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**RDSO SPECIFICATION  
OF  
VIDEO CONFERENCING SYSTEM**

SPECIFICATION NO. RDSO/SPN/TC/100/2020

**Revision 1.0**

Number of Pages: 22

**TELECOM DIRECTORATE  
RESEARCH DESIGNS & STANDARDS ORGANISATION  
LUCKNOW-226011**

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<b>DOCUMENT DATA SHEET</b>	
<b>Specification</b>	RDSO/SPN/TC/100/2020
<b>Revision</b>	1.0
<b>Title of Document</b>	RDSO Specification of Video Conferencing System
<b>Author</b>	Director/Telecom-I/RDSO
<b>Approved by</b>	Executive Director/Telecom/RDSO
<b>Abstract</b>	This document specifies technical specification of Video Conferencing System.

#### **DOCUMENT CONTROL SHEET**

<b>NAME</b>	<b>ORGANIZATION</b>	<b>FUNCTION</b>	<b>LEVEL</b>
DIRECTOR/Telecom-I	RDSO	Member	Prepare
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#### **REVISIONS:**

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**I. SUMMARY:**

This document covers the technical requirements of Video Conferencing System to be provided at Railway Board / Zonal Railway HQ / other important establishments.

**II. SOURCE:**

1. Specification RDSO/SPN/TC/100/2014, Rev. 0.0 has been prepared by RDSO, Lucknow as per Railway Board letter No. 2011/Tele/15(10/2 dated 05/10/2011.
2. Revision 1.0 of the specification RDSO/SPN/TC/100/2020, Rev 1.0 have been prepared by RDSO, Lucknow as per DG/RDSO letter No. DG/Misc. dated 10.06.2020.

**RESEARCH DESIGNS & STANDARDS ORGANISATION MINISTRY  
OF RAILWAYS  
MANAK NAGAR, LUCKNOW**

**Specification of Video Conferencing System**

**RDSO Specification No. RDSO/SPN/TC/100/2020 Revision 1.0**

**1.0 SCOPE:**

- 1.1 Video conferencing system wherever provided at Railway Board / zonal Railway HQ / other important locations shall be able to carry out video conferencing with other video conferencing system located at Zonal HQ/Divisional HQ / any other important location.
- 1.2 This specification covers technical requirement of equipments for video conferencing system like cameras, multiple conferencing units (MCU), gatekeepers, embedded softwares, overhead projectors, etc.
- 1.3 Location requiring video conferencing shall be equipped with video conferencing system.
- 1.4 Nominated conference site shall work as master unit and shall be provided with Multiple Conference Unit (MCU). This conference unit shall be connected to different end points located at Zonal HQ/Divisional HQ / any other important location.
- 1.5 Video conference system shall be IP based system and shall work on IP Dial-in / Dial-out topology.

**2.0 SYSTEM DESCRIPTION:**

- 2.1 Video Conferencing System to be provided at Railway Board / zonal Railway HQ / other important locations and shall consist of following:

S. No.	Hardware and Software requirement for System
a)	HD Camera for End Point
b)	Multiple Conference Unit (MCU)
c)	Recording and streaming server
d)	Gatekeeper and Device management Server
e)	Projector & Projection Screen
f)	Licensing
g)	Cables

- 2.2 It shall be possible to integrate the video conferencing system using the existing LAN / WAN infrastructure on optical / Radio Link network of Railways.

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- 2.3 It shall work on Railway owned IP backbone (Intranet) i.e. Railnet / any other assigned IP backbone and with other site outside Railnet (Internet).
- 2.4 It shall be able to integrate with existing stand alone audio conferencing system installed in conference rooms.
- 2.5 It shall be able to connect equipments like PC presenter, visual presenter/ interactive boards, etc. with the video conferencing system.
- 2.6 Video conferencing system and cameras shall offer streams of H.323 and SIP video compression standards at 30 fps.
- 2.7 System shall be able to provide secured recording for later on reference purposes and user authentication to protect data integrity.
- 3.0 **GENERAL REQUIREMENTS:**
- 3.1 Original Equipment Manufacturer (OEM) of video conferencing system shall have office in India. OEM or its authorized representative shall have service facility in India.
- 3.2 Manufactured products shall have quality system compliance and shall be UL or EN and FCC or CE certified.
- 3.3 All core components of video conferencing system like camera, codec, MCU, Gateway, Gatekeeper and embedded software should be from same manufacturer.
- 3.4 MCU Port size shall be of 10 or 15 or 20 ports. Size of MCU shall be specified by the purchaser at the time of procurement based on the site requirement.
- 3.5 All software and firmware upgrades shall be free of cost for a period of five years or as specified by purchaser.
- 3.6 It shall be possible to dial-in any Video Conferencing (VC) site from the Divisional, Zonal Headquarters or any other locations or when ever desired with no extra hardware & software. LAN/WAN Connectivity for same shall be provided by Railways.
- 3.7 Every VC system shall be capable of getting connected over Ethernet network provided by Railways.
- 3.8 The power supply available at the locations shall be 230 V / 50 Hz AC  $\pm$  10%. All modules of the video conferencing system should work using this power supply only. A suitable UPS may be used for power backup for video conferencing equipment. UPS of suitable size shall be provided by the purchaser.

