D; TIA492CAAC suitable for use inoutdoor ducts and backbone cabling. Certificates for the same has to be submitted		
2	Fiber Type	Single Mode, 9/125 micron, UV curable Acrylate coated above the cladded fiber, OS2 (IEC 60793 and ITU T G652.D)		
3	Armor	Electrolytic chrome-coated steel TapeArmor of min. 0.15 mm thickness		
4	Cable Construction Type	Telcordia GR 20, IEC 60794-1- 2E1, E2, E3,E4, E6, E7, E11, F1 and F5		
5	Fiber identification	Each fiber strand must be color coded in thesequence as per TIA 598-C standard:		
		Blue, Orange, Green, Brown, Slate, White, Red, Black, Yellow, Violet, Pink and Natural.		
6	Attenuation	@ 1310nm <=0.35 db/Km MAX		
		@1550nm <=0.21 db/Km MAX		
7	Loose tube material	Single PBTP Loose tube filled with water blocking Thixotropic gel		
8	Loose tube diameter (Nominal)	2.5 ± 0.10 mm		
9	Jacket material	High Density Poly Ethylene outer jacket		
10	Water Blocking Material	Water Swellable Peripheral Tape/Glass yarn		
11	Tensile Strength	600 N or better		
12	Crush Resistance	1000 N or better		
13	Cable Diameter	7.5 + - 0.5 mm		
14	Min Bend Radius – Installation (mm)	200 or better		

SL.No				
15	Min Bend Radius – Service (mm)	160 or better		
16	Cable weight Kg/Km	100 – 110		
17	Test Reports	OEM factory test reports must be provided against each drum / roll of fiber cable.		

14. RACKS

42U RACK		
SL.No	**Technical Specification**	
1	Supply and installation of 19" Rack, 42U with Accessories	
2	Racks manufactured out of steel sheet punched, formed, welded and Powdercoated	
3	Rack should be from ISO 9001 & 14001 Certified Company & UL Listed	
4	Standard for Racks configuration will be welded frame with side panel and vented top cover / CKD type	
5	Rack should have Front Glass/ Convex Perforated Door and Dual Perforated door at Rear.	
6	Rack vertical frame should be made of 7 fold profile of CRCA material to withstand the load bearing capacity of 10K Newton	
7	Rack should have 2 no's of removable side panel with slam latch.	
8	Rack should have provision to mount racks on Floor	

9	Rack should be 42U (1U = 44.45 mm) in Height.	
10	It should be 800MM Wide,1000MM Deep and Overall height 2100mm.	
11	Rack should Conforms to DIN 41494 or Equivalent EIA /ISO / EN Standard	
12	Rack should have Adjustable mounting depth,	
13	Rack 4 No Adjustable, 19" verticals with Punched 9mm Square Hole and Universal	
14	Rack should have Numbered U positions,	
15	Rack should have 100% assured compatibility with all equipment's conforming to DIN 41494 (General industrial standard for equipment's)	
16	Powder coated finish with seven Tanks pre-treatment process meeting IS	
17	Rack should have Proper Grounding & Bonding	
18	Rack should have Fan module Mount Provision on top Cover	

27U RACK		
SL. No	Parameter	
1	Supply and installation of 19" Rack, 27U with Accessories	
2	Racks manufactured out of steel sheet punched, formed, welded and Powdercoated	
3	Rack should be from ISO 9001 & 14001Certified Company & UL Listed	
4	Standard for Racks configuration will be welded frame with side panel and ventedtop cover / CKD type	
5	Rack should have Front Glass/ Convex Perforated Door and Dual Perforated doorat Rear.	
6	Rack vertical frame should be made of 7 fold profile of CRCA material towithstand the load bearing capacity of 10K Newton	
7	Rack should have 2 no's of removable side panel with slam latch.	
8	Rack should have provision to mount racks on Floor	
9	Rack should be 27U	
10	It should be 800MM Wide,1000MM Deep and Overall height 2100mm.	
11	Rack should Conforms to DIN 41494 or Equivalent EIA /ISO / EN Standard	
12	Rack should have Adjustable mounting depth,	
13	Rack 4 No Adjustable, 19" verticals with Punched 9mm Square Hole and Universal	
14	Rack should have Numbered U positions,	
15	Rack should have 100% assured compatibility with all equipment's conforming toDIN 41494 (General industrial standard for equipment's)	
16	Powder coated finish with seven Tanks pre-treatment process meeting IS	
17	Rack should have Proper Grounding & Bonding	
18	Rack should have Fan module Mount Provision on top Cover	

