CCTV SURVEILLANCE SYSTEM (SUB-STATION)

February 2024

Engineering Department

WEST BENGAL STATE ELECTRICITY TRANSMISSION COMPANY LIMITED

পশ্চিমবঙ্গ রাজ্য বিদ্যুৎ সংবহন কোম্পানি লিমিটেড

(পশ্চিমবঙ্গ সরকারের একটি উদ্যোগ)

Regd. Office: VidyutBhawan, Block – DJ, Sector-II, Bidhannagar, Kolkata – 700091.

CIN: U40101WB2007SGC113474; Website: www.wbsetcl.in

Technical Specification for IP Based CCTV Surveillance System (for Sub-Station)

1.0 General

The specification covers design, supply, erection, testing and commissioning of the complete CCTV surveillance system including cameras, Network Digital video recorder, computer with peripherals, mounting arrangement for cameras, network switches, cables etc. for effective visual monitoring of total Sub-Station premises.

The number of cameras and their locations shall be decided considering the following:

- Entire Boundary wall portion to detect any intrusion.
- Complete Switch yard portion with clear view of each equipment and their operations.
- Coverage of front & rear portion of equipment like - Gas Insulated switchgears, Control Relay & Protection Panels, ACDB, DCDB, Battery Chargers & Batteries, 33 kV & 11 kV switchgears, Communication equipment etc. – to detect any fault and unwanted events.
- Sub-Station main gates and Entrance of key areas like – Store, Colony, Control room building, fire-fighting pump house, GIS Hall etc.

The mounting poles / structures for the cameras are to be provided by the bidder. However, if existing structures are available, the same can be utilised without damaging the structure and hampering other activities.

2.0 Technical requirements

- The system should provide inter-operability of hardware, operation protocols; system expansion should be possible through off-the-shelf available System, software, networking, printing, database connectivity, reporting & communication hardware.
- Proposed CCTV system shall be an open standard based integrated system with IP Network and management architecture aimed at providing high-speed Manual / automatic operation for best performance.
- The system shall use video signals from various types of indoor/outdoor IP based colour cameras installed at different locations, process them for viewing on workstations/monitors and simultaneously record all the cameras after compression using suitable standard. Mouse-Keyboard controllers shall be used for Pan, Tilt, Zoom, and other functions of desired cameras.
- The System shall provide sufficient storage. It shall be ensured that data once recorded shall not be altered by any means. The recording resolution and frame rate for each camera shall be user programmable. The provision for transfer of recorded data to separate external media shall be ensured.
- The required NVR software shall run on common off the shelf available servers.
- The surveillance CCTV System shall operate on 230 V, 50 Hz single-phase power supply.
- **The camera and supplied software both shall be ONVIF (Open Network Video Interface Forum) compliant for easy integration with different make of cameras and hardware for future expansion.**

3.0 System requirements:

a) Cameras for Switchyard portion shall be Day/Night PTZ Dome type. All other cameras shall be with fixed focal length lens suitable for Day-Night use.

b) All camera recordings shall have Camera ID & location/area of recording as well as date/time stamp. Camera ID, Location/Area of recording & date/time shall be programmable by the system administrator with User ID & Password.

c) System to have facility of additional camera installation beyond the originally planned capacity.

d) System shall be triplex i.e. it should provide facility of simultaneous recording, playback & network operation.

e) The offered system shall have facility to export the desired portion of clipping (from a desired date/time to another desired date/time). Viewing of this recording shall be possible on standard PC using standard software like windows media player etc.

f) System shall have provision for remote monitoring and control through Central Command & Control Centre.

g) All the workstations in LAN should be provided with software to view and control the cameras and retrieve the recorded video images from the camera server seamlessly

The equipment should generally conform to Electromagnetic compatibility requirements for outdoor equipment in EHV switchyards. Type test reports to establish compliance with this requirement shall be submitted during detailed engineering.

The major EMC requirement for cameras and other equipment shall be-

1. Electrical Fast Transient -As per IEC 61000-4-4,
2. Damped Oscillatory (1MHz and 100 KHz) -As per IEC 61000-4-18,
3. AC voltage Dips & Interruption / Variation -As per IEC 61000-4-11,
4. Electrostatic Discharge -As per IEC 61000-4-2.
5. Power Frequency Discharge - As per IEC 61000-4-8,
6. Ripple on DC input power supply port immunity test -As per IEC 61000-4-17

4.0 VIDEO SURVEILLANCE APPLICATION SOFTWARE

h) The required software used shall be of open protocol for ease of future expansion.

i) Digital video surveillance control software should be capable to display and manage the entire surveillance system. It should be capable of supporting variety of devices such as cameras, video encoder, Servers, NAS boxes/Raid backup device etc.

j) Surveillance control software should be compatible with MS Windows operating system.

c) Software should have inbuilt facility to store configuration of encoders and cameras.

d) The software should Support flexible Windows Split screen display and scroll mode.

e) The software should be able to control all cameras i.e. PTZ control, Iris control, auto / manual focus, color balance of camera, Selection of presets, Video tour selection etc.

f) The software should have user access authority configurable on per device or per device group basis. The user shall have the facility to request the access and control of any camera for a predetermined time period. Control of camera shall be released automatically after expiry of the predetermined time period.

g) The system shall provide a user activity log with user ID, time stamp, action performed.

h) The users should be on a hierarchical basis as assigned by the administrator. The higher priority person can take control of cameras, which are already being controlled by a lower priority user.

i) It should have recording modes viz. continuous, manual, or programmed modes on date, time and camera-wise. All modes should be disabled and enabled using scheduled configuration. It should also be possible to search and replay the recorded images on date, time and camera-wise. It should provide onscreen controls for remote operation of PTZ cameras. It should have the facility for scheduled recording. Different recording speeds (fps) and resolution for each camera should be possible.

j) The software for clients should also be working on a browser based system for remote users. This will allow any authorized user to display the video of any desired camera on the monitor with full PTZ and associated controls.

k) Retrieval: The VMS application should allow retrieval of data instantaneously or any date / time interval chosen through search functionality of the application software. The system should also allow for backup of specific data on any drives like DVD's or any other device in a format which can be replayed through a standard PC based software. Log of any such activity should be maintained by the system.

