



**GUJARAT ENERGY TRANSMISSION**  
**CORPORATION LTD.**  
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**TECHNICAL SPECIFICATION**

**FOR**

**VISUAL MONITORING SYSTEM**

GETCO/ENGG/TECH. SPECI. – VMS Dt.20.02.14

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## **VISUAL MONITORING SYSTEM**

Visual monitoring system (VMS) for effective watch and ward of sub station premises covering the areas of entire switchyard, Inside GIS Building, Control Room, Administrative offices, Transit camp cum guest house, stores and main gate, shall be provided. The contractor shall design, supply, erect, test and commission the complete system including cameras, Digital video recorder system, mounting arrangement for cameras, cables LAN Switches, UPS and any other items/accessories required to complete the system. To provide all the necessary licenses to run the system successfully shall be in the scope of contractor.

System with Color IP Cameras for VMS surveillance would be located at various locations including indoor areas, outdoor switchyard and as per the direction of engineer-In-Charge. The VMS data partly/completely shall be recorded (**minimum for 15 days**) and stored on network video recorder.

The number of cameras and their locations shall be decided in such a way that any location covered in the area can be scanned. The cameras shall be located in such a way to monitor at least:

1. The operation of each and every isolator pole of the complete yard (including future scope).
2. All the Transformer and Reactors (including future scope).
3. All the Entrance doors of Control Room Building, GIS building and Transit camp cum guest house and Panel room.
4. All the gates of switchyard.
5. Main entrance Gate.
6. All other Major Equipments (such as CVT, LA etc.)
7. All other major equipments inside GIS building.

The cameras can be mounted on structures, buildings or any other suitable mounting arrangement to be provided by the contractor.

### **1.1 Technical requirements of major equipment of Visual Monitoring System.**

- 1.1.1 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.
- 1.1.2 The system should facilitate viewing of live and recorded images and controlling of all cameras by the authorized users.
- 1.1.3 The system shall use video signals from various types of indoor/outdoor CCD colour cameras installed at different locations, process them for viewing on

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Workstations / monitors in the control Room and simultaneously record all the cameras after compression using H264/MPEG4 or better standard. Mouse/Joystick-KeyBoard controllers shall be used for Pan, Tilt, Zoom, and other functions of desired cameras.

- 1.1.4 The System shall provide sufficient storage of all the camera recordings for a period of 15 days or more @ 25 FPS, at 4 CIF or better quality using necessary compression techniques for all cameras. 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.
- 1.1.5 The surveillance VMS System shall operate on 230 V, 50 Hz single-phase power supply. System shall have back up UPS power supply meeting power supply need of all the cameras in the stations including those which are installed at gate for a period of 2 hours. The bidder shall submit the sizing calculation for the UPS considering the total load requirement of Video Monitoring System.

## **1.2 System requirements:**

- a) System must provide built-in facility of watermarking or Digital certificate to ensure tamperproof recording.
- b) All cameras may be connected through a suitable LAN which shall be able to perform up to 400 KV class substation environment without fail.
- 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 real-time mode (25 FPS)/15/12.5/10 or lower FPS as well as in any desired combination must be available in the system.
- e) Facility of Camera recording in HD(1280x720p), D1, 4CIF, VGA, as well as in any combination i.e. any camera can be recorded in any quality.
- f) System to have facility of 100% of additional camera installation beyond the originally planned capacity. ( 100 % expansion capacity)
- g) In order to optimize the memory, while recording, video shall be compressed using H 264/MPEG-4 or better standard and streamed over the IP network.
- h) System shall be triplex i.e. it should provide facility of Viewing, Recording & Replay simultaneously.
- i) The offered system shall have facility to export the desired portion of clipping (from a Specific date/time to another specific date/time) on CD or DVD. Viewing of this recording shall be possible on standard PC using standard software like windows media player etc.
- j) System shall have provision of WAN connectivity for remote monitoring.

