

Technical Specification of PIDS & CCTV Surveillance System
(Annexure – D as per checklist)

Specification of 2MP Fixed Box Type Camera

Annexure -A

S. No.	Parameter	Specification	Vendor compliance	Remark
i.	Image Sensor	1/2" or larger, Progressive scan, CMOS sensor		
ii.	Pixel Resolution	Minimum 2.0 Mega Pixel (1920 x 1080)		
iii.	Video Compression	H.265		
iv.	Streaming Capability	Quadruple streaming		
v.	Video resolutions	a) For Main stream :		
		Minimum 25 frames per second (FPS) for Full HD streams.		
		Stream & Resolution :		
		Stream 1 @1920x1080		
		Stream 2 @ 704x480		
		Stream 3 @ 352x240		
		Stream 4 @ 352x240		
vi.	Resolution and Frame Rate	Full HD (1920x1080) @ 25/30 FPS		
vii.	Minimum Illumination			
	a) Colour Mode	0.02 Lux @ F1.5		
	b) B/W Mode	0.01 Lux @ F1.5 (Should give Colour Image at night)		
viii.	Shutter speed	Shutter speed should be 1/8000sec or better		
ix.	IRIS Control	P-IRIS / DC Auto IRIS		
x.	Signal to Noise Ration	>45 dB		
xi.	Dynamic range	120db True WDR		
xii.	Lens mount & Type	9-22mm Vari-Focal with Auto IRIS to be supplied with Camera		
xiii.	Auto Back Focus	Yes Required		
xiv.	Day/Night Camera	Auto Day/Night Configuration		
xv.	Data rate	8 Mbps maximum or better		
xvi.	Bit Rate Control	CBR, VBR		
xvii.	Edge Storage	To be supplied with 64gb inbuilt micro SD/ SDHC / SDXC		
xviii.	Network Connectivity	Ethernet, 10/100 Base T		
xix.	Discovery Interface	OEM interface to detect the camera automatically and configure network settings		
xx.	Network Protocols	Suitable and required network protocol stack to work Camera in TCP/IP based		

		Ethernet network environment. (As required for system working)		
xxi.	Web Server	Internal Web server required with embedded operating system.		
xxii.	Digital Noise Reduction	2DNR/3DNR		
xxiii.	Protocol	RTSP, HTTP, HTTPS, IPV4, IPV6, TCP/IP, FTP		
xxiv.	Onboard Analytics	Camera Tampering, Video Motion Detection		
xxv.	Alarm Inputs / outputs	1 input & 1 output		
xxvi.	Input Voltage	12VDC/PoE(IEEE802.3af), POE IEEE 802.3af compliant		
xxvii.	Security	SSL Encryption, Multi User Authority, IEEE802.1x, HTTPS		
xxviii.	Operating Temperature	(-)10°C to + 50°C		
xxix	Operating Humidity	20 to 90% RH non-condensing		
xxix	Regulatory Approvals/Certifications	FCC, CE, BIS, NDAA Compliant		
xxx	MTBF	100,000 @40°C (MTBF Software Reports to be submitted)		
xxxi	Additional Functionality	When any failover or network interference happens, the recording should start on the SD Card in the IP Cameras, however when network recovers, the data on SD Card should be automatically transferred to VMS/NVR. PoE Adaptor and necessary accessories to be supplied along with camera.		

Specification for IP based Video Surveillance Camera (PTZ)

Annexure -B

S. No.	Parameter	Specification	Vendor compliance	Remark
i.	Image Sensor	1/1.7" or larger, CMOS sensor		
ii.	Pixels	4K UHD (3840x2160)		
iii.	Video Compression	H.265		
iv.	Focal Length	6.5 -202mm or higher		
v.	Multi-Video resolutions	Quadruple Streaming		
vi.	Resolution and Frame Rate	Minimum 25 frames per second (FPS) for Full HD streams		
		Stream & Resolution :		
		Stream 1 @3840x2160		
		Stream 2 @ 1920x1080		
		Stream 3 @ 704x480		
		Stream 4 @ 352x240		
vii.	Minimum Illumination :			

	a) Colour Mode	0.1Lux		
	b) Black & White Mode	0Lux @ (IR LED On)		
viii.	Shutter speed	Shutter speed should be 1/8000sec or higher		
ix.	Signal to Noise Ratio	>45 db		
x.	IR Distance	200 meter		
xi.	Lens	Optical zoom 30x or better		
xii.	Focus & Iris	Automatic with manual override		
xiii.	Pan/Tilt adjustment	360° continuous pan; 0° to 90° tilt from horizontal plane		
xiv.	Preset speed	240°/sec ± 0.5° accuracy		
xv.	Pan/Tilt speed	1°/sec to 180°/sec		
xvi.	Sector Blanking	Minimum 16 Zones		
xvii.	Digital Noise Reduction	2DNR/3DNR		
xviii.	Data rate	8 Mbps maximum for H.265 Video Compression		
xix.	Presets	Minimum 256 presets		
xx.	Trigger Events	Motion Detection, face detection, Alarm in, Tampering		
xxi.	Edge Storage	To be supplied with 64Gb Sd/SDHC Micro Card		
xxii.	Network Connectivity	Ethernet, 10/100/1000 Base-T		
xxiii.	Discovery Interface	OEM interface to detect the camera automatically and configure network settings		
xxiv.	Network Protocols	Suitable and required network protocol stack to work Camera in TCP/IP based Ethernet network environment. (As required for system working)		
xxv.	Web Server	Internal Web server operating system. required with embedded		
xxvi.	Security	SSL Encryption, Multi User Authority, IEEE802.1x, HTTPS		
xxvii.	Image Settings	Configurable Exposure, White Balance, Sharpness		
xxviii.	Wide Dynamic Range (WDR)	120db True Wide Dynamic Range		
xxix.	Alarm Inputs / outputs	1 input & 1 output		
xxx.	Input Voltage	24V AC : Max 75W (Heater & IR LED On), High POE		
xxxi.	Operating Temperature	(-)20°C to + 55°C (with Heater)		
xxxii.	Operating Humidity	20 to 90% RH non-condensing		
xxxiii.	Enclosure Protection	IK10 & IP66 with Wiper for remote cleaning		
xxxiv.	Regulatory Approvals/ Certifications	FCC, CE, BIS, NDAA Compliant		
xxxv.	MTBF	100,000 @40°C (MTBF Software Reports to be submitted)		
xxxvi.	Additional Functionality	When any failover or network interference happens, the		

		recording should start on the SD Card in the IP Cameras, however when network recovers, the data on SD Card should be automatically transferred to VMS/NVR.		
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Specification of 2MP Fixed Box Type Camera

Annexure -C

S. No.	Parameter	Specification	Vendor compliance	Remark
i.	Image Sensor	1/2" or larger, Progressive scan, CMOS sensor		
ii.	Pixel Resolution	Minimum 2.0 Mega Pixel (1920 x 1080)		
iii.	Video Compression	H.265		
iv.	Streaming Capability	Quadruple streaming		
v.	Video resolutions	a) For Main stream :		
		Minimum 25 frames per second (FPS) for Full HD streams.		
		Stream & Resolution :		
		Stream 1 @ 1920x1080		
		Stream 2 @ 704x480		
		Stream 3 @ 352x240		
		Stream 4 @ 352x240		
vi.	Resolution and Frame Rate	Full HD (1920x1080) @ 25/30 FPS		
vii.	Minimum Illumination			
	a) Colour Mode	0.02 Lux @ F1.5		
	b) B/W Mode	0.01 Lux @ F1.5 (Should give Colour Image at night)		
viii.	Shutter speed	Shutter speed should be 1/8000 sec or better		
ix.	IRIS Control	P-IRIS / DC Auto IRIS		
x.	Signal to Noise Ration	>45 dB		
xi.	Dynamic range	120db True WDR		
xii.	Lens mount & Type	9-22mm Vari-Focal with Auto IRIS to be supplied with Camera		
xiii.	Auto Back Focus	Yes Required		
xiv.	Day/Night Camera	Auto Day/Night Configuration		
xv.	Data rate	8 Mbps maximum or better		
xvi.	Bit Rate Control	CBR, VBR		
xvii.	Edge Storage	To be supplied with 64gb inbuilt micro SD/ SDHC / SDXC		
xviii.	Network Connectivity	Ethernet, 10/100 Base T		
xix.	Discovery Interface	OEM interface to detect the camera automatically and configure network settings		

xx.	Network Protocols	Suitable and required network protocol stack to work Camera in TCP/IP based Ethernet network environment. (As required for system working)		
xxi.	Web Server	Internal Web server required with embedded operating system.		
xxii.	Digital Noise Reduction	2DNR/3DNR		
xxiii.	Protocol	RTSP, HTTP, HTTPS, IPV4, IPV6, TCP/IP, FTP		
xxiv.	Onboard Analytics	Camera Tampering, Video Motion Detection		
xxv.	Alarm Inputs / outputs	1 input & 1 output		
xxvi.	Input Voltage	12VDC/PoE(IEEE802.3af), POE IEEE 802.3af compliant		
xxvii.	Security	SSL Encryption, Multi User Authority, IEEE802.1x, HTTPS		
xxviii.	Operating Temperature	(-)10°C to + 50°C		
xxix.	Operating Humidity	20 to 90% RH non-condensing		
xxx.	Regulatory Approvals/Certifications	FCC, CE, BIS, NDAA Compliant		
xxxi.	MTBF	100,000 @40°C (MTBF Software Reports to be submitted)		
xxxii.	Additional Functionality	When any failover or network interference happens, the recording should start on the SD Card in the IP Cameras, however when network recovers, the data on SD Card should be automatically transferred to VMS/NVR. PoE Adopter and necessary accessories to be supplied alongwith camera.		