5.0 Network video recorder

The Computer based server grade network digital Video recorder is to be provided. The computer shall include the latest configuration available in the market.

6.0 Camera for Visual Monitoring System (VMS)

The VMS camera shall be suitable for wall mounting, ceiling mounting and switchyard structure mounting. The VMS camera should be color high resolution, , Weatherproof, Dome / bullet type. The Camera shall have an internal amplifier that applies gain to the signal. The amplifier must operate when there is insufficient light in the scene to produce an acceptable video output level, and must only apply as much gain as is necessary. The camera shall incorporate one level of automatic gain Compensation (AGC), allowing the user to achieve the optimal balance of noise and low light performance in demanding environments.

Fixed Dome/Bullet Camera

The High-Resolution DSP Color Camera (Digital Signal Processing using a DSP chip) shall include the following features:

a) The Dome Camera shall support the use of P Iris lens connected to the camera via 4-pin molex socket located from the inside of the camera housing. The camera must provide power to the lens. In case of bullet camera, factory fitted lens and housing shall be offered.

b) The Camera shall use Varifocal lens so that focal length can be adjusted as per site condition for larger area surveillance and better picture quality.

c) The power consumption of the High-Resolution DSP Color Dome/Bullet Camera shall be minimum.

PTZ-Control

The features of PTZ shall include:

- Fully functional dynamic keyboard controllers with joystick / mouse for smooth camera movements.
- Controls all pan, tilt, zoom, iris, preset functions.
- Many preset options for quick access to frequently monitored areas and advanced tour programming
- Compatible with all cameras and Control all units including future ones from a single keyboard.

Technical particulars cum compliance sheet

(To be submitted by Bidder during Detailed Engineering)

IP based Fixed Indoor Dome camera			
Sl. No	**Parameter**	**Specification**	**Compliance (Yes/No)**
1.	Image Sensor	Minimum 1/2.8" Progressive Scan CMOS / CCD with Day/Night Function (IR corrected)	
2.	Minimum illumination	Color: 0.025 Lux and B/W: 0.0051 Lux 0 lux with IR	
3.	Focal Length	3.0 - 9.0 mm or better, motorized varifocal zoom lens, auto focus	
4.	Iris Type	P - Iris	
5.	WDR	120 dB or better image quality as per relevant IEC	
6.	Video Compression	H.265, H.264 and MPEG 4 user selectable	
7.	Resolution	1920x1080	
8.	Image settings	Wide dynamic range (WDR), colour, brightness, sharpness, white balance, exposure control	
9.	Local Storage	SD/SDHC/SDXC support 512 GB or better to be available. 128 GB memory card to be provided with each camera.	
10.	Users	5 or more simultaneous Users / Unlimited users in multicast mode.	
11.	IR Distance	30m or better	
12.	ONVIF Conformant	ONVIF Profile S, G, T and M compliance	
13.	Supported Protocols	IPv4/v6, HTTP, FTP, SMTP, UPnP, SNMP, RTP, TCP, UDP, IGMP, ICMP, DHCP, HTTPS	
14.	Operating Temperature	minus 10~+50°c or better	
15.	Operating Humidity	10~90% (non-condensing)	
16.	Intelligent Video Analytics	Motion detection, Audio detection, Object Loitering, Object crossing beam, Direction Violated, Object Appears in Area, Object leave Area, Deep Learning Analytics which can classify Human. All the mentioned analytics should work simultaneously on the camera for continuous alerts.	
17.	Cybersecurity	Onboard FIPS 140-2 L3 certified TPM	

18.	Mount	Facility of Ceiling / Wall mount should be available and all accessories for its support to be provided.	
19.	Certification	UL/CSA/EN/IEC 62368-1, IEC 62471	
20.	Electromagnetic Emissions	FCC Part 15 Subpart B (Class B), IC ICES-003 (Class B), EN 55032 (Class B), EN 61000-6-3, EN 61000-3-2, EN 61000-3-3	
21.	Electromagnetic Immunity	EN 55035, EN 61000-6-1, EN 50130-4, EN 50121-4	

IP based Outdoor Bullet camera for Short range and Bullet / Box camera for Long range			
Sl. No	**Parameter**	**Specification**	**Compliance (Yes/No)**
1.	Image Sensor	Minimum 1/2.8" Progressive Scan CMOS / CCD with Day/Night Function (IR corrected)	
2.	Minimum Illumination	Color: 0.04 Lux and B/W: 0.005 Lux 0 lux with IR	
3.	Focal Length	- 9-40 mm or better Motorized varifocal lens – for Long range - 3-10 mm or better Motorized varifocal lens – for short range	
4.	Image settings	Wide dynamic range (WDR – 120DB image quality or better as per relevant IEC), white Balance, backlight compensation	
5.	Iris Type	P Iris	
6.	Video Compression	H.265, H.264 and MPEG 4 user selectable	
7.	Resolution	2048x1536 pixels or better	
8.	Users	5 or more simultaneous Users/Unlimited users in multicast mode	
9.	IR Distance	- 80 Mtr or better (for long range) - 40 Mtr or better (for short range)	
10.	ONVIF Conformant	ONVIF Profile S, G, T and M compliance	