- k) The equipment should generally conform to Electro magnetic compatibility requirements for outdoor equipment in EHV switchyards. The major EMC required for Cameras and other equipment shall be as under:

1	Electrical Fast transient(Level 4)	-	As per IEC 61000-4-4
2	Damped Oscillatory (1MHz and 100 kHz)(level 3)	-	As per IEC 61000-4-12
3	AC Voltage Dips & Interruption/Variation (level 4)	-	As per IEC 61000-4-12
4	Electrostatic Discharge (level 4)	-	As per IEC 61000-4-2
5	Power Frequency Magnetic Field (level 4)	-	As per IEC 61000-4-8
6	Ripple on Dc Power Supply (level 4)	-	As per IEC 61000-4-17

Type test reports to establish compliance with the above requirement shall be submitted during detailed engineering.

### 1.1.1 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 have inbuilt facility to store configuration of encoders and cameras.
- c) The software should Support flexible 1/2/4/8/16/32 Windows Split screen display mode or scroll mode on the PC monitor.
- d) The software should be able to control all cameras i.e. PTZ control, Iris control, auto / manual focus, and color balance of camera, Selection of presets, Video tour selection etc.
- e) The software should have user access authority configurable on per device or per device group basis. The system shall provide user activity log with user ID, time stamp, action performed, etc.
- f) 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.
- g) 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 recording mode for each camera should be

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possible.

- h) 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.
- i) 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 15 days and available, the retrieval should be possible. 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.
- j) VMS shall provide the full functionality reporting tool which can provide reports for user login/logoff, camera accessibility report, and server health check reports etc.

### 1.1.2 Network video recorder

The Network Video recorder shall include at least Server (min 3.0 GHZ, 8 GB RAM, 3000GB HDD(min)), RAID 5, with suitable configuration along with colored TFT 22” High resolution monitor, and Internal DVD writer. Window XP/Vista/7 Prof. or VMS compatible licensed operating system latest version with hardware like graphic cards, licensed Anti-virus etc.

Further the digital video recorder shall conform to the following requirements:

1.	Server Spec.	Intel Quad Core (or better) 3.0Ghz(min), 8MB Cache, 8GB memory, with suitable NVIDIA graphics card, 3 TB HDD, Raid 5
2.	Recording& Display Frame Rate	Real-time 25 frames per second per channel, manual select.
3.	Recording Resolution	(PAL):1280X720,704(H)x586(V) It should be possible to select lower resolutions
4.	Compression Method	H.264/MPEG-4 or better and latest.
5.	Video Motion Detection Capable	Standard and built-in (selectable in menu).
6.	Monitoring Options	Split screen 1,2,4, 8, 16, 32 or more cameras.
7.	Playback Options	Search, still image capture

8.	Alarm/Event Recording Capable	To be provided with built-in external alarm input/ output ports (8 in, 2 out).
9.	Network Operation Capable	To be provided by using WAN or LAN router.
10.	Remote Internet Viewing Capable	Using WAN or LAN router.
11.	HDD Storage Consumption	1GB~per hour / channel variable based on frame speed and resolution settings, as well as compression.
12.	Operation	Triplex operation (simultaneous recording, playback, network operation)
13.	Number of Video Inputs	32
14.	Audio Recording Capable	32
15.	Input Voltage	230v AC with UPS as a backup for 30 minutes.

### 1.1.3 VMS Camera

- a) The color IP camera for substation shall have PAN, TILT and ZOOM facilities so that it can be focused to the required location from the remote station through a controller. Whereas wireless IP cameras with PTZ controls are required for installation at gates of the GETCO premises as per the direction of Engineer-In-Charge.
- b) The IP Camera at the main gate can be fixed or PTZ base and shall be used for monitoring entry and exit.
- c) It should have sufficient range for viewing all the poles of isolators and other equipments with high degree of clarity.
- d) The VMS camera shall be suitable for wall mounting, ceiling mounting and switchyard structure mounting.
- e) It shall be possible to define at 128 selectable preset locations so that the camera gets automatically focused on selectable of the location for viewing a predefined location.
- f) The camera should be able to detect motion in day & night environments having light intensity of color: 0.5 Lux; B&W: 0.05Lux.
- g) Housing of cameras meant for indoor use shall be of IP 42 or better rating whereas outdoor camera housing shall be of IP66 or better rating, Housing shall be robust and not have the effect of electromagnetic induction in 400kV switchyard.
- h) 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.
- i) Facility of camera recording in real-time mode (25 FPS)/15/12.5/10 or lower FPS as well as in any desired combination must be available in the system.