Annexure -D

Specification of 2MP Fixed Bullet Camera

S. No.	Parameter	Specification	Vendor compliance	Remark
i.	Image Sensor	1/2.8" or larger, Progressive scan, CMOS sensor		
ii.	Pixel Resolution	Minimum 2.0 Mega Pixel (1920 x 1080)		
iii.	Video Compression	H.265		
iv.	Streaming Capability	Quadruple streaming		
v.	Video resolutions	a) For Main stream :		
		Minimum 25 frames per second (FPS) for Full HD streams.		
		Stream & Resolution :		
		Stream 1 @1920x1080		

		Stream 2 @ 704x480		
		Stream 3 @ 352x240		
		Stream 4 @ 352x240		
vi.	Resolution and Frame Rate	Full HD (1920x1080) @ 25/30 FPS		
vii.	Lens	Fixed 2.8mm or 4mm		
	Minimum Illumination			
	a) Colour Mode	0.1 Lux		
viii.	b) B/W Mode	0 Lux (IR LED On)		
ix.	Shutter speed	Shutter speed should be 1/8000sec or better		
x.	Signal to Noise Ration	>45 dB		
xi.	Dynamic range	120db True WDR		
xii.	Day/Night Camera	IR Cut Filter with Auto Switch		
xiii.	Data rate	8 Mbps maximum or better		
xiv.	Bit Rate Control	CBR, VBR		
xv.	Edge Storage	To be supplied with 64gb inbuilt micro SD/ SDHC / SDXC with failover feature to automatic record when connection with NVR/VMS is interrupted		
xvi.	Network Connectivity	Ethernet, 10/100 Base T		
xvii.	Discovery Interface	OEM interface to detect the camera automatically and configure network settings		
xviii.	Network Protocols	Suitable and required network protocol stack to work Camera in TCP/IP based Ethernet network environment. (As required for system working)		
xix.	Web Server	Internal Web server required with embedded operating system.		
xx.	Digital Noise Reduction	2DNR/3DNR		
xxi.	Protocol	RTSP, HTTP, HTTPS, IPV4, IPV6, TCP/IP, FTP		
xxii.	Onboard Analytics	Camera Tampering, Video Motion Detection		
xxiii.	Alarm Inputs / outputs	1 input & 1 output		
xxiv.	Input Voltage	12VDC/PoE(IEEE802.3af), POE IEEE 802.3af compliant		
xxv.	Security	SSL Encryption, Multi User Authority, IEEE802.1x, HTTPS		
xxvi.	Operating Temperature	(-)10°C to + 50°C		
xxvii.	Operating Humidity	20 to 90% RH non-condensing		
xxviii.	Regulatory Approvals/Certifications	FCC, CE, BIS, NDAA Compliant		
xxix	Additional Functionality	When any failover or network interference happens, the recording		

		should start on the SD Card in the IP Cameras, however when network recovers, the data on SD Card should be automatically transferred to VMS/NVR. PoE Adaptor to be supplied along with camera.		
xxx	MTBF	100,000 @40°C (MTBF Software Reports to be submitted)		

Annexure -E

Specification of High Definition 12 Mega Pixel IP Fixed Fisheye Camera

S. No.	Parameter	Specification	Vendor compliance	Remark
i.	Image Sensor	1/1.7" or larger, Progressive scan, CMOS sensor		
ii.	Pixel Resolution	12MP resolution		
iii.	Video Compression	H.265, H.264 (MPEG-4 Part 10/AVC), M-JPEG		
iv.	Lens	Focal Length 1.2mm		
v.	Streaming Capability	Quadruple streaming		
	Supported resolutions	3200 x 2944, 2400 x 2208, 3200 x 1472, 1600 x 1472, 1600 x 736, 800 x 736		
vi.	Resolution and Frame Rate	30ips : 3200 x 2944 15ips : 3200 x 2944 (WDR)		
	a) Colour Mode	0.2 Lux		
viii.	b) Black & White Mode	0 Lux		
ix.	IR Distance	15 m		
x	Shutter speed	1/30 ~ 1/10000 sec or higher		
xi	WDR	True WDR (120DB)		
xii	Edge Storage	To be supplied with 256GB inbuilt micro SD/ SDHC / SDXC		
xiii	Recording Session Buffer	Yes (Up to 60MB)		
xiv	Network Connectivity	Ethernet, 10/100 Base T		
xv	Discovery Interface	OEM interface to detect the camera automatically and configure network settings		
xvi	Network Protocols	RTP/RTSP/TCP, RTP/RTSP/HTTP/TCP, RTP/UDP RTSP/TCP, HTTP, HTTPS, FTP, SNTP, SMTP, mDNS, Upnp		

xvii	Security	SSL Encryption, Multi-User Authority, IEEE802.1x, IP Filtering, HTTPS		
xviii	Web Server	Internal Web server required with embedded operating system.		
xix	Digital Noise Reduction	2DNR/3DNR		
xx	Privacy masking	8 Zones		
xxi	Alarm Inputs / outputs	Input 1ea / Output 1ea		
xxii	Input Voltage	12VDC, PoE (IEEE 802.3af Class 3)		
xxiii	Operating Temperature	-10°C ~ +50°C		
xxiv	Operating Humidity	0% ~ 90% RH non-condensing		
xxv	Mean Time Between Failure (MTBF)	Should not be less than 125,000 hours Calculated at 40 Degrees. Software reports along with NABL report		
xxvi	Regulatory Approvals/Certifications	FCC, CE,UL/BIS, ONVIF-S		
xxvii	Additional Functionality	When any failover or network interference happens, the recording should start on the SD Card in the IP Cameras, however when network recovers, the data on SD Card should be automatically transferred to VMS/NVR. PoE Adopter to be supplied alongwith camera.		
xxviii	MTBF	100,000 @40°C (MTBF Software Reports to be submitted)		

Annexure -F

Specification of Network Video Recorder

S. No.	Parameter	Specification	Vendor compliance	Remark
i.	Channels	64 nos Full HD or 16 Nos 4K Resolution or a mix of both IP Cameras		
ii.	Camera Type	Should Support up to 4K UHD Camera		
iii.	Recording Resolution and Frame Rate	Full HD @ 25 FPS or higher		
iv.	Supported Image Resolution	HD resolution and 4K UHD Resolution		
v.	Operating System	Windows / Linux Embedded		
vi.	Video Compression	H.264/H.265		

vii.	Recording Throughput	Minimum 350 Mbps		
viii.	Video Playback	16 Channels Simultaneously Full HD Playback in Realtime or Simultaneous 4Ch 4K Playback		
ix.	Storage	80TB Internal and expandable to 140TB using Internal or External		
x.	Drive Type	SATA Surveillance Grade HDD		
viii.	Raid	Raid-5		
ix.	Video In Connections	Gigabit Ethernet (Video In) x3, SFP (Video In) x 2		
x.	Discovery Interface	OEM interface to detect the camera automatically and configure network setting		
viii.	Video Output/ Interface	HDMI, VGA		
ix.	Network Interface	Ethernet 10/100/1000 Base-T ports		
x.	USB Interface	USB 2.0 x 2, USB 3.0 x 1		
viii.	Monitoring	USB Mouse Control, Digital Keyboard control		
ix.	Features :-			
x.	1. Multiscreen Display	Support (support on local monitor Full screen, Quad view, 4x4 (16-view) or any other window division based on the site requirement)		
viii.	2. Camera Control	Yes		
ix.	3. Recording/Playback Control	Required		
x.	4. Recording Mode	Manual, Schedule (Continuous/Event), Event (Pre/Post), Motion detection, Alarms, Trigger Input etc.		
viii.	5. Redundancy	N:1 Required		
ix.	6. Search and Export	Recording search by Camera, date and time. Export of video clips to USB Flash Drives.		
x.	7. System Log	Alarms, Events, Operator Log etc.		
viii.	8. User Management	Authentication of User Login, Configuration of Users, User Groups and User Access Rights.		
ix.	Power Supply	Dual, Redundant		
x.	Chassis Mounting	19" Rack Mounted		
viii.	Regulatory Approvals/Certifications	FCC, CE, UL, BIS		
ix.	Additional Functionality	When any failover or network interference happens, the recording should start on the SD Card in the IP Cameras, however when network recovers, the data on SD Card should be automatically transferred to VMS/NVR.		
x.	MTBF	100,000 @40°C (MTBF Software Reports to be submitted)		