11.	Supported Protocols	IPv4/v6, HTTP, FTP, SMTP, UPnP, SNMP, RTP,TCP, UDP, IGMP, ICMP, DHCP, HTTPS	
12.	Operating Temperature	minus 10~+60°c or better	
13.	Operating Humidity	90% (non-condensing)	
14.	Intelligent Video Analytics	Motion detection, Audio detection, Object Loitering, Object crossing beam, Direction Violated, Object Appears in Area, Object leave Area, Deep Learning Analytics which can classify Human. All the mentioned analytics should work simultaneously on the camera for continuous alerts.	
15.	Local Storage	SD/SDHC/SDXC support 512 GB or more to be available. 128 GB memory card to be provided with each camera.	
16.	Cybersecurity	Onboard FIPS 140-2 L3 certified TPM	
17.	Mount	Facility of Pole / Structure Mount should be available and all accessories for its support to be provided	
18.	Certification	UL/CSA/EN/IEC 62368-1, IEC 62471	
19.	Casing	IP66 and IK10 or better	
20.	Electromagnetic Emissions	FCC Part 15 Subpart B (Class B), IC ICES-003 (Class B), EN 55032 (Class B), EN 61000-6-3, EN 61000-3-2, EN 61000-3-3	
21.	Electromagnetic Immunity	EN 55035, EN 61000-6-1, EN 50130-4, EN 50121-4	

IP based Outdoor PTZ Camera			
Sl. No	**Parameter**	**Specification**	**Compliance (Yes/No)**
1.	Image Sensor	Minimum 1/2.8” Progressive Scan CMOS / CCD	
2.	Security	Multiple user access with password protection, User Access Log	
3.	Resolution	1920 x 1080 pixels	
4.	Video Compression	H.264, H.265 and MJPEG selectable	
5.	Preset	256 or better	
6.	Signal to noise Ratio (SNR)	Better than 50 dB	
7.	Frame Rate	Upto 60 fps	

8.	Low Light Sensitivity (lux)	Color@0.1 (33ms) & B/W@0.05(33ms), Color @0.025(125 ms) , B/W@0.01(125ms)	
9.	ONVIF Conformant	ONVIF Profile S, T and G compliance	
10.	Lens Type	IR Optical Corrective, Motorized Varifocal	
11.	IR Distance	500ft (150m)	
12.	Lens Zoom	Minimum 360x (30X Optical Zoom and 12X Digital Zoom)	
13.	Focal Length	Minimum 4.5-135mm	
14.	Lens Aperture	f/1.6 ~ f/4.4, 59.8° (wide) ~ 2.34° (tele)	
15.	Panning travel	Complete 360 degree Continuous	
16.	Pan Speed	Adjustable , 0.1 degree / second ~100 degrees/ second	
17.	Tilt Travel	+15° ~ -90°	
18.	Tilt Speed	0 to 145 Deg/Sec	
19.	In built Storage	SD/SDHC/SDXC support 512 GB or more to be available. 128 GB memory card to be provided with each camera.	
20.	IP class	IP66 and IK10 or better, Type 4X	
21.	Working Temperature	minus 10 to +60 deg C	
22.	Working Humidity	90% RH (non-condensing)	
23.	Cyber Security	Onboard FIPS 140-2 L3 certified TPM	
24.	Certification	UL/CE, FCC, EN	
25.	Alarm I/O	2 In & 2 Out	

IP based Outdoor Thermal camera			
Sl. No	**Parameter**	**Specification**	**Compliance (Yes/No)**
1.	Image Sensor	320 x 256 Uncooled VOx Microbolometer or better	
2.	Pixel Pitch	12µm	
3.	Spectral Range	8µm to 14µm	
4.	Aspect Ratio	05:04	
5.	Imaging Rate	Up to 8.6 fps or better	
6.	Dynamic Range	minus 40°C to 225°C (-40°F to 437°F) [may vary based on operating temperature]	
7.	Resolution Scaling	320 x 256, can be scaled up to 640 x 512	
8.	Sensitivity	NETD ≤50 mK or better	
9.	Thermal Palettes	White Hot, Black Hot, Rainbow, RainHC, IronBow, Lava, Artic, GlowBow, GradedFire, Hottest	
10.	Image Uniformity Optimization	Automatic Flat Field Correction (FFC) - Thermal and Temporal	
11.	Lens	4.3 mm, F1.0 or better	

12.	Image Compression Method	H.264, H.265, Motion JPEG	
13.	Streaming	Multi-stream H.264, Multi-stream H.265, Motion JPEG	
14.	Motion Detection	Pixel and Classified Objects	
15.	Tamper Detection	Yes	
16.	Privacy Zones	Up to 64 Zones	
17.	Audio Compression Method	Opus, G.711 PCM 8 kHz	
18.	ONVIF	ONVIF Profile S, G, T and M compliance	
19.	Security	Password protection, HTTPS encryption, digest authentication, WS authentication, user access log, 802.1x port based authentication	
20.	Protocols	IPv6, IPv4, HTTP, HTTPS, SOAP, DNS, NTP, RTSP, RTCP, RTP, TCP, UDP, IGMP, ICMP, DHCP, Zeroconf, ARP	
21.	USB Port	USB 2.0	
22.	Onboard Storage	microSD/microSDHC/microSDXC slot – video speed class card required. Class V10 or better.	
23.	External I/O Terminals	Alarm In, Alarm Out	
24.	Audio Input/Output	Line level input and output	
25.	Enclosure Body	Aluminium	
26.	Operating Temperature	minus 40 °C to +65 °C (-40 °F to 149 °F)	
27.	Certifications	UL, cUL, CE, UKCA, ROHS, RCM, BIS, NOM	
28.	Electromagnetic Emissions	FCC Part 15 Subpart B (Class B), ICES-003 (Class B), EN 55032 (Class B), EN 61000-6-3, EN 61000-3-2, EN 61000-3-3	
29.	Electromagnetic Immunity	EN 55035, EN 61000-6-1, EN 50130-4	
	RADIOMETRIC EVENTS		
30.	Temperature Below, Above, Match Pre-Defined Value	The event is triggered when the temperature in the region of interest is below, above or match a pre-defined temperature value.	
31.	Temperature Changed	The event is triggered when the temperature changed a predefined value during a designated period of time.	