15. UPS

40 KVA UPS				
Parameters			**Technical Description**	
POWER		kVA	40	
UPS Type			ON LINE - Double Conversion	
Nominal output power		kVA	40	
Active output power*		kW	40	
Efficiency (AC ¸ AC) (Double Conversion)	@100% load	%	Upto 94	
	@75% load	%	Upto 94	
	@50% load	%	Upto 94	
	@25% load	%	Upto 92	
UPS ambient temperature*		°C	0 ¸ 40	
UPS storage temperature		°C	-10 / +70	
Relative humidity (non condensing)		%	< 95	
Altitude		m	< 1000 (above sea level)	
Ventilation			Forced	
Heat Dissipation (BTU/Hr)		BTU/h	6535	
Audible noise level		db	< 65	
Protection of degree			IP 20	
IEC Standards			EN 62040-1, -2 & -3	
Paint			RAL 9005	
Accessibility			Front and Side access, Termination at Rear side	
Dimensions (W x H x D)		mm	250 x 660 x 590	
Weight		kg	50	
Input/Output cable connection			Terminal block @ Rear Side	
Design standards			"IEC EN 62040" "ISO 9001:2008" "ISO 14001"	
Communication interface			RS232,SNMP	
			Modbus over RS485	
Input: Rectifier and battery charger				
POWER		kVA	40	
Input			400V Three-phase + N	
Nominal input voltage Range	@100% load	Vac	400V '-20% / +20%	
	@50% load		400V '-35% / +20%	
Input frequency Range		Hz	45 ¸ 55	
Input power factor	@100% load		≥ 0.99	
	@75% load		≥ 0.99	

	@50% load		≥ 0.98	
	@25% load		≥ 0.95	
Input current THD at rated voltage and THDv <1%	@100% load	%	≤ 3	
	@75% load	%	≤ 4	
	@50% load	%	≤ 8	
	@25% load	%	≤ 16	
DC output voltage accuracy		%	±2	
DC output voltage ripple		% rms	2	
AC-DC converter type			PFC IGBT	
Isolation Transformer			Required at input side of the UPS	
Input protection			MCB & Fuses	
Maximum current from mains (at nom. load, min. voltage & battery discharged)		A	114	
Battery				
Power		kVA	40	
Type (standard)			VRLA	
Number of Cells			40	
Floating voltage at 25°C		Vdc	2.25V/cel	
Maximum charge voltage (Boost mode)		Vdc	2.3 - 2.4V/cel	
Minimum discharge voltage		Vdc	420	
Maximun charging current		Adc	20	
Cold start from batteries			Yes available	
Common Battery option		required	Yes, 2 Parallel UPS & One battery back	
Battery Protection (external to the UPS)			MCCB	
Battery Backups per UPS			1 hours	
Minimum VAH Required			57600	
Battery Test			Included as standard	
Output: Inverter				
Power		kVA	40	
Inverter Bridge			IGBT (by PWM)	
Nominal output power		kVA	40	
Active output power*		kW	40	
Efficiency (DC ، AC) Battery Mode	@100% load	%	Upto 92	
Output			3 phase - 4 wire	