Specification of 42 U Rack

S. No.	Parameter / Feature	Detailed Specifications	Vendor compliance	Remark
1	Make & Model			
2	Mounting	Floor Standing		
3	Height	42 U		
4	Dimensions (Width X Depth)	800 x 1000 mm or higher		
5	Doors	Lockable front door of perforated steel & lockable vented rear door of steel. Perforation on front and rear doors should be minimum 80%.		
6	Side Panels	Side Panels with Slam Latches and Key Locks		
7	Top & Bottom Covers	Top & Bottom Covers with cable entry gland plates		
8	Stationary Shelves	3 No. of Stationary Shelves		
9	Sliding Rotary Keyboard Tray	1 No. of 19" Sliding Keyboard Tray		
10	Equipment Mounting Angles	One pair of Equipment Mounting Angles to provide 19" mounting positions		
11	Cooling Fans	Min. 4 Nos. of Cooling Fans (230VAC, 90 CFM) in top mounted Fan Housing Unit		
12	Mounting Hardware Packet	Captive Mounting Hardware (10 Pkts)		
13	PDU	Min. Two independent & redundant vertical or horizontal power strips each containing 10 Nos. of 5/15A IEC320 C14 & 2 normal type sockets, a fuse, indicator lamp and 15A Switch, nema type connector (plug- socket set)		
14	Cable Management accessories	Two horizontal , two vertical cable managers & two vertical Cable Channels with cabling loops		
15	Castors	4 castors with foot operated brakes		
16	Earthing Kit	Copper earthing kit (bars, straps, continuity kit, etc) to be provided.		
17	Color	Preferred Graphite black		
18	Warranty	OEM onsite , labour , parts warranty for the entire lease period		

Specification of VMS Server

S. No.	Parameter	Specification	Vendor compliance	Remark
1	Processor	Intel Xeon processor Silver 4110 2.1Ghz		
2	No. of Cores	8		
3	No. of Threads	16		
4	Frequency	2.1 GHz or better		
5	Cache	DDR4 2400		
6	No. of Processors	1		
7	Network Connections	4 GBE RJ-45 Ports		
8	Recording Data Rate	Upto 1024 Mbps		
9	Memory	8GB Ram		
10	Operating System	Server 2012 R2 or better		
11	LAN/ Ethernet	4GbE RJ-45 Ports		
12	Hard Disk Drive	32TB Internal with RAID5		
13	Hard Disk Drive	Hot Pluggable SAS HDD, 4x600 GB 7200 RPM or higher with minimum 06 nos. or higher internal drive bays.		
14	RAID Controller	SAS RAID controller with RAID 0/1/5 configuration.		
15	DVD R/W Drive & USB Ports	Required		
16	USB/ PS/2 mouse and keyboard	Required		
17	Power Supply	Redundant Hot-swappable power supply		
18	Power Consumption	750Watts		
19	No of VMS Channel Support	256 VMS Channels (For future Upgrade)		
20	Chassis Type	19" Rack Mountable with sliding rails and fittings to install into a Rack.		

Annexure -I

Specification of Video management & Control VMS Software License for VMS Channels

Required VMS Features	Vendor compliance	Remark
Software Features		
(1) The VMS shall permit server and client software applications to be installed and run on the same computer or on separate computers.		
(2) The VMS shall support the remote monitoring of live image in multiple clients systems through a streaming service. The number of channels that can be streamed equals the number of channels that can be recorded.		
(3) The VMS shall support the stable streaming by using the load balancing function in installation with more than one streaming server.		
(4) The VMS shall remotely upgrade software and setup multiple systems which provide this feature.		
(5) The VMS shall display the system log information of devices which use own protocol.		
(6) The VMS shall monitor the map image on live monitoring screen.		

(7) The VMS shall support the centralized system operation, management and event-handling.		
(8) The VMS shall support the enhanced security using SSL function.		
(9) The VMS shall support two-way audio communication and audio broadcasting.		
(10) The VMS shall support the enhanced security by setting up different authorities for each user group.		
(11) The VMS shall be controlled by network keyboard.		
(12) The VMS shall support text-in and alarm function via TCP networking.		
(13) The VMS shall support receiving digital input triggers and triggering digital outputs through an I/O board. One number in quantity needs to be supplied along with VMS.		
(14) The VMS will provide the mechanism by which individual alarm(s) from a 3rd party system (access control, etc.) can be pre-selected and configured to be monitored, and in turn trigger event driven video operations(Optional).		
(15) The VMS shall support an intuitive GUI.		
(16) The VMS shall support the following features for network cameras and network video transmitters:		
A. Recording of video and playback with speeds supporting upto 32x(varying from 1x to 32x) of the recorded video		
B. Multiple recording servers for advanced recording performance		
C. Instant Recording/Panic Recording of monitored images		
D. Audio recording		
E. Stable recording using proprietary video database le system		
(17) The VMS shall support the following features for DVRs:		
A. Playback of video recorded in DVRs		
B. Remote control of panic recording		
(18) The VMS mobile client shall be free and supported by Android and Apple mobile devices.		
(19) The VMS shall be available in the following languages:		
A. English		
(20) VMS shall support dynamic video stream management architecture which includes:		
A. Support for industry standard compression formats including but not limited to:		
a. MJPEG		
b. MPEG-4		
c. H.264		
d. H.265		
B. The client and server machine shall communicate resolution real estate such that the server machine acts as a video proxy and shall know the maximum monitor resolution supported by the client machine.		
C. Support for reducing the required client bandwidth and processing power of a megapixel video stream by transmitting only the fraction of the video stream that is visible in the video display tile. (e.g. If a user is viewing a 2MP camera in a 352x240 resolution tile then a CIF representation of the 2MP image shall be transmitted).		
D. Dynamic video stream management shall be supported for local users, remote users and mobile devices.		

(21) The VMS shall support recording and management of video and audio sources including but not limited to:		
A. ONVIF Cameras		
B. RTSP / RTP Video Streams		
(22) The VMS shall support recording and monitoring video and audio streams from sources with bandwidth up to 4096 Mbytes/sec, frame rate up to 30 fps, and video resolution up to 12MP. This specification depends on the performance of server or workstation including HDD performance.		
(23) The VMS shall support the decompression of H.264 and H.265 video through the quick sync video technology of Intel based client graphics card/graphical processing unit (GPU) instead of using the client processing power.		
(24) The VMS shall require no proprietary recording hardware, no hardware multiplexer or time-division technology for video and audio recording or monitoring.		
(25) The VMS shall support the storage capacity with up to 50TB per partition and shall allow for upgrades of recording capacity without additional licensing.		
The VMS shall support max 74 partitions per one Recording Service.(Logical Drive Partition 24ea+Physical Drive Partition 50ea)		
(26) The VMS shall secure video and audio data by securely transmitting all command and control data via TCP/IP using cryptographic keys based on SSL to prevent eavesdropping or tampering.		
(27) The VMS shall support software level integration via an API. The API integration shall include but not limited to:		
A. Bi-directional alarm event processing for monitoring and acknowledgement		
B. Receiving digital input events		
C. Receiving intrusion zone events		
D. Transmitting live and recorded video		
(28) The VMS client shall provide alarm management operations through the use of the client graphical user interface. Including but not limited to:		
A. Occurrences for “Alarm” and “Reset” conditions for each of the pre-selected access system alarms will be processed and managed from the VMS system’s Live View workspace.		
a. In a section reserved for displaying alarm notifications or from an alarm viewer.		
b. Alarms can also be acknowledged from the camera display tile.		
B. Once an initiated alarm occurrence is acknowledged from the VMS system, it should be automatically acknowledged and processed in the access system alarm monitor queue without further operator intervention.		
(29) The VMS shall have an easy process for upgrading versions:		
A. Are capable of being upgraded from one version to another without having to uninstall the previous version. The complete backup of the software along with cameras needs to be backed up automatically. It should not be limited to 1. Cameras along with Configurations 2. Certificates of each cameras. 3. User and group's backup(Users along with id ,passwords and profiles for accessing the cameras). The Complete backup needs to be restored with a click of a button if required.		

(30) The VMS shall run as a service configured to automatically start when the server or workstation is powered on, and automatically recover from failure or attempted tampering.		
(31) The VMS shall allow users to monitor and administer the system from:		
A. A single client application for monitoring live and recorded video and audio.		
B. A single window for administrating all system connections.		
C. Any client located on the network.		
(32) The VMS shall provide an automatic discovery solution that will easily find devices and systems by:		
A. Automatically discovering server instances that run on computers connected to the same network as the client.		
B. A search functionality to discover server instances running on computers connected on a different network segment than the client by using IP addresses or hostnames.		
C. Automatically discovering video and audio sources that are connected to the same network as the server.		
D. A search functionality to discover video and audio sources that are connected on a different network segment than the server by using IP addresses .		
(33) The VMS shall allow manually discovered server instances, video and audio sources to be visible to all users of a single client workstation.		
A. Network settings for all server instances will be identical for all users of a single client workstation.		
(34) The VMS shall provide multiple methods for providing fault tolerant solutions to maintain high availability recording in mission critical installations including:		
A. The ability to maintain a centralized system administration so that the same operation and system configuration settings are shared between all servers in a site. This allows the same user login details and other configurations to be used across a site, and ensure that the settings remain active even if a server fails.		
B. The ability to connect a video or audio source to multiple VMSs to achieve redundant recording.		
C. The VMS failover server should automatically start recording in case any of the primary recording servers fails.		
(35) The VMS shall detect if the video or audio signal is lost and alert the system administrator.		
(36) The VMS shall provide the capability to rename all video and audio sources and SERVERS.		
(37) The VMS shall record video and audio streams based on a recording schedule that can be defined individually for each video source. The schedule shall include but not limited to the following parameters:		
A. Recording Mode		
a. Continuous (TimeLapse)		
b. Event		
- Motion Detection		
- TripZone		
- Tampering		
- Face Detection		
- Video Blind		
- Auto Tracking		