Video Management System Software			
Sl. No	**Parameter**	**Specification**	**Compliance (Yes/No)**
1	Features	The Video Monitoring System Shall be an Integrated System with IP Network Centric functional and Management architecture aimed at providing high-Speed manual/automatic operation for best performance.	
2		Capable of handling multi-vendor products and open standard. The system should support seamless integration of all ONVIF compliant cameras.	
3		The system should facilitate viewing of live and recorded images and controlling of all cameras by the authorized users.	
4		The system shall use video signals from various indoor/outdoor CCD/CMOS cameras installed at different locations, process them for viewing and simultaneously record all the cameras after compression using H264/H265/MPEG4 or better standard. Mouse/Joystick- keyboard controllers shall be used for pan, Tilt, Zoom and other functions of desired cameras.	
5		The Video display should be intelligent enough so that it can –	
		i) Automatically change view based on the event such as motion started/stopped, video analytic, camera digital input contact closed/opened.	
		ii) Display map with all camera health status	
		iii) Device states shown by icons, including network connection loss, video loss etc.	
6		The system shall provide sufficient storage of all the camera recordings (minimum 36 IP cameras to be considered) for a period of 24hrs * 60 days or more @25 FPS, at 1080P or better quality using necessary compression techniques. It shall be ensured that data once recorded shall not be altered by any means. The recording resolution and frame rate for each camera shall be user programmable.	
7		System Requirements:	
a)		System must provide build-in facility of watermarking of digital certificate to ensure tamperproof recording.	
b)		All cameras may be connected through a suitable LAN which shall be able to perform in High Voltage sub-station environment without fail. The equipment should generally conform to Electromagnetic compatibility requirements for outdoor equipment in EHV switchyards. Type test reports to establish compliance with the above requirement shall be submitted during detailed engineering.	
c)		All camera recordings shall have camera ID & location/area of recording as well as date/time stamp. Camera ID, location/area of recording & date/time shall be programmable by the system administrator with user ID & password.	
d)		Facility of camera recording in HD (1920x1080p), (1280×720p), DI, 4CIF, CIF, VGA as well as in any combination i.e any camera can be recorded in any quality.	

e)		System to have facility of 100% additional camera installation beyond the originally planned capacity.	
f)		System shall be triplex i.e. it should provide facility of viewing, multiple recording & Replay simultaneously.	
g)		The offered system shall have facility to export the desired portion of clipping (from a specific date/time to another specific date/time). Viewing of this recording shall be possible on standard pc using standard software like windows media player etc. The Video Management System software shall provide fast evidence export by exporting in video to various formats, including video from multiple cameras in encrypted native database format with an included viewer.	
h)		System shall have provision of WAN connectivity for remote monitoring.	
8		Video Surveillance Application Software	
a)		Digital video surveillance control software should be capable to display and manage the entire surveillance system. It should be capable of supporting variety of devices such as cameras, Video encoder, servers, NAS boxes/Raid backup device etc.	
b)		The Software should support flexible 1/2/4/8/16/32 windows split screen display mode and scroll mode	
c)		The Software should be able to control all cameras i.e. PTZ control , Iris control , audio/manual focus, color balance of camera, Selection of presets, Password and firmware change, video tour selection etc feature shall be there.	
d)		The users should be on a hierarchical basis as assigned by the administrator. The higher priority person can take control of cameras, which are already being controlled by a lower priority user. The VMS software must be integrated with windows active directory.	
e)		It should have the facility for scheduled recording. Different recording speeds (fps) and resolution for each recording mode for each camera should be possible.	
f)		The software for clients should also work on a browser based and mobile app with biometrics authentication system for remote users. This will allow any authorized user to display the video of any desired camera on the monitor with full PTZ and associated controls.	
g)		Retrieval: The VMS application should allow retrieval of data instantaneously or any date/time interval chosen through search functionality of the application software. In case data is older than 30 days and available, the retrieval should be possible. The system should allow for backup of specific data on any drives like DVD's or any other device in a format which can be replayed through a standard PC based software. Log of any such activity should be maintained by the system.	
h)		VMS shall provide the full functionality reporting tool which can provide reports for user login/logoff, Camera accessibility report, server health check reports etc.	

9		The camera and supplied software both shall be ONVIF (Open Network Video Interface Forum) full member or Affiliate to Parent Company or Contributing membership level	
10		The system should have the capability to integrate with Central Control Unit for control and monitoring through common third party software without any commercial involvement.	
11		VMS shall have API based integration with the major camera vendors in order to support features such as, up to 3 Multi-streams, SD Card storage sync, Camera based Edge Analytics support, Camera I/O support, Camera Audio support	
12		VMS manufacturer shall provide their SDK (or any other integration means) libraries and documentation to ensure a seamless integration with any other system	
13		The VMS should support video data grooming feature to enables reduction of video recording data size by reducing the frame rate of the video data.	
14		The system should have built-in, real-time, camera-independent motion detection with the ability to generate motion metadata for Smart Search. The Recording server shall have the ability to handle Video Motion detection without any dependency on camera.	
15		To ensure safety from cyber attacks ,The VMS has the ability to operate in a FIPS 140-2 compliant mode and GDPR compliant	
16		The Video Management System shall support 56-bit encryption of video for export purposes. The 56-bit encryption shall meet the requirements on export limits for encryption.	
17		The Video Management System shall include a Software Development Kit (SDK) that offers important capabilities for integrating the Video Management System with third party software and applications.	
18		The recording server must accept, display and record individual streams of video from each camera that supports it, for example, display a stream in H.264 format and record another stream in MPEG4 format. The intent of this functionality shall be providing independent streams of video from the camera to the server with different resolution, encoding and frame rate.	
19		The VMS software must not be banned/blocked/replaced by any govt authority in India or globally for any support or malfunctioning issue.	
20		The VMS system shall have feature for enhancing security and authorization control	
21		The VMS mobile application should support biometric support for secure access to application data. It should be supported on Android as well as on Apple users.	
22		Video and audio of particular camera shall be mapped accordingly.	