**A. Outdoor IP Fixed Megapixel Camera Specifications (For Main Gate)**

1.	Image sensor	2- megapixel Progressive, 1/3” CMOS/CCD sensor, Minimum illumination 0.1 Lux
2.	Min luminous	0.5LUX(Color)0.05Lux(Black)
3.	Camera Enclosure Type	IP66 Grade
4.	Iris/Focus	Auto/Manual
5.	Video Compression	Dual stream H.264 and MPEG 4 user selectable
6.	Support Dual-stream	Primary/secondary stream, H.264 and MPEG 4 optional
7.	Video Definition	Primary Stream:1600X1200, 1280X960, 1280X720, Secondary Stream:800X600, 400X288, 192X144,
8.	Video Parameters	Brightness, hue, contrast, saturation and image quality
9.	Video Frame Rate	PAL: 1-25frames/second NTSC:1-30frames/second
10.	Video Compression BR	32Kbit/S - 6Mbit/S
11.	Video output	One channel composite Streaming
12.	Support protocols	TCP, UDP, IP, HTTP, FTP, SMTP, DHCP, DNS, ARP, ICMP, POP3, NTP, IPsec, UpnP, RTP, RTCP
13.	Operating temperature	-5~+50°C
14.	Operating Humidity	10~90%

**B. Outdoor IP66 PTZ HD Camera Specifications (For Switch Yards)**

1.	Image sensor	1/3type Solid State Progressive Scan CCD, WDR(High Definition)
2.	Security	Multiple user access with password protection
3.	Effective Pixels	(PAL): Main Stream:1280X720 Sub Stream:640X360, 320X280 selectable
4.	Compression	Dual Stream H.264 and MPEG 4 user selectable
5.	Signal System	50 Hz
6.	S/N (Signal to noise Ratio)	Better than 50 dB
7.	Electronic Shutter	1/60~1/10,000 sec. automatic or better
8.	Scanning System	Progressive/interlace
9.	Low light Sensitivity (lux)	Color: 0.5Lux; B&W : 0.02Lux
10.	Lens	Minimum 10x(minimum) optical in High Definition (The system shall be able to zoom the images on the monitor without any distortion to the maximum level of optical zoom)
11.	Lens size	Minimum 4.1~73.8 mm

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12	Lens Aperture	F1.6(wide)~F2.8(tele), f=4.1~41.0mm, 10X Zoom, Video Auto Focus Angle of View Horizontal: 52°(wide),2.8°(tele)
13.	PTZ Data Transfer Baud/Bid Rates Supported	Selectable 2400 bps / 4800 bps / 9600 bps.
14.	Panning Range	Complete 360 degrees (horizontal)
15.	Pan Speed	Adjustable 0.1 degrees / second ~ 250 degrees / second
16.	Tilting Range	Min 180° Tilt Rotation.
17.	Tilt Speed	Adjustable 0.1 degrees / second ~ 150 degrees / second.
18	In Built storage	Camera should have inbuilt storage TF or SD format for recording and storing Pictures
19	IP Class	IP66 Standard
20	Working temperature	-0°C~+50°C
21	Operating Humidity	10~90%

#### 1.1.4 PTZ–Keyboards

The features of PTZ shall include:

- Fully functional dynamic keyboard/joystick controllers.
- Control all pan, tilt, zoom, iris, present functions.
- Control up to 255 units from a single keyboard.
- Many preset options and advanced tour programming.
- Compatible with all connected cameras.

1.	Key Application Pan / Tilt / Zoom Protocol Languages	wired keyboard control operation of PTZ functions for weatherproof dome cameras.
2.	Supported PTZ Data Transfer Baud	Selectable Selectable 1200 bps / 2400 bps / 4800 bps
3.	Rates Supported.	/9600bps Dynamic joystick for smooth camera movements, preset location option for quick access to frequently monitored areas.
4.	Additional Features	