- Video Analytics		
- PIR Detection		
- Alarm Input / Output (and Network Alarm Input)		
- Audio Detection		
B. Time and Date Settings		
a. One day		
b. Daily		
c. Weekly		
d. Monthly		
e. Yearly		
(38) The VMS shall provide the ability to manually trigger recording.		
(39) The VMS shall provide a pre-event and post-event recording option.		
(40) The VMS shall provide a continuous recording option in the absence of events.		
(41) The VMS shall perform motion detection on each individual video source with adjustable sensitivity, threshold and detection zones.		
(42) The VMS shall perform analytics event detection on each individual video stream sourced from a device possessing adaptive video analytics capabilities.		
A. The VMS shall allow users to connect individual video sources to analytics appliance channels.		
B. The VMS shall allow users to configure events based on classified object motion detection.		
C. The VMS shall allow configured analytics events to be used as alarm and rule triggers.		
(43) The VMS shall provide the ability to set a maximum recorded video retention time for each video source.		
(44) The VMS shall perform dynamic bandwidth management to ensure the total bandwidth does not overload the system.		
(45) The VMS shall authenticate users before granting access to the system. Access rights for each user can be defined individually for each user, and shall include but not be limited to:		
A. Live monitoring		
a. Use PTZ setup and controls		
b. Use audio in/out controls		
c. Use instant recording		
d. Use image processing		
e. Export live images		
f. Trigger manual recording (panic recording)		
g. Use web browser in live tab		
B. Search and Play		
a. Save AVI or Clip Copy images		
b. Export images		
c. Use image processing		
d. Search the recorded data by motion, object or other events		
e. Play manually recorded data (panic record play)		
C. Device Health Monitoring		
D. Use alarm in/out controls		

E. Search and export log data		
F. Search and export event history		
G. Show device and device group		
H. Create user layout		
(46) The VMS shall provide the ability to rank access rights based on a user's position within a corporate hierarchy.		
A. Ranked users may only administer changes to users and groups that are subordinate in rank.		
B. The corporate hierarchy can be used to enforce the authority of a parent site over the user and group settings of one or more child sites.		
(47) The VMS shall allow the creation of site families.		
A. A child site can be connected to an appropriately licensed parent site.		
B. The parent site will have control over the group and user privileges and information of a child site.		
(48) The VMS shall support multiple credentials to gain access to the system including, but not limited to:		
A. The ability to import members of Active Directory groups as users in the VMS.		
a. Changes made to members in the Active Directory are automatically synced with the VMS.		
b. Users imported from the Active Directory can be added directly to existing permission groups.		
B. Using Windows credentials to authenticate users.		
C. Accept user credentials entered into the VMS user database.		
(49) The VMS shall provide the ability to schedule backups of recorded video with associated events to a local folder or mapped network drive. The system should be capable of writing any incident that needs to be backed up on to a USB Storage Drive.		
(50) The VMS shall provide the ability to create and schedule alarms and corresponding actions including:		
A. Provide the ability to email users and system administrators when an event or system health error occurs.		
B. Provide the ability to schedule when email notifications are sent.		
C. Provide the ability to include camera images in email notifications.		
(51) The VMS shall maintain a system event log.		
(52) The VMS shall have the capability to schedule and execute any of the following actions in response to any of the events listed above:		
A. User Notification Actions		
a. Display on-screen message		
b. Send an email		
c. Play a sound		
B. Monitoring Actions		
a. Start live streaming video		
b. Create Bookmark		
c. Start live streaming on a virtual matrix monitor		
d. Open a map on a virtual matrix monitor		
C. Device Actions		
a. Reboot camera		

b. Trigger digital output		
D. PTZ Actions		
a. Go to Preset		
b. Run a Pattern		
The Vms should be able to trigger the presets patterns/ Patrolling as configured by the Administrator.		
E. Alarm actions		
a. Trigger an alarm		
b. Acknowledge an alarm		
(53) The VMS shall provide the ability to escalate alarms from one user or group to another if the alarm is unacknowledged for a preset duration.		
(54) The VMS shall provide a maintenance log and audit trail of all system errors and events.		
(55) The VMS shall support the operation of a License Plate Recognition system that include:		
A. The ability to define a region of an image where license plate detection is performed. Detected license plates shall be stored with the video data.		
B. The ability to create a Watch List that is used to create events when specific license plates are detected in the images being analyzed.		
(56) The VMS shall provide the ability to enable and configure PTZ control on the RS-485 interface of a video source.		
(57) The VMS shall support PTZ protocols and models. Including but are not limited to the following:		
A. IP Cameras		
a. ONVIF Cameras		
B. The VMS shall support different models of PTZ and supported protocols		
(58) The VMS shall provide the ability to change the network settings for a video and audio source including:		
A. A change in image quality and image rate parameters for a single video source shall not affect the settings of other video sources.		
B. The ability to enable a secondary stream for live viewing.		
C. The ability to change the exposure, iris, IR filter, backlight compensation, gain, sharpening, noise filtering, saturation, focus, and white balance settings for a video source.		
D. The ability to change the image dimensions for a video source.		
E. The ability to rotate the image 90°, 180° or 270° for a video source dependent on camera.		
F. The ability to add privacy zones to a video source to block unwanted areas in the image field of view.		
G. The ability to set a maximum recording duration for manually triggered recording for a video source.		
H. The ability to change the input, output, gain and volume for an audio source.		
(59) The VMS shall support the use of uni-directional and bi-directional audio.		
A. The VMS shall support full-duplex two-way audio communication.		
B. The VMS shall provide the ability to link any audio source to any video source.		
a. Able to link to the audio sources from multiple cameras simultaneously and record the same if required.		

b. Able to link an audio source to many video sources.		
C. The VMS shall provide the ability to synchronize audio and video on playback regardless of video, audio, network, or storage parameters		
(60) The VMS shall provide the ability to manage operator access to the VMS and assets, including:		
A. Ability to automatically log in to a VMS.		
B. Ability to override user access to a VMS if there are insufficient licenses.		
C. Ability to automatically log out of a VMS when the application is left idle.		
D. Ability to save and restore the window layout.		
E. Ability to control the system using a PC keyboard, mouse or joystick.		
F. Ability to import and export system settings such as maps, views, web pages, users and groups.		
(61) The VMS shall support live or recorded video monitoring of 1 to 64 video streams simultaneously on a single monitor with the following standard layouts:		
A. Normal Screen		
a. Full Screen, 2x2, 3x3, 4x4, 5x5, 6x6, 8x8, 1+5, 1+7, 1+11, 1+12, 1+27, 1+32, 2+8, 2+18, 3+4, 4+28, 12+16		
b. Corridor Format: 1x2, 1x3		
B. Wide Screen		
a. 3x2, 4x3, 5x4, 6x5, 7x6, 8x7, 1+2, 1+3, 1+4, 1+5, 1+6, 1+8, 1+10, 2+1, 2+4, 2+12, 4+12, 12+24		
(62) The VMS shall support live or recorded video monitoring in a customizable video display beyond the standard layouts.		
(63) The VMS shall be able to simultaneously display video streams from maximum 64 cameras per window with no additional license cost (if required).		
(64) The VMS shall support the ability to bias the displayed video to a lower frame rate or to a lower image resolution if the client network bandwidth or processing power is insufficient for displaying the video at full frame rate and image resolution.		
(65) The VMS shall support the ability to display image overlays. Including but not limited to the following:		
A. Live		
a. Camera Title, Status Icon, PTZ, Timestamp (Date &Time), Event Alert, Motion Block, Site Name, Face Detection, Text-In messages.		
B. Playback		
a. Camera Title, Recorded Title, Status Icon, ePTZ, Timestamp (Date &Time), Site Name, Face Detection, Text-In messages.		
(66) The Video Analytics Activity overlay shall provide a color-coded bounding box around moving objects categorized as humans or vehicles.		
(67) The VMS client software shall:		
A. Maximum four monitors used for monitoring video and audio streams connected to a single workstation.		
B. Support monitoring live and recorded video and audio streams simultaneously on the same monitor.		
C. Support viewing the same live or recorded video stream at different zoom levels and areas of interest.		
D. Support the ability to switch from live to recorded video on demand for an instant replay of recently recorded video.		