23		The system should have the capability to integrate with Central Control Unit for control and monitoring through common third-party software without any commercial involvement.	
24		VMS should consist of only one Base license and Channel Licenses.	
25		The system shall support automatic failover for recording servers. The system shall provide monitoring of all failover servers from the graphical alarm management module.	
26		Full Viewing Client, Web Client and Mobile Client User Interface must be available in English language with unlimited nos. without any additional cost.	
27		The system must have capability to keep a desired portion of video until it is not asked to delete	
28		The VMS shall support GIS maps and accordingly live view, playback, alarms should support the visualisation of alarms on the map.	

Industrial grade media converter			
Sl. No	**Parameter**	**Tender Specification**	**Compliance (Yes/No)**
1.	Connector Type	1000 Base-X to 1000 Base-T Type Media Convertor	
2.	Fiber Type	Single Mode	
3.	Type	Industrial Grade	
4.	Compliance	Should be of IEEE standards	
5.	Operating Temperature	-10ºC to 75ºC	
6.	Certifications	Should comply with EN, FCC, TUV, UL, VCCI or equivalent standards as well RoHS complied. Protection Rating should be IP30. Standalone or DIN rail mount.	
7.	Features	Auto-negotiation (IEEE 802.3u-compliant)/ Auto MDI/MDI-X/ Support Missing Link and Smart Missing Link and Transparent to IEEE 802.1Q VLAN packets, 8K MAC table, 10KB Jumbo Frame	
8.	Status Indicators	System and port LEDs should there to show the status	

Server based Network Video Recorder			
Sl. No	**Parameter**	**Tender Specification**	**Compliance (Yes/No)**
1	Operating System	MS WINDOWS latest (64 bit)	
2	Compression Method	IP Cameras using MJPEG, H.264, H.265 or better	
3	Supported IP Cameras	Must Support minimum 40 numbers Multi-Brand IP cameras	
4	CPU	Intel Xeon or better	
5	RAM	32 GB	
6	Storage	Minimum 20TB of usable space after RAID 5/6 configuration or as per requirement whichever is higher	
7	Monitor Output	HDM and VGA – 2 or more simultaneous monitors	
8	Keyboard, Mouse, Joystick	Included	
9	Monitoring Option	Split screen for 1 – 2 – 4 – 8 – 16 -32 cameras	
10	Operation	Triplex operation (simultaneous recording, playback, network operation)	
11	Software	Video management Software with permanent license complied with GDPR and FIPS 140-2	
12	Recording	Must have different recording modes like Manual, Continuous, Motion Detection etc.	
13	Playback Options	Play, Pause, Stop, Rewind, Fast Play, Slow Play etc Search Mode: Time / Date, Alarm, Motion Detection	
14	Remote Operation	Monitor, Playback, System Setting, File Download, PTZ control etc.	
15	Input Voltage	230V AC	
	Network Operation Capable	Using WAN or LAN router.	
16		Must support standard network protocol like HTTP, TCP/IP etc	
17	ONVIF Conformant	ONVIF full member	
18	Ethernet Card	1 Gbps	
19	Graphics Card	Minimum 4GB	
20	Communication Ports	Minimum 1 Gbps adaptive Ethernet Interface, 2 USB2.0 interface ports, 1 USB 3.0 interface port (Ethernet ports Type and quantity shall be as required for the system configuration)	
21	Certification	CE, FCC	

Next Generation Firewall / Cyber Security Gateway System				
Sr. No.	**Parameter**	**Specifications**	**Compliance (Yes/ No)**	**Remarks**
1	Hardware Architecture & Performance	The appliance based security platform should be capable of providing firewall, application visibility, Web Protection and IPS functionality in a single appliance		
2		The appliance hardware should be a multicore CPU architecture with a hardened 64 bit operating system to support minimum 8GB memory. Should have additional NPU processor with 4 GB RAM for hardware acceleration .		
3		Should support minimum 120 GB SSD for logs & reports		
4		The appliance should support atleast 8 * 1G ports 2 * 1G SFP ports . The appliance should have option to support additional 4 * 10G ports in future.		
5		Should support atleast 30 Gbps Firewall throughput & 6 Gbps of NGFW throughput		
6		Solution should have 15 Gbps of IPSec VPN throughput		
7		Firewall Should support atleast 1.2 Gbps of Threat Protection Throught (Measured with Firewall, IPS, Application Control, and Malware prevention enabled)		
8		Solution should have 1.4 Gbps SSL/TLS inspection throughput		
9	Industry Certification	Solution should have FIPS & ICSA certified		
10		Solution should provide make in India certificate with minimum 65% local content		
11		Solution should be NSS lab certified with minimum 93% exploit block rate		
12		Solution should be in latest gartner magic quadrant		
13	General Management	Purpose-built, streamlined user interface and firewall rule management for large rule sets with grouping with at-a-glance rule feature and enforcement indicators		

14		Firewall should support TLS 1.3 inspection of encrypted traffic		
15		Firewall should support application acceleration		
16		The Firewall should be able to interoperate with third party threat Intelligence/external threat feed. Solution should have SDWAN license		
17		Full command-line-interface (CLI) accessible from GUI		
18		Automated firmware update notification with easy automated update process and roll-back features		
19		Reusable system object definitions for networks, services, hosts, time periods, users and groups, clients and servers		
20		Backup and restore configurations: locally, via FTP or email; on-demand, daily, weekly or monthly		
21	Firewall, Networking & Routing	Stateful deep packet inspection firewall		
22		Network Flow FastPath acceleration for trusted traffic		
23		User, group, time, or network based policies		
24		Access time polices per user/group		
25		Enforce policy across zones, networks, or by service type		
26		Zone isolation and zone-based policy support		
27		Default zones for LAN, WAN, DMZ, LOCAL, VPN and WiFi		
28		Custom zones on LAN or DMZ		
29		Customizable NAT policies with IP masquerading and full object support to redirect or forward multiple services in a single rule		
30		Routing: static, multicast (PIM-SM), and dynamic (RIP, BGP, OSPF)		
31		Protocol independent multicast routing with IGMP snooping		