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- 3.9 All the cameras and other modules of video conferencing system shall be modular in construction. In case of up gradation of such modules in future, it shall be possible to upgrade them without replacing the entire system.
- 3.10 The system should have diagnostics facility for serial, video & network interfaces. System logging shall be possible either to a remote IP address or console port or on the system.
- 3.11 The supplier / manufacturer shall manufacture the equipment locally in India with international quality standards ISO 9001 for which the manufacturer shall be duly accredited. The quality plan describing the quality assurance system followed by the manufacturer shall be submitted.
- 4.0 **TECHNICAL REQUIREMENTS:**
- 4.1 **HD CAMERA FOR END POINT:**
- 4.1.1 The proposed system must support PAL with a PTZ (Pan/Tilt/Zoom) camera, Touch panel, etc. The codec must be based on industry standards such SIP umbrella standards for IP-based audio/video.
- 4.1.2 All the devices proposed should support 10/100/1000 mbps NIC port and IPV6 support.
- 4.1.3 **Video Standards and Protocols:**
- 4.1.3.1 System shall support video protocols as H.264, H.265.
- 4.1.3.2 System shall support content sharing employing dual video using standard H.239 and Binary Flow Control Protocol (BFCP) over SIP. System should also support audio from PC used for content sharing.
- 4.1.4 **Video Resolution:**
- 4.1.4.1 The system should support upto HD 1080p 60fps video resolution.
- 4.1.5 **Content Resolution:**
- 4.1.5.1 The system should support upto HD 1080p 30fps content resolutions.
- 4.1.6 **Audio Standard:**
- 4.1.6.1 The system should support following audio standards and features:
- 4.1.6.1.1 22kHz bandwidth with crystal clear audio, stereo sound.
- 4.1.6.1.2 Equipment shall support G.711, G.722, G.722.1/G.728/G.729, G.722.1 Annex C or equivalent.
- 4.1.6.1.3 Equipment shall have automatic Gain Control and automatic noise suppression.

4.1.6.14 Equipment shall have keyboard noise reduction and instant adaptation echo cancellation.

4.1.6.15 Equipment shall have voice prompts for Auto Attendance.

**4.1.7 Inputs (Video/Audio):**

4.1.7.1 It shall have 1 no. of HD input for connecting main PTZ HD camera.

4.1.7.2 It shall have 1 no. of HD input for connecting additional PTZ HD camera.

4.1.7.3 It shall have 1 no. of HDMI input for connecting PC/Laptop to share 4K content.

4.1.7.4 It shall have 2 no. of Mic input.

4.1.7.5 It shall have 1 no. of Line-Level stereo in (RCA or equivalent or higher) for connecting external audio device.

4.1.7.6 The Unit should support sharing of content Wirelessly without any cables over the network.

**4.1.8 Outputs (Video/Audio):**

4.1.8.1 It shall have 1 no. of HDMI for connecting the main monitor supporting 4K resolution.

4.1.8.2 It shall have 1 no. of HDMI for connecting 2nd monitor supporting 4K resolution.

4.1.8.3 It shall have 1 no. of RCA/Stereo for main monitor audio out or to external speaker system.

**4.1.9 PTZ (Pan/Tilt/Zoom) Camera for video conferencing site shall have following features:**

4.1.9.1	Sensor	1/3" CMOS or CCD
4.1.9.2	Resolution	HD (High Definition) 1080p at 30 fps (Frames Per Second) or 60 fps (Frames Per Second)
4.1.9.3	Zoom	10x optical zoom (minimum)
4.1.9.4	Field of view	Horizontal - 70° (minimum), Vertical - 32° (minimum)
4.1.9.5	Power supply	Power is supplied from HDCI input or HDMI input for codec or from optional power supply (12V DC)
4.1.9.6	Pan range	-90° to +90°
4.1.9.7	Tilt range	-20° to +15°
4.1.9.8	Focus	Automatic