E. Support the ability to share the application window display in a joint session with other users for collaborative investigations.		
F. Support the creation various layouts of video streams.		
G. Support the ability to toggle between tiled and full-screen view.		
H. Support the ability to save views.		
I. Support the ability to cycle through views (guard tour) based on a specified interval.		
J. Display all video sources connected to the system.		
K. Support the ability to drag and drop sources from a system tree. Sources include but are not limited to:		
a. A video/audio source for live and recorded display.		
b. A predefined layout view of video/audio sources.		
c. Third party or integrated devices		
d. Web pages		
e. Graphical maps		
(68) The VMS shall support the ability to configure how the system tree is displayed.		
A. The system tree of video sources, maps, saved views and web pages can be organized into virtual folders that are represented as branches within the Site.		
B. Users can be granted access to individual items or entire folders within the tree.		
C. New items added to a folder automatically inherit the permissions of that folder.		
(69) Alarm and Digital Output Management:		
A. The VMS shall support monitoring alarms on receiving an alarm alert/input from any of the camera, The alert should appear in the alarm stack and a audio visual alert should appear on the user screen.		
B. The VMS shall support the ability to designate one or more regions/tiles in a window for displaying video directly linked to triggered alarms and rules.		
C. The VMS shall support the ability to acknowledge alarms from the designated video display area.		
D. The VMS shall support the ability to manually trigger digital output:		
a. Through the use of a pre-configured software “button”.		
b. Through the use of a hard-wired dry alarm contact connected to a supported input/output device.		
E. The VMS shall support the ability to assign alarms to users.		
F. The VMS shall support the ability to acknowledge alarms.		
G. The VMS shall support the ability to bookmark alarms.		
(70) The VMS shall support creating bookmarks for recorded video and audio. Bookmarks can be:		
A. Viewed from multiple sources		
B. Displayed on the timeline during playback		
C. Used as a search criteria for recorded video and audio. Search criteria can include but are not limited to:		
a. Name		
b. Description		
c. Bookmark Creator		

(71) The VMS shall support the ability to create a map that represents the physical location of cameras and other devices throughout the surveillance system.		
A. Maps shall be created from images stored in standard image formats. Including but not limited to the following:		
a. JPEG		
b. BMP		
c. PNG		
d. GIF		
B. Maps shall have the ability to contain links so as to create a hierarchy of interlinked maps.		
C. Maps shall support the ability to drag and drop a video source from the map into a window for live or recorded video and audio monitoring.		
D. Cameras in a map are highlighted when an alarm linked to the camera is triggered.		
(72) The VMS shall support physical and digital zooming and panning on live and recorded video streams.		
A. The VMS shall support controlling pan-tilt-zoom, iris, and focus as well as setting presets and patterns.		
B. The VMS shall provide the ability to name pan-tilt-zoom presets.		
C. The VMS shall support the ability to center a PTZ camera's field of view by clicking anywhere on the video image where the PTZ supports this function.		
D. The VMS shall support the ability to click and drag to define an area for the PTZ camera to optically zoom and center on, where the PTZ supports this function.		
E. The VMS shall support controlling pan-tilt-zoom camera on-screen display and auxiliary controls.		
F. The VMS shall support locking PTZ controls.		
G. The VMS shall support control of a pan-tilt-zoom camera with a network keyboard with joystick.		
(73) The VMS shall support playback of recorded video and audio.		
A. Forward and reverse playback of recorded video and audio at variable speeds.		
B. Audio and video shall synchronously playback when audio and video sources are linked.		
(74) The VMS shall support the navigation of recorded video and audio. Including but not limited to the following methods:		
A. Calendar		
B. Timeline		
a. The VMS shall support a timeline that displays all connected video sources and the corresponding motion and recording events.		
b. The VMS shall support a timeline that can display the entire time range down to one second of recorded video and audio.		
c. The VMS shall support a timeline that can synchronize video displayed on multiple tabs to the same point in time.		
C. Events.		
(75) The VMS shall support searching through recorded video and audio based on various search criteria. Including but not limited to the following parameters:		

A. Bookmarks		
B. Calendar		
C. Timeline (Date & Time)		
D. Event search		
a. Alarm-In		
b. Motion Detection		
c. Video Loss		
d. Video Blind		
e. TripZone		
f. Tampering		
g. Video Analytics		
h. Face Detection		
i. Audio Detection		
j. Device Connection & Disconnection		
(76) The VMS shall support performing a search through a series of thumbnail images.		
A. Thumbnails can be based on the entire image region or a pre-selected area.		
B. Thumbnails can be stacked to support an automatic secondary search when looking at a large timespan of video.		
(77) The VMS shall support the ability to take a snapshot of a live or recorded image and export it from the system.		
(78) The VMS shall support the ability to export recorded video in the following formats including but not limited to:		
A. Video		
a. Native Format		
b. AVI		
B. Still Image		
a. JPEG		
b. PNG		
c. BMP		
d. PDF		
C. Print		
(79) The VMS shall support the ability to export recorded audio in WAV format.		
(80) The VMS shall support the ability to export a live stream of images in the following formats:		
A. JPEG		
B. PNG		
C. BMP		
D. PDF		
(81) The VMS shall support the ability to export video in Native format. Native format exported video shall:		
A. Digitally sign recorded video and audio using chained finger print technology so video can be authenticated for evidentiary purposes.		
B. Be able to export video from one or multiple camera streams simultaneously.		
C. Support reviewing of exported video and audio		
D. Support reviewing of backed-up video and audio		

E. Support exporting of video in lower frame-rates than originally recorded.		
F. Include camera properties. Including but not limited to:		
a. Site name		
b. Recorded video time, resolution, frame type and size		
G. Support additional exporting into Native or open formats.		
(82) The VMS System should support the following services as required during installation		
Administration Service		
Recording Service		
Monitoring Service (Alarm)		
Video Analytics Service		
Failover Service		
General Description		
(1) The VMS specified is a highly scalable and fully integrated network video surveillance solution. The VMS can work together with network cameras, SERVERs, and NVRs while providing superior image quality and extensive coverage.		
(2) The VMS shall be available as a stand-alone software offering or pre-loaded on turn-key workstations and servers running Microsoft Windows with configurable storage.		
(3) The VMS shall be available in a module based licensed software solution as follows:		
A. Expert (Standard) Services		
a. Administration Service		
b. Recording Service		
c. Failover Service		
d. Monitoring Service		
e. Video Analytics Service		
f. Video wall Service		
(4) Licensing : Software license.		

Annexure -J

Specification of Artificial Intelligence Software (Deep Learning) License

Artificial Intelligence (AI) enabled Video Analytics Software:		
Possible applications of Artificial Intelligence (AI) enabled analytics software over the IP based video surveillance system, for specified number of Cameras for specific stations, as defined in the tender document shall include the following minimum Artificial Intelligence (AI) enabled video analytics software and should be seamlessly integrated to the VMS		
· Intrusion Detection		
· Camera Tampering		
· Loitering Detection		

· Human & Vehicle Detection		
· Search of Humans based on Attribute		
· Colour Search		
· Combination Search (Human/Vehicle & Colour)		
Intrusion Detection:		
The offered Artificial Intelligence (AI) enabled video analytic software shall include a comprehensive intrusion detection feature. The intrusion detection shall be used for generating alarm under following scenarios:		
PIDS shall be capable of detecting intrusion of Person, Vehicles, Objects etc. in the Region of Interest (ROI) created along the perimeter wall as per the user requirement.		
User shall be able to set the parameters for triggering an alarm as per the OBJECT OF INTEREST such as number of persons, type of vehicles, type of object etc entering the Region of Interest (ROI).		
System shall have high accuracy to avoid false alarm during night The system shall be based on a Video Analytics Server, PIDS shall support all ONVIF D/N or IR & Thermal Cameras		
The software shall have filters/methods to distinguish between humans/animals and vehicles/ objects.		
User shall be able to create multiple ROI (Region of Interests) in the single camera frame. Shall be able to recognize the objects based on the type and not just by the size. (Example: It shall have options to distinguish between person, vehicles like car, bus, truck, motorbike, bicycle etc)		
The user shall be able to set an exclusion area to exclude any object in the detection zone that may cause false alarm, e.g., a statue, an electric pole or a tree that may look like a person standing at night.		
Once user receives the intrusion alerts, System/ Software should be able to show which camera intrusion happened along with date & time stamp .		
Camera Tampering:		
The software shall be able to detect sabotage or tampering to the Cameras. It shall be able to detect Camera blurring, Camera blinding and change of orientation of fixed Cameras.		
Camera tampering feature shall be provided for all Cameras.		
AI enabled Video Analytics is not implemented on PTZ cameras.		
Loitering Detection:		
The user shall be able to define area and detection time in software.		
The software shall give an alarm as soon as a person is detected in a defined Region of Interest(RoI) area above a predefined time limit.		
User shall be able to create multiple ROI (Region of Interests) in the single camera frame. Shall be able to recognize the objects based on the type and not just by the size.		
Human & Vehicle Detection:		

The software shall be able to detect and classify humans and vehicles in live viewing and give alert only when the classified objects break a rule.		
Search based on Attribute:		
The AI should be able to sort through hours of video with ease, to quickly locate a specific person/ Multiple persons of interest. Attribute Search should improve incident response time and enhance forensic investigations by helping operators compile robust video evidence, create a powerful narrative of events, and reveal an individual's route or last-known location.		
AI software should allow operator/User to bookmark a person who has been identified as a suspect in any playback video or in live mode. It should then have the capability to track and search the objects movements across multiple cameras based on the Attribute of the person and show the results so that the user can track the movement of the person across cameras.		
In the event when a suspect's face is not captured clearly or not recognizable due to any reason, the AI software should allow operators to search a Person based on a person's Attribute characteristics and retrieve intelligent information to locate a specific person or vehicle of interest across multiple recorded video streams from cameras across the campus.		
The system shall be able to trigger an alert if a minimum number of person as a configured by Operator/User in the system gather at a single location. Once Triggered, it should be able to detect all person in the frame for further analysis.		
The system shall be able to detect and extract content metadata from the live and recorded video and photos of certain case: For person's face and body		
It should sort through hours of video across all the station cameras with ease, to quickly locate the specified person across cameras based on his Attribute, reducing search time from day and hours down to minutes.		
The AI should be able to detect the Number Plate of all kind of vehicles entering the Gates during Day and Night Environment.		
The AI should be able to detect kind of vehicle too like car/ Motor Bike/ Truck/ Bus etc. along with colour of vehicle.		
The AI should be able to integrate with the automatic bollard system planned to install at the gates in future.		
The system shall be able to work on normal / ONVIF Profile Compliant Cameras		
Colour Search:		
In the event when suspect face is not clearly visible, in such case a colour base detection and search should be available with Artificial Intelligence (AI) enabled video analytics.		
Combination Search (Human/Vehicle & Colour) ;		
Artificial Intelligence (AI) enabled video analytics should be able to search for suspects with combination of search criteria like Colour and Object (Human / Car) on both live and recorded video		
Artificial Intelligence (AI) enabled Video Analytics Software can be implemented either at firmware level at fixed IP Cameras or at server/ workstation (which should be able to work 24x7, 365 days) level in the control room.		