32		Bridging with STP support and ARP broadcast forwarding		
33		VLAN DHCP support and tagging, VLAN bridge support		
34		WAN link balancing: multiple Internet connections, auto-link health check, automatic failover, automatic and weighted balancing, and granular multipath rules		
35		Full configuration of DNS, DHCP and NTP, 802.3ad interface link aggregation		
36		IPv6 tunnelling support including 6in4, 6to4, 4in6, and IPv6 rapid deployment through IPSec		
37		Set user-based traffic quotas on upload/download or total traffic and cyclical or non-cyclical		
38	Authentication	Synchronized User ID utilizes Synchronized Security to share currently logged in Active Directory user ID without an agent on the AD server or client		
39		Authentication via: Active Directory, eDirectory, RADIUS, LDAP and TACACS+		
40		Server authentication agents for Active Directory SSO, STAS, SATC		
41		Single sign-on: Active directory, eDirectory, RADIUS Accounting		
42		Browser SSO authentication: Transparent, proxy authentication (NTLM) and Kerberos		
43		Browser Captive Portal		
44	Next Gen VPN Support	Site-to-site VPN: SSL, IPSec, 256- bit AES/3DES, PFS, RSA, X.509 certificates, pre-shared key		
45		L2TP and PPTP, Route-based VPN		
46		Remote access: SSL, IPsec, iPhone/iPad/ Cisco/Android VPN client support, IKEv2 Support		
47		SSL client for Windows and configuration download via user portal		
48		Encrypted HTML5 self-service portal with support for RDP, HTTP, HTTPS, SSH, Telnet, and VNC		

49		Authentication: Pre-Shared Key (PSK), PKI (X.509), Token and XAUTH		
50		Enables Synchronized Security and Security Heartbeat for remote connected users		
51	Intrusion Prevention (IPS)	High-performance, next-gen IPS deep packet inspection engine with selective IPS patterns that can be applied on a firewall rule basis for maximum performance and protection		
52		Advanced Threat Protection (detect and block network traffic attempting to contact command and control servers using multi-layered DNS, AFC, and firewall)		
53		Firewall should have option to block or quarantine IP address of any compromised end point		
54	Web Protection and Control	Fully transparent proxy for anti-malware and web-filtering		
55		Enhanced Advanced Threat Protection		
56		Malware scanning: block all forms of viruses, web malware, trojans and spyware on HTTP/S, FTP and web-based email		
57		Advanced web malware protection with JavaScript emulation		
58		Live Protection real-time in-the-cloud lookups for the latest threat intelligence		
59		Second independent malware detection engine for dual-scanning		
60		Web keyword monitoring and enforcement to log, report or block web content matching keyword lists with the option to upload customs lists		
61		Block Potentially Unwanted Applications (PUAs)		
62	Application Protection and Control	Synchronized App Control to automatically, identify, classify, and control all unknown Windows and Mac applications on the network		
63		Signature-based application control with patterns for thousands of applications		

64		Cloud Application Visibility and Control to discover Shadow IT		
65		App Control Smart Filters that enable dynamic policies which automatically update as new patterns are added		
66		Micro app discovery and control		
67		Application control based on category, characteristics (e.g., bandwidth and productivity consuming), technology (e.g. P2P), and risk level		
68	Zero Day Protection	Inspects executables and documents containing executable content (including .exe, .com, and .dll, .doc, .docx, docm, and .rtf and PDF) and archives containing any of the file types listed above (including ZIP, BZIP, GZIP, RAR, TAR, LHA/LZH, 7Z, Microsoft Cabinet)		
69		Aggressive behavioural, network, and memory analysis		
70		Suspicious files subjected to threat intelligence analysis in parallel with full sandbox analysis		
71		Machine Learning technology with Deep Learning scans all dropped executable files		
72		Includes exploit prevention and Cryptoguard Protection technology from endpoint security		
73		In-depth malicious file reports and dashboard file release capability		
74	48 months License from the date of commissioning includes :	Network Protection Subscriptions (IPS,HTML5, ATP, Anti-malware),		
75		Web Protection Subscriptions (URL, AppCtrl, Web/App Traffic Shaping),		
76		Zero Day Protection		
77		24 X 7 hardware & warranty support from OEM		

Industrial grade 4 Port PoE Network switch			
Sl. No	**Parameter**	**Specification**	**Compliance (Yes/No)**
1.	General Features	Industrial grade Managed switch with minimum 4x10/100/1000 RJ-45 PoE+ ports and 2x100/1000 Base-X SFP ports.	
2.		Switch should support maximum PoE Budget of 240watt	
3.		The switch should have minimum switching capacity of 20Gbps.	
4.	Supported protocols	Should support SNMP v1/v2c/v3v6, Web, Telnet and SSHv6, etc.	
5.	Temperature	Operating Temperature of switch should be -10°C to 75°C	

24Port Managed Network Switch			
Sl. No	**Parameter**	**Specification**	**Compliance (Yes/No)**
1.	Interface	Switch Should have 24*10/100/1000T ports with minimum 4 numbers fibre support	
2.	Performance	The switch should have min 52Gbps or higher Switching capacity	
3.	Quality of Service	IEEE 802.1p tagging. Port-based priority. Four priority queues per port.	
4.	Security	Should support ACLs, Remote authentication through RADIUS. Destination MAC filtering. Broadcast storming control.	
5.	Management	Should Support SNMPv1/v2c/v3. Configuration backup/restore by FTP and HTTP. Support Web-based configuration.	
6.	Compliances	UL 1950, FCC/EN55022 Class A, VCCI Class A, C-Tick, EN60950 (TUV), EN55024, CE, CSA / CUL and RoHS or equivalent standard.	