Nominal Output Voltage		Vac	380 - 400 - 415	
Output Voltage Stability				
- Static (Balanced Load)		%	± 1	
- Static (Unbalanced Load)		%	± 2	
- Dynamic (Step Load 20%¸ 100% ¸20%)		%	± 5	
Phase Angle Accuracy		°		
- Balanced Load			± 1°	
- 100% Unbalanced Load			± 2°	
Output Frequency (selectable)		Hz	50 / 60	
Output Frequency Stability				
- Free Running Quartz Oscillator		Hz	± 0,1	
Nominal Output Current (at 400 Vac)				
- Cosj 0.9 (leading and lagging)	Per ph	A	43	
- Cosj 1 (purely resistive load)	Per ph	A	43	
Paralleling option required			Upto 4 UPS	
Overload Capability online mode*			Upto 110% - 60 min	
			Upto 125% - 10 min	
			Upto 150% - 1 min	
Overload Capability Bypass mode			Upto 110% - Continues	
			150% -200% - 10 ms	
Short Circuit Current Phase-to-Neutral	Peak	A	135	
Output Waveform			Sinusoidal	
Output Harmonic Distortion		%		
- Linear Load			< 2	
- Non Linear Load		%	< 4	
Max Crest Factor without derating *			3 : 1	

@ 35 Deg C				
Battery Management Software			Battery Management software has to be considered is mandatory	
Warranty			5 years for UPS and Battery	

10KVA UPS		
Parameters	**Technical Description**	
UPS Capacity	10KVA (10KW)	
Rack	Floor Mount/Rack Mount	
Input Phase	Three Phase with Ground(R-Y-B-N-G)	
Isolation Transformer	Isolation transformer at input side	
Voltage Range	176 V-280 V (Line-Neutral), 305 V-485 V (Line-Line)	
Frequency Range	40-70 Hz	
Power Factor	0.99 (with full linear load)	
THDi	<5% at full linear load and normal voltage	
Output Voltage	230 V (adjustable 220 VAC / 230 VAC / 240 VAC+-1% **)**	
Voltage Regulation	+ / - 1%	
Frequency	50/60 Hz +/- 0.1Hz %	
Harmonic Distortion (THDv)	<1% (linear load) <3% (non-linear load)	
Output Waveform	Pure sine wave	
Crest Factor	3:1	
Efficiency (AC - AC)	96%	
out put Power Factor	Unity	
Overload	105% : Continuous,	
	106%~110% : 60 min	
	111%~130% : 10 min	
	131-155 % : 1 min, above 155% load 200 ms	
Battery Type	Sealed Lead Acid Maintenance Free	
DC Voltage	12V Battery 288 VDC-480 VDC(+-12 No's-+-20 No's)	
Minimum VAH requirement for providing 60 Mins battery back-up	16128VAH	
Make of battery	Quanta/Exide	
Rated Battery Current	10A(1A/2A/3A/4A/5A/6A/7A/8A/9A/10A selectable	
Recharge Time (to 90%)	4 hours	
Parallel function (Optional)	Up to 4 units	
General		
Operating Temperature	0 to 40 Deg. C	
Noise level	<55 dB @ 1 meter	
Safety	EN / IEC 62040-1 & IS 16242:2014	

EMC	EN / IEC 62040-2	
Performance and test requirements	IEC 62040-3	
Maintenance Bypass switch	Available	
Communication Interface		
Intelligent slot	For SNMP required for remote monitoring	
Warranty	5 years for UPS & Battery	

3 KVA UPS		
Parameter	**Technical Description**	
UPS Capacity	3KVA (2400W)	
Rectifier Type	IGBT	
Rate Voltage	220/230/240VAC, 1phase, 2 wire+Gnd(L1-N/L1-L2+GND)	
Input Voltage Range	160 V - 300 VAC @ 100% load ± 5%/110 V - 300 VAC @ 60% load ± 5%	
Frequency Range	50-60 Hz ± 8% Auto sensing	
Input Power Factor	Single Phase $\geq$0.99	
Battery Charging current	10A default (1A / 2A/5A/10A Selectable)	
Battery Type	Sealed Lead Acid Maintenance Free	
DC Voltage	72	
Backups	60 minutes	
Battery Type	Sealed Lead Acid Maintenance Free	
Battery Capacity & Numbers	65AH* 6 Nos SMF Battery	
Rated Power	3KVA/2400W	
Rated Voltage	Single Phase, 230VAC	
Output Voltage THD	<3% for linear load, <5% non-linear Load	
Overload capacity in Battery Mode	105 - 110% 10 mins, 111 - 130% 1 mins, 131 - 150% 3 sec	
Overload capacity in Line Mode	105 - 110% 10 mins, 111 - 130% 2 mins, 131 - 150% 30 sec	
Convertion type	online Double Convertion	
Display	LCD	
Systems Efficiency	>90%	
Eco mode	97%	
Certificate	CE, RoHS	
Safety	IEC 62040-1 & IS 16242 (Part1) : 2014	
Performance and test requirements	IEC 62040-3	
Warranty	5 years for UPS & Battery	