Artificial Intelligence (AI) enabled Video analytics software shall be implemented either at firmware level or server level for fixed IP Cameras as per details mentioned in the table or as specified by the purchaser. Purchaser has to specify		
System should be capable of uploading video and provide analytics of the uploaded video.		
Minimum of 64 numbers of Cameras to be provided with different types of video analytics software with floating license and should be capable of being changed to any camera if needed.		

Annexure -K

Specification of Client Work station

S. No.	Parameter	Specification	Vendor compliance	Remark
1	Processor	i7-8700		
2	No. of Cores	Minimum 8 Cores in Single Processor PC Workstation		
3	No. of Threads	16		
4	Frequency	3.2 GHz or higher		
6	Memory	32 GB or higher GB DDR3/DDR4 SRDRAM or latest		
7	Operating System	Windows 10 Operating System or latest		
8	LAN/ Ethernet	Onboard/ on slot Gigabit Ethernet (RJ45) with Load Balancing and Fail over Support, IPv6 compliant.		
9	Graphics Card	One no. of dual Port 4 GB NVIDIA Graphic Card or better.		
10	Hard Disk Drive	HDD 1TB HDD 7200 RPM or higher		
12	DVD R/W Drive & USB Ports	Required		
13	USB/ PS/2 mouse and keyboard	Required		

Specification of Display Unit 55 inch (Professional LED Monitor)

S. No.	Parameter	Specification	Vendor compliance	Remark
1	Screen Size	55 Inch		
2	Active Display Area	1,209.6(H) x 680.4(V) mm		
3	Resolution	1920 x 1080 @ 60Hz		
4	Panel Technology	IPS (In-Plane Switching)		
5	Pixel Pitch	0.63mm (H) X 0.63mm (V)		
6	Brightness	500 cd/m2		
7	Contrast Ratio	1400:01:00		
8	Aspect Ratio	16:09		

9	Viewing Angle (H/V)	178° / 178°		
10	Display Color	1.06 Billion (10bit)		
11	Response Time	12ms		
	Interface			
12	HDMI in	minimum 2		
13	Display Port	1(1.1a Ver.)/1(1.1a Ver.)		
14	VGA in	1		
15	DVI in	1		
16	BNC Video In	1/-		
17	RS232	1-Jan		
	External Control			
18	IR Sensor	Remote Control		
19	Serial IN/OUT	RS232-C Daisy Chain		
20	USB	minimum 2 (for firmware update)		
	Transmitter			
21	Remote Control	Yes		
	Feature			
22	Power Savings	Yes		
23	Anti-glare	Yes		
	General			
24	MTBF	50,000 Hours		
25	Power Supply	AC 110~127V 50/60Hz, 220~240 50/60Hz		
26	Power Consumption	240W		
27	Operating Temperature	5°C ~ 35°C (41°F ~ 95°F)		

Annexure -R

Specification of ANPR Video management & Control Software License

S. No.	Specification	Vendor compliance	Remark
	ANPR Video Mgt. Software Specifications (Separate System from VMS)		
	a) The System should be able to detect a vehicle approaching or leaving the designated location without requiring to fully stop.		
	b) The system should be able to support capturing of vehicle license plates.		
	c) The system should be compatible to capture images of License Plate with options to capture Driver images and store in central database.		
	d) System should Perform OCR [Optical Character Recognition] for the standard license number plate (only English alpha numeric plates) of vehicles entering or leaving from the designated locations.		

	e) System should be able to detect and recognize the English alpha numeric License plates of two wheelers or four wheelers & above.		
	f) The system should be able to detect & recognize all vehicle license plates in single or dual row.		
	g) The system shall provide the validation algorithm to detect the number from multiple snaps.		
	h) The system should support customization of vehicle license plates to different formats for each type of plate (eg. 6Char or 8Char per license plate).		
	i) The system should have required interface to support vehicle access barriers to prevent any escape of “wanted”, “Suspicious”, “Stolen”, “Expired” vehicles.		
	j) The system should be able to work seamlessly with wired or wireless networks.		
	k) The system should support real time status update to central command control.		
	l) The system should enable easy and quick retrieval of license plate image / data for post incident analysis and investigations.		
	m) The system design should be based on scalable open architecture platform for seamless integration with similar surveillance systems in use or likely to be used by the customer.		
	n) The system should manage the vehicle search list and be able to upload to all the clients from centrally.		
	o) The system should be rugged & be able to work under all weather conditions.		
	p) The system should have option to clip & associate a pre & post recording of a license plate capture as per the defined time interval by the user.		
	q) The system should support license plate recognition under free flow traffic with or without induction loops support for vehicle detection.		

Annexure -Q

Specification of ANPR Workstation

S. No.	Parameter	Specification	Vendor compliance	Remark
1	Processor	i7-8700		
2	No. of Cores	Minimum 8 Cores in Single Processor PC Workstation		
3	No. of Threads	16		
4	Frequency	3.2 GHz or higher		
6	Memory	32 GB or higher GB DDR3/DDR4 SRDRAM or latest		
7	Operating System	Windows 10 Operating System or latest		
8	LAN Port	Onboard Gigabit Ethernet Port		
9	Graphics Card	One no. of dual Port 4 GB NVIDIA Graphic Card or better.		

10	SSD	250GB SSD for operating system		
11	Hard Disk Drive	HDD 1TB HDD 7200 RPM or higher		
12	Form Factor	Rack Type		
13	USB/ PS/2 mouse and keyboard	Required		
14	Monitor	28" Minimum		

Annexure -L

Specification of Minimum 8 port outdoor industrial switch (managed)

S. No.	Parameter	Specification	Vendor compliance	Remark
1	General Requirements:	Rugged outdoor Din Rail mountable switch with Min 8 10/100/1000 Base-T port of POE + and 4 * 100/1000 Fx Fibre slots with suitable AC PSU; Support bi-directional SFP optical for seamless integration and dual power inputs.		
		Full wire speed layer 2+ switching with 20 Gbps switching capacity		
		IPv4 & IPv6 Static Routing		
		Built-in 8 Gigabit PoE+ ports compliant with IEEE802.3af/at standards		
		Up to 30 W output per PoE+ port		
		Two 1000Base SFP or 1000Base-T Combo ports		
		Operates with 120 watts full PoE+ loading at -40 to 70°C		
		Dual Redundant DC Power Supply Input		
		Layer 2 & Layer 3 Access Control List.		
2	Performance & QoS Features:	(i) Up to eight egress queues per port and strict priority queuing so that the highest priority packets are serviced ahead of all other traffic.		
		(ii) IEEE 802.1D Spanning Tree, IEEE 802.1s Multiple Spanning Tree Protocol (MSTP)		
3	Access Control Features:	(i) Port security, IEEE 802.1x, ip6 first hop security or equivalent, SPANor equivalent, SSH, uRPF		
		(ii) Advanced Access Control Lists (ACL), enhanced TACACS+ and RADIUS authentication		
		(iv) SSHv2 and SNMPv3, DHCP snooping, IGMPv3		

		(v) Spanning Tree Root Guard Support		
		(vi) Multilevel security on console access to prevent unauthorized access		
4	VLAN Features	(i) 802.1Q Tagged VLAN		
		(ii) Dynamic VLAN Registration		
		(iii) Protocol support for auto negotiation of 802.1Q trunk and encapsulation on all inter-switch links		
		(iv) Protocol support for addition, deletion, renaming of VLANs on a network-wide basis		
		(v) IEEE 802.1s, IEEE 802.1w, 802.1X support		
		(vi) IEEE 802.1p CoS and DSCP field classification		
		(vii) IEEE 802.1Q VLAN, IGMP snooping, 802.1p Priority Queues		
5	Protocol and Traffic Features	(i) 8 egress Queues per port, Strict priority queuing, WRR/SRR, WTD, flow based rate limiting or ACLbased rate limiting		
		(iii) Traffic segmentation		
		(iv) Traffic classification should be based on user-definable application types: TOS, DSCP, Port based, Mac address, IP address, TCP/UDP port number		
6	Management Features	(i) RS-232 console port for management via a console terminal or PC		
		(ii) SNMP v1, v2, v3		
		(iii) Web-based management, Web GUI traffic monitoring		
		(iv) Web management. Should support Netflow or equivalent for traffic monitoring.		
		(v) CLI management support.		
		(vi) Layer 2/ Layer 3 trace route		
		(vii) TFTP, Four RMON groups (history, statistics, alarms, and events) support		
7		Should support Unidirectional Link Detection (UDLD) or equivalent to detect unidirectional links caused by incorrect fibre optic wiring or port faults and disable on fibre optics interfaces		
8	Multicast For Video	IGMP snooping v1 , v2 and v3, MLD snooping (v1 and v2)		
9	Operating temperature	Min of -40 to 70 Degrees or better		
10	Humidity	5% to 95% or better		
11	Certifications	Shock EN60068-2-27, EN60068-2-31, Vibration EN60068-2-6, NEMA TS2, EMC : EN61000-4-2 (ESD), EN61000-4-3 (RS), EN61000-4-4 (EFT), EN61000-4-5		