Display Monitor, 24 X 7 operation			
Sl. No	**Parameter**	**Tender Specification**	**Compliance (Yes/No)**
1.	Display Type	4K UHD	
2.	Screen Size	Minimum 40"	
3.	Resolution	3840x2160 (16:9)	
4.	Brightness	500 Nit	
5.	Response Time	8 ms	

6.	Interface	HDMI, USB, RJ-45	
7.	Colour	16.7 M	
8.	Viewing Angle	Horizontal 178°, Vertical 178°	
9.	Speaker	2 X10 W, 2 built in speakers	
10.	Operation	24 X 7 hours per week	

Fiber Optic LIU 6 / 12 / 14 Port loaded with SC Adapter, Splice Tray, SC Pigtail and Splice Protector			
Sl. No	**Parameter**	**Specification**	**Compliance (Yes/No)**
1	Fiber optic patch Panel	The 1U Multi-Function Fibre Enclosure is a configurable rack mount unit for storing and terminating incoming fibre cable.	
		The fibre enclosure has been designed to accommodate various termination types and adapter configurations. Accommodates minimum 3 Modlink Cassettes or minimum 3 nos of 6 or 12-Pak adapter plates.	
		The enclosure must, have a sliding drawer for ease of reconfiguring fibers, incorporates a heavy-duty ball bearing slide mechanism, allowing easy access to fibers	
		The adapter plates must be an interchangeable front plate which can facilitates upgrades as & when required	
		Copper grounding stud tie down points at each cable entrance point.	
		Fibre management enclosures that can be used as rack mount enclosure for integrated applications.	
2	Material	Powder coated Mild Steel	
		Rugged steel construction in graphite finish	
		Rear, side & base access for Incoming / Outgoing fiber cables	
3	Cable Management rings	Management rings within the system to accommodate excess fibre cordage behind the through adapters and maintain fibre bend radius.	
4	Sliding cover	Panel cover is of slide out for easy maintenance. Incorporates heavy-duty ball bearing slides for smooth and limited extension of the drawer unit, allowing for patch cable access while protecting installed patch and trunk cables from damage during re-entry of the enclosure	
5	Optical Fibre Adapter Plates	SC Adpter SM Plate - loaded with 6 /12 / 24 Nos SC Adapter	
6	Pigtails	SC, Singlemode, 9/125 µm - 1.5 mtrs (6 / 12 / 24 Nos)	
7	Splice Tray	12 Port Splice Tary - 1 / 2 No	

UPS with 30 minutes Battery Back-up			
Sl. No	**Parameter**	**Tender Specification**	**Compliance (Yes/No)**
1.	Rated Power	2 KVA or as mentioned at BOQ	
2.	Battery Type	12V Sealed Lead Acid Maintenance Free	
3.	Battery charging	Constant Current & Constant voltage	
4.	Topology	True On-line Double conversion	
5.	Backup Time	30 Minutes for Full Load (2 KVA @ 0.8 PF)	
6.	Output waveform	Sinewave	
7.	Protection	Mains Over/Under Voltage , DC Over/Under Voltage , Inverter Over /Under Voltage, Inverter Overload, Overheat etc	
8.	Input Voltage	200 to 260 V AC, 50 Hz ,Single Phase	
9.	Display	LCD Display	
10.	Charger	Built in solid state float cum equalizing charger with automatic boost / trickle charge modes with current limiting features.	

CAT6 UTP Cable			
Sl. No	**Parameter**	**Specification**	**Compliance (Yes/No)**
1	Type	Category 6 shielded Twisted Pair 4 pair cable shall be compliant with ANSI/TIA/EIA-568-B.2-1 Additional Transmission Performance Specifications for 4-pair Category 6 Cabling.	
a)		Category 6 UTP cables shall extend between the work area location and its associated telecommunications closet and consist of 4 pair, 23 AWG, UTP.	
b)		Supports ultrahigh speed data networks such as Gigabit Ethernet (1000 Base-T and 1000 Base-TX) and beyond.	
2	Jacket:	The cable jacket shall be LSZH and LSZH sheath should Complying to: a. Fire rating IEC 60332-1, b. Acid gas IEC 60754-2 c. Smoke density IEC 61034-2	
3		Incorporates central spine maintaining pair separation during installation to ensure premium performance after installation.	

4	Mechanical Characteristics	Construction: 4 twisted pairs separated by internal X shaped, 4 channel, polymer spine / full separator. Half shall not be accepted. Conductor Solid Copper Conductor Diameter 0.56±0.005mm (23 AWG) Insulator Polyolefin Outer Diameter 6.0±0.4mm Max. Temperature 70°C	
5	ROHS/ELV	Compliant	
6	ETL Test Report @250 MHz	Cable should have test by ETL / Intertek @250 MHz and test report should be subbmitted.	