1 KVA UPS		
Parameter	**Technical Description**	
Rating (VA/Watts)	1000VA/600W	
Mains Input		
Input Voltage Range	140 -295V	
Input Frequency	50 Hz/60Hz (Auto Sensing)	
Output Volts	195V-255V	
Charging current	1A	
Inverter		
Output Volts	230V	
Transfet Time	4ms - 10ms typical	
Output Volts Regulation	230V±10%	
Output Frequency	50Hz/60Hz	
Output Wave form	Stepped Sinewave	
Battery	7Ah *2	
Battery Voltage	24Vdc	
Back up Time	Refer runtime chart	
Recharge time	8 hrs for 90% charging	
Front Display	LED	
Indicator	Mains ON/On Batt. /Low Battery/Fault/Overload	
Alarm	ON Batt. /Fault, Over load, Low Battery	
Physical		
Weight	8kg	
Relative Humidity	0-95% without condensation	
Temperature	0 - 40 deg C	
Warranty	5 years for UPS & Battery	

16. RESOURCE QUALIFICATION & KEY REQUIREMENT

ONSITE RESOURCE			
SL No	**Parameters**	**Minimum Requirements**	
1	TYPE OF RESOURCE	**Team Lead** for organizing, coordinating and implementing Scheduled maintenance, break down maintenance and health check-up of all devices. (Category High Skilled)	
2	Field Engineers	**Technicians** for attending day to day maintenance work in cameras, switches, cables, Wireless etc. (Category –Skilled)	
3	Deployment of Resource	Contractor must deploy minimum 08 nos. of manpower during the warranty period to achieve four shifts of a day with One Team Lead in General Shift on weekly 5 Days.	

4	Minimum Qualification	Deployment of **Team Lead** (Qualification: B Tech/ BE. **Residential Engineers/Technicians**: Diploma in Electrical/Electronics/ IT/ Computer Science/ Networking)	
5	Minimum Wages Act	Rate of the wages should not be less than minimum wages as prescribed by Govt. of India and contractor shall ensure that wages are not less than minimum wages at any point of time during the complete period of contract. Accordingly, contractor should quote taking in to consideration future increase in minimum wages as well. If the quoted price is less than the prevailing minimum wages, the difference price to be paid by contractor to resource.	
6	Quoted Price Should be inclusive:	The quoted price shall be inclusive of salary, allowances, ESIC payment, PF payment, Bonus payment, Gratuity, conveyance, & overtime wages, if any, service & work contract Tax & all other charges including appropriate insurance charges, overheads for the work as mentioned in the service support (i) of Detailed scope of work. The Contractor shall pay bonus @ 8.33% of total wages (Basic + DA) to his employees every year as per the government guidelines	
7	Experience	Minimum 01-year similar work experience for B Tech/ BE candidate and minimum 03 years similar experience for Diploma in Engineering candidates).	
8	TEAM LEAD	Deployment of Senior Technician- Qualification and Work Experience: 01 Year experience in similar or CCTV systems for B.Tech, Minimum 03 years of experience in similar or CCTV systems for Diploma in Engineering candidates and 05 years working experience in similar or CCTV systems for ITI candidates.	
9	Technician	Deployment of Technician- Minimum 01 years of experience in similar or CCTV systems for Diploma in Engineering candidates and 03 years working experience in similar or CCTV systems for ITI candidates.	

IMPORTANT:

- The bidder is requested to consider required FIREWALL & ANTIVIRUS for complete project.