		(Surge), EN61000-4-6 (CS), EN61000-4-8 EN61000-4-11		
12		UL/IEC/EN 60950-1; ROHS Compliance; Min. IP30 Enclosure Rating, DIN Rail Mounting		
13	Mounting	Switch must be rack mountable. Rack mounting kits and accessories should be supplied.		
14	Cables & Accessories	All necessary cables - FC, power & accessories should be supplied		

Annexure -V

Specification of 24 port PoE+ Based managed switch

Technical Specification				
Access Switch				
Sr. No.	Criteria	Feature Description	Vendor compliance	Remark
1	General Requirements:	i) 24 gigabit Ethernet 10/100/1000Mbps PoE+ Based		
		ii) Dedicated uplink module supplied must be able to support minimum 4 1/10G Fiber Uplink ports.		
		iii) Switch should be of 1 RU configuration. Switch should support stacking of minimum 8 switches.		
		iv) All 24 ports can auto-negotiate between 10Mbps/100Mbps/1000, half-duplex or full duplex and flow control for half-duplex ports.		
		v) Minimum 128 Gbps Switching bandwidth capacity.		
		vi) Minimum Packet Forwarding Rate of 90 Mpps (based on 64-byte packet)		
		vii) Minimum 1000 VLANs		
		viii) Minimum 32K MAC address		
		ix) Minimum 2GB Flash Memory and 4 GB DRAM		
		x) Should have support for dual internal field replaceable redundant AC Power and FAN unit both		
		xi) Switch ports should support MDIX (medium-dependent interface crossover) connections		

		xii) Switch should have support for Private Vlan,		
		xiii) Switch should have switch hibernation mode and energy efficient Ethernet 802.3az standard.		
		Switch should support dedicated stacking ports with stack bandwidth of atleast 128 Gbps		
		(xv) The uplink ports shall support 1000BaseLX, 1000BaseLH, 1000BaseSX, 1000BaseT, 10GBaseSR, 10GBaseLR, 10GBaseER, 10GBaseLRM transceivers		
2	Performance & QoS Features:	(i) Auto negotiating on all ports that automatically selects half- or full-duplex transmission mode to optimize bandwidth.		
		(ii) Per-port broadcast, multicast, and unicast storm control support		
		(iii) Port Mirroring, Port Trunking and 802.3ad Link Aggregation port trunks		
		(iv) IEEE 802.3x flow control for full-duplex mode ports.		
		(v) IEEE 802.1D Spanning Tree, IEEE 802.1W RSTP, IEEE 802.1s Multiple Spanning Tree Protocol (MSTP)		
		(vi) Provision for loop avoidance in case of Unidirectional fiber.		
		(vii) Switch should be capable of detecting and disabling port(s) causing spanning tree Protocol loops		
		(viii) It should be possible to configure STP on a per VLAN basis.		
		(ix) IEEE 802.1Q VLAN, IGMP snooping, 802.1p Priority Queues		
		(x) IEEE 802.1p CoS and DSCP field classification		
		(xi) Strict priority queuing support, IGMP Filtering		
		(xii) Support for Granular Rate limiting		
3	Access Control Features:	(i) Port security, IEEE 802.1x, ip6 first hop security or equivalent, SPAN Or Equivalent and SSH.		
		(ii) Advanced Access Control Lists (ACL), enhanced TACACS+ and RADIUS authentication		
		(iii) 802.1x port-based authentication		
		(iv) SSHv2 and SNMPv3, DHCP snooping, IGMPv3 snooping, IGMP Filtering		
		(v) Spanning Tree Root Guard Support		
		(vi) Multilevel security on console access to prevent unauthorized access		
		(vii) MACSeC Support on all ports		
4	VLAN Features	(i) 802.1Q Tagged VLAN and port based Vlan, cross stack ether-channel,		

		(ii) Dynamic VLAN Registration		
		(iii) Protocol support for auto negotiation of 802.1Q trunk and encapsulation on all inter-switch links		
		(iv) Protocol support for addition, deletion, renaming of VLANs on a network-wide basis		
		(v) IEEE 802.1s, IEEE 802.1w and IEEE 802.1ae		
		(vi) Protocol support for maintaining a separate spanning-tree instance for each VLAN		
		(vii) Switch should have capability to support VxLAN and VRF		
5	Protocol and Traffic Features	(1) 8 egress Queues per port, Strict priority queuing, WRR/SRR, WTD, flow based rate limiting or ACLbased rate limiting		
		(ii) Multicast filtering per port		
		(iii) Traffic segmentation		
		(iv) Switch should support basic Layer 3 protocols such as OSPF, IS-IS, PBR, VRRP/HSRP etc		
		(iv) Traffic classification should be based on user-definable application types: TOS, DSCP, Port based, Mac address, IP address, TCP/UDP port number		
6	Management Features	(i) RS-232 console port for management via a console terminal or PC		
		(ii) SNMP v1, v2, v3		
		(iii) Web-based management, Web GUI traffic monitoring		
		(iv) Web management. Should support Netflow or equivalent for traffic monitoring.		
		(v) CLI management support.		
		(vi) Layer 2/Layer3 trace route		
		(vii) TFTP, Four RMON groups (history, statistics, alarms, and events) support		
7	Switches Operating System	(i) All the LAN (Access, Distribution and Core Switches) Components must have same Operating system		
		(ii) Switches operating system must support providing better network analytics and network visibility to help finding the root cause of issues.		
		(iii) Switches Operating system must support telemetry of system information and real time monitoring to identify and automate the issues resolution.		
8	Operating temperature	32 to 104°F (0 to 40°C)		
9	Operating relative humidity	15% to 90%, noncondensing		

10	Mounting	Switch must be rack mountable. Rack mounting kits and accessories should be supplied.		
11	Cables & Accessories	All necessary cables - FC, power & accessories should be supplied		
12	Compliance Standard	● UL 60950-1 Second Edition		
		● CAN/CSA-C22.2 No. 60950-1 Second Edition		
		● EN 60950-1 Second Edition		
		● IEC 60950-1 Second Edition		
		● IPv6 Ready logo Certified		
		● EAL/NDPP Certified		

Annexure -T

Specification of 25 KVA Online UPS

Item Name		25 KVA Online UPS		
S.No.	Parameter / Feature	Detailed Specifications	Vendor Compliance	Remark
1	Make & Model			
2	System Configuration	25 KVA		
3	Technology	True Online, Double Conversion with PWM Technology & IGBT based Inverter		
4	Input Source	Mains/Local DG Set Compatibility		
5	Input Voltage	415V AC 3 phase, 4 wires		
6	Input Voltage Tolerance	± 15%		
7	Input Frequency	50 Hz		
8	Input Frequency Tolerance	45 HZ TO 55 HZ		
9	Input Power factor at nominal voltage and full load	>0.9		
10	Total Harmonic Distortion at 100% Non Linear Load	< 5%		
11	Output Voltage	230 Volts Single Phase		
12	Output Voltage Regulation	± 1% - For 100% static load. THDU <3% between phase to neutral for 100% non-linear load		
13	Output Power Factor	0.8 or higher		
14	Over Load Rating	110% for 60 minutes		
15	Inverter Efficiency	> 89%		
16	Overall efficiency	> 85%		

17	Static Bypass switch	A Built-in static transfer switch shall be provided as an integral part of the UPS. The Static switch shall be a bi-directional naturally committed high-speed static (SCR type) device rated to carry full load current continuously.		
18	Manual Bypass switch	The UPS should have a Built-in Maintenance Bypass Isolator to directly connect the load to the input AC power source, bypassing the rectifier, inverter and static transfer switch.		
19	Battery type	Sealed Maintenance Free with a separate Battery Rack		
21	Backup	Min. 30 minutes backup on full load at 0.8 Efficiency		
22	Battery management	The UPS should have Battery Management feature for:		
		Periodic Battery Test		
		Controlling Charging Time and Current		
		Increase in Battery Life		
		Protection : Battery low Cut-off without draining current		
23	LCD Panel	The UPS should have LCD/LED panel for measuring Output voltages, Output currents and Frequency, Battery Voltage and charging / discharging current, display status of the battery capacity and backup time left and event logging.		
24	RS232 interface	RS232 or USB port & necessary communication cables to be provided		
25	Battery Refresh	The Vendor shall replace all the batteries after every 2.5 years, also replace batteries on failure.		
26	Warranty	OEM onsite, labour, parts warranty for the entire lease period.		