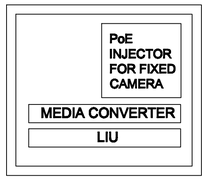
Approved Vendors

Sl. No	Description	Vendors
1.	CCTV Camera	Axis, Pelco, Bosch
2.	Video Management software	Camera OEM, Milestone, Verint, Axxonsoft
3.	Display monitor	Sony, LG, Samsung, Panasonic
4.	Server, Work station , Network Video Recorder	HP, Dell, Advantech
5.	Industrial grade media converter	Allied Telesis, Cisco, D-Link, Sixnet, Korenix
6.	UPS	Emersion, Hitachi HI-Rel, Liveline, Numeric
7.	HDPE pipe	Tirupati, Supreme, Ashish pipe, Narayani
8.	Armoured Fibre Cable	Aksh Opticfibre Ltd., Apar Industries Ltd., KEC International Ltd.
9.	CAT 6 cable, Patch cord LIU	Panduit, RIT, Molex
10.	Power cable	Finolex, Polycab, Havells, KEI
11.	Ethernet Switch	Ruggedcom, Hirschman, Allied Telesis
12.	Surge Protection Device (SPD)	Tercel, Citel, Zotup, Schirtec

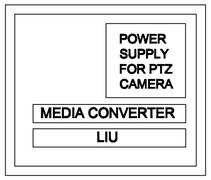
SUBSTATION	NO. OF 4P SWITCH(TO BE INSTALLED AT OUTDOOR)
400KV SUBSTATION(AIS)	6
400KV SUBSTATION(GIS)	3
220KV SUBSTATION(AIS)	4
220KV SUBSTATION(GIS)	2
132KV SUBSTATION(AIS)	3
132KV SUBSTATION(GIS)	2
66KV SUBSTATION	2

LEGENDS

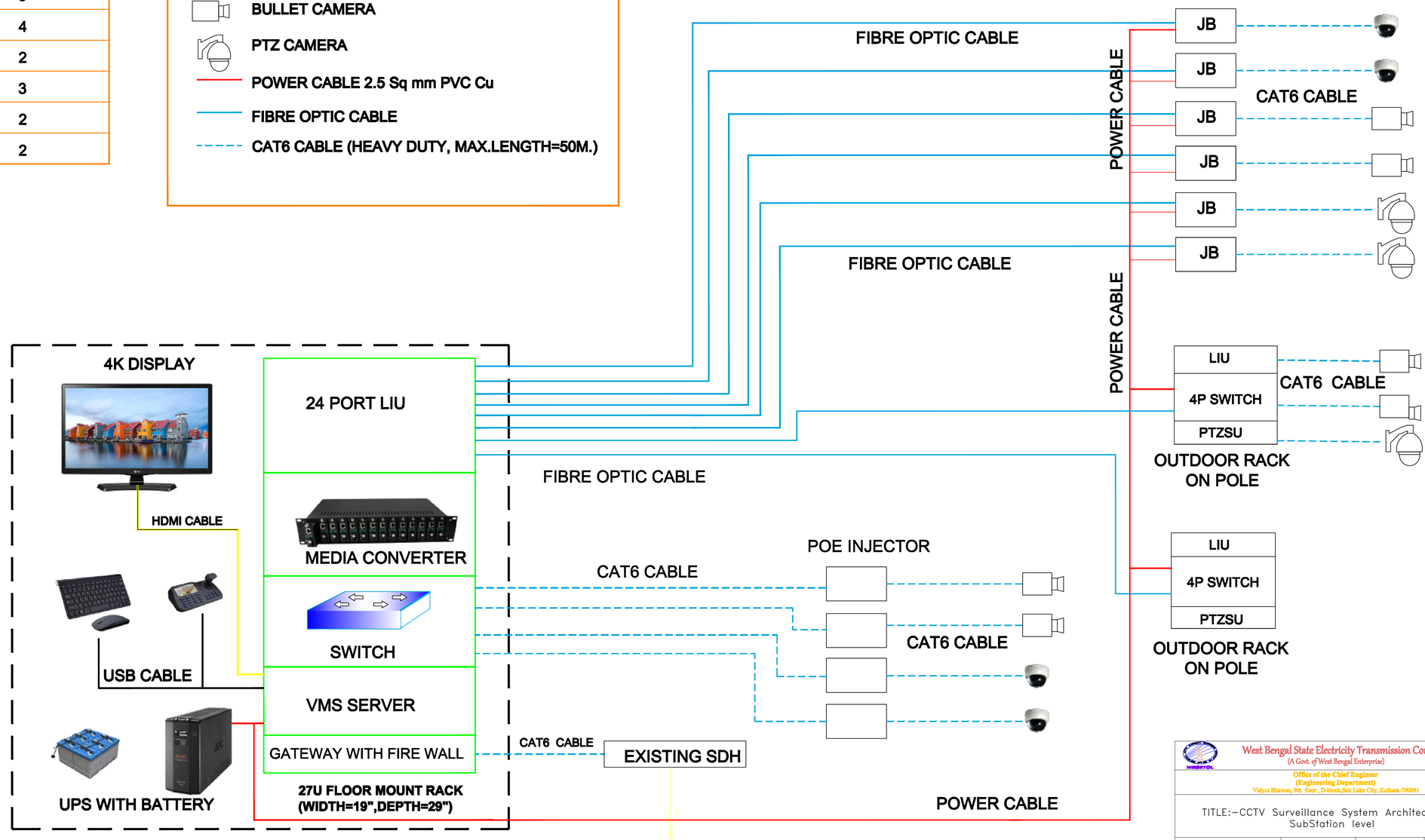
- DOME CAMERA
- BULLET CAMERA
- PTZ CAMERA
- POWER CABLE 2.5 Sq mm PVC Cu
- FIBRE OPTIC CABLE
- CAT6 CABLE (HEAVY DUTY, MAX.LENGTH=50M.)



TYPICAL DETAIL OF FIXED CAMERA JUNCTION BOX



TYPICAL DETAIL OF PTZ CAMERA JUNCTION BOX



West Bengal State Electricity Transmission Company Ltd.
(A Govt. of West Bengal Enterprise)
Office of the Chief Engineer
(Engineering Department)
Vidyut Bhawan, 9th floor , D-block,Salt Lake City, Kolkata-700091

TITLE:–CCTV Surveillance System Architecture – SubStation level

DRAWN BY:–	CHECKED BY:–		
SCALE :–N.T.S	RECOM. BY:–		
DRG. NO.–SB/2175	APPROVED BY:–		
DATE:– 29/09/2023		ELEC.	CIVIL.