Annexure -T

Specification of 15 KVA Online UPS

Item Name		15 KVA Online UPS		
S.No.	Parameter / Feature	Detailed Specifications	Vendor Compliance	Remark
1	Make & Model			
2	System Configuration	15 KVA		
3	Technology	True Online, Double Conversion with PWM Technology & IGBT based Inverter		
4	Input Source	Mains/Local DG Set Compatibility		

5	Input Voltage	415V AC 3 phase, 4 wires		
6	Input Voltage Tolerance	± 15%		
7	Input Frequency	50 Hz		
8	Input Frequency Tolerance	45 HZ TO 55 HZ		
9	Input Power factor at nominal voltage and full load	>0.9		
10	Total Harmonic Distortion at 100% NonLinear Load	< 5%		
11	Output Voltage	230 Volts Single Phase		
12	Output Voltage Regulation	± 1% - For 100% static load. THDU <3% between phase to neutral for 100% non-linear load		
13	Output Power Factor	0.8 or higher		
14	Over Load Rating	110% for 60 minutes		
15	Inverter Efficiency	> 89%		
16	Overall efficiency	> 85%		
17	Static Bypass switch	A Built-in static transfer switch shall be provided as an integral part of the UPS. The Static switch shall be a bi-directional naturally committed high-speed static (SCR type) device rated to carry full load current continuously.		
18	Manual Bypass switch	The UPS should have a Built-in Maintenance Bypass Isolator to directly connect the load to the input AC power source, bypassing the rectifier, inverter and static transfer switch.		
19	Battery type	Sealed Maintenance Free with a separate Battery Rack		
21	Backup	Min. 30 minutes backup on full load at 0.8 Efficiency		
22	Battery management	The UPS should have Battery Management feature for:		
		Periodic Battery Test		
		Controlling Charging Time and Current		
		Increase in Battery Life		
		Protection : Battery low Cut-off without draining current		
23	LCD Panel	The UPS should have LCD/LED panel for measuring Output voltages, Output currents and Frequency, Battery Voltage and charging / discharging current, display status of the battery capacity and backup time left and event logging.		

24	RS232 interface	RS232 or USB port & necessary communication cables to be provided		
25	Battery Refresh	The Vendor shall replace all the batteries after every 2.5 years, also replace batteries on failure.		
26	Warranty	OEM onsite, labour, parts warranty for the entire lease period.		

Annexure -P

Specification of IP66 Rated Junction Box

S. No.	Specification	Vendor compliance	Remark
1	Frame Enclosures in sturdy sheet steel construction consisting of a 1.5mm sheet steel frame folded from one piece and welded, with All-round protective channel on the door aperture. Cutout with Gland plates on Top sides for cable entry purpose.		
2	Doors 2mm sheet steel door with foamed-in seal, screw fixed hinges Which can be changed for left-hand or right-hand door hanging (for Single door enclosures), 130° opening angle which can be retrofitted for 180° , cam lock with double-bit insert.		
3	Enclosure Material CRCA Sheet steel		
4	Colour Nano Ceramic Coated, electro-dipcoat primed to 20 microns and powder coated with Textured polyester RAL 7035 to 80 to 120 microns		
5	Dimension (minimum) 300 X 400 X 210 (mm)		
6	IP Protection IP66 (Certificate to be enclosed)		
7	Paint Electrophoretic Powder coating:		
8	Standard and Certificates Regulatory Standard Compliance: IP66 to EN60529 , ISO 9001, 14001, comply with EIA 310 ,DIN 41494		
9	Supply includes:		
	a. 6 Core 2 Fiber cable Splice Tray,		
	b. 2 Pole 16Amp MCB		
	c. Terminal Blocks		

Annexure -W

Specification of 10 Sq.mm., 4 Core Armoured Cable

S. No.	Parameter	Specification	Vendor compliance	Remark
1	Size	1.1 KV, 4 CORE X 10 SQ. MM. , PVC INSULATED STRANDED COPPER		
2	type	COMPACT SHAPED CONDUCTOR		
3	HEAT RESISTANT	HEAT RESISTANT TYPE C PVC INSULATION		
4		EXTRUDED PVC INNER SHEATH		

5	ARMOUR TYPE	GALVANIZED STEEL ROUND ARMoured		
6		FRLS (C2 TYPE) AND ST-2 TYPE PVC OUTER SHEATH OVERALL CONFORMING TO IS: 1554 (PART - 1) LATEST		

Annexure -N

Specification of 2.5 Sq.mm., 4 Core Armoured Cable

S. No.	Parameter	Specification	Vendor compliance	Remark
1	Size	1.1 KV, 4 CORE X 2.5 SQ. MM. , PVC INSULATED STRANDED COPPER		
2	type	COMPACT SHAPED CONDUCTOR		
3	HEAT RESISTANT	HEAT RESISTANT TYPE C PVC INSULATION		
4		EXTRUDED PVC INNER SHEATH		
5	ARMOUR TYPE	GALVANIZED STEEL ROUND ARMoured		
6		FRLS (C2 TYPE) AND ST-2 TYPE PVC OUTER SHEATH OVERALL CONFORMING TO IS: 1554 (PART - 1) LATEST		

Annexure -M

Specification of 6 Core Armoured Single Mode Fiber Cable

S. No.	Parameter	Specification		Vendor compliance	Remark
1	Size & Description	6 Core Armoured Single Mode Fiber Cable including Laying in HDPE Conduit (32/26) outer 32 mm and 3 mm thickness ISI Marked			
2	Fiber count	6			
3	Jacketing material details	material	HDPE		
		colour	black		
		Nominal Thickness	2 mm		
		Overall Diameter (Nominal)	15.5 mm		
4	Fibre type	Single mode OS1/ OS2			
5	Operational temperature range	-20 deg C to +60 deg. C			
6	Storage temperature range	-20 deg C to +60 deg. C			
7	Number of Fibers/ Loose Tube	6F (Fiber Identification – blue, orange, green, brown, gray & white)			
8	Cable Armouring	Armoured with ECCS tape with tape thickness >0.15			
9	Installation temperature range	-30 deg C to + 60 deg C			

10	Standards	EN 50173, ISO/ IEC 11801, ANS/TIA- 568- C.3, Telcordia GR- 409			
11	Optical Parameters - SM	ATTENUATION@1310nm	≤ 0.34 (Max) Db/Km		
		ATTENUATION@1550nm	≤ 0.22 (Max) Db/Km		
		ATTENUATION@1380 - 1388 nm	≤ 0.31 (Max) Db/Km		
		Point Discontinuity	≤ 0.1 Db		
		Cut Off Wave length	≤ 0.1260 nm		
		Chromatic Dispersion @1310 nm	≤ 3.5 ps/nm x Km		
		Chromatic Dispersion @1550 nm	≤ 18 ps/nm x Km		
		Core/ Mode - Field	9 μm		
		Cladding	125 μm		
		Coating	250 μm		
12	LOOSE TUBE/ TIGHT BUFFER	Type	LOOSE TUBE		
		Material	PBTP		
		No of Loose Tube	1		
		Diameter	3±0.2 mm		
		Loose Tube Gel	Water blocking gel		
		Core wrapping	Single layer of Polyester tape		
13	Strength Members	Type (Peripheral)	Water Blocking E-Glass		
		Type (Central)	FRP ROD		
14	Mechanical Properties	Minimum installation bend radius	310 mm		
		Minimum service bend radius	248 mm		
		Cable weight (Nominal)	215 Kg/ Km		
		Standard length	2 KM ±5% mtrs.		
		Tensile Strength	4000 N		
		Maximum Crush Resistance	4000 N		
		Type of packing	Wooden Drum		

Annexure -O

Specification of Cat-6 Armoured Ethernet Cable

S. No.	Parameter	Specification	Vendor compliance	Remark
1	Size & Description	Cat-6 Armoured Ethernet Cable compliant with latest EIA/TIA- 568-C.2-1 standard including laying in PVC Conduit 25 mm dia. Medium 2.0 mm Thick		
2	Cat 6	Should meet minimum Category 6 requirements		
3	Type of Conductors	Solid Bare Electrolytic grade Copper, 4 Pair 23 AWG Conductors		
4	Conductor Diameter	23 AWG		

5	Insulation	High Density Polyethylene Solid			
6	Rip Cord	Yes			
7	Inner Jacket	PVC - GREY			
8	Thickness of Inner Jacket	0.65 to 0.7 mm			
9	Armouring	Aluminium wire			
10	Size of Wire	0.80 mm			
11	Sequential Marking	At every meter			
12	Temperature rating	-20 deg C to + 60 deg C			
13	Outer Jacket	FR PVC Black			
14	Thickness of Outer Jacket	0.85 mm (Nom.)			
15	Approximate OD	9.50 mm			
16	Filler	HDPE			
17	Frequency	Characterized to 250 MHz			
18	Standards	TIA/EIA 568-C-2, ISO/ IEC Class E 11801-2002			
19	Gigabit Requirements	Should meet or exceed Gigabit Ethernet Requirements at 100 mtrs			
20	Connectors	Same make as of Cable			
21	Conductor resistance (DC)	93.5Ω/1000mtr @20°C Max			
22	Resistance unbalance	5% Max			
23	Mutual capacitance	5.6 nf/100 mtr max			
24	Capacitance Unbalance pair/ Ground	330PF/100M Max			
25	Propagation Delay Skew	536 nS/100M			
26	Worst Case Cable Skew/ Delay Skew	45ns/100m			
27	NVP	69%			
28	Impedance	100±15%Ω			
29	Colour Code	Pair: 1-2	White-Orange Strip & Orange		
		Pair: 3-6	White-Green Strip & Green		
		Pair: 4-5	White-Blue Strip & Blue		
		Pair: 7-8	White-Brown Strip & Brown		
30	Sheath	CM rated PVC			
31	Pulling Force	11.5 Kg			