#### 4.1.10 **Security:**

- 4.1.10.1 The system should support secure web, Telnet based access, Embedded AES(Advance Encryption Standard), H.235v3, Support for IPv6 .
- 4.1.10.2 The system should support standard based Directory services, SNMP (Simple Network Management Protocol) and CDR (Call Detail Reports).
- 4.1.10.3 System shall have login access levels for web interface, whitelist feature for secure access i.e. list of IP addresses that can connect to codec over web interface.
- 4.1.10.4 It should be possible to define the system access password policy, disable web based remote access for security reasons.

#### 4.1.11 **Other Features:**

- 4.1.11.1 System shall support for atleast 10 camera presets. The system must be able to support display of near and far end on the single display screen.
- 4.1.11.2 The system should directly connecting atleast 2 microphones without using any external audio mixer.

#### 4.2 **MULTIPLE CONFERENCE UNIT (MCU):**

- 421 The MCU shall be a hardware based system with 1U or more provided with all the necessary accessories to integrate into a 19 inches or 23 inches rack.
- 422 The MCU should be based on advanced telecom computing architecture for higher processing power capability. It must support provision for increasing media in case of upgrade & be scalable.
- 423 The MCU shall operate on a non-Windows based operating system.
- 424 The MCU shall support a dedicated serial/USB connection for maintenance/upgrade.
- 425 The MCU should be modular and should support field replaceable modules with least downtime.

#### 426 **Network Interface:**

- 4.2.6.1 MCU shall have minimum 1 nos. of 10/100/100 Mbps auto sensing Ethernet Interface.
- 4.2.6.2 Equipment shall support direct dial-in from any network.
- 4.2.6.3 System shall support conference data rate up to 6 Mbps (Max).
- 4.2.6.4 System shall support Packet loss recovery, Dynamic jitter buffering for optimum video and audio quality.
- 4.2.6.5 The system must support SIP (Video and Content).
- 4.2.6.6 System should support standards based lost packet recovery feature for H.323 calls, QOS IEEE 802.1P/Q.
- 4.2.6.7 System should also provide support for NAT and firewall traversal through External Firewall Traversal Solution.

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4.2.6.8 Equipment shall support BFCP, AES (Advance Encryption Standard), SRTP, BFCP, RTP, HTTP, HTTPS, DHCP, SNMP, NTP, IPv4 and IPv6.

4.2.6.9 Equipment or sub-system (as mentioned in Para 2.1) status shall be monitored through NMS as diagnostic tools and remotely accessed by all end point user (Zonal Railway)

#### 427 **System Capacity:**

4.2.7.1 It should be a standalone multi point conferencing unit with support for minimum 10 or 15 or 20 or 40 video ports on HD 1080p in Continuous presence (CP) over IP from the day one with AES encryption in a single box without cascading. Entire equipment should be rack mountable with clean wiring. Purchaser shall specify the number of ports at the time of procurement.

4.2.7.2 It must support conference data rates for each video conferencing site up to 6 Mbps (Max.)

4.2.7.3 There should not be any port loss while doing simultaneous conferences on MCU. All the end points should be able to show all the MCU features (BFCP data collaboration, etc) without any port loss.

4.2.7.4 The system should support H.261, H.263, H.264 video coding.

4.2.7.5 The MCU should support bandwidth management features from day one in order to have best performance at lower bandwidths.

4.2.7.6 The MCU shall be capable of supporting SIP, and H.235 v3 at the same time. The MCU should support H.264 in SIP conferences.

4.2.7.7 The MCU should support BFCP and SIP modes.

4.2.7.8 It shall be possible to carry out video conferencing with different sites equipment with different vendors in Dial-in/Dial-out mode on IP network.

#### 428 **Features:**

4.2.8.1 The MCU shall support aspect ratio of 16:9 and 4:3 as well as H.243/chair control.

4.2.8.2 The MCU shall support a mix of resolutions in both Voice Activated mode and Continuous Presence. Each endpoint shall receive at the maximum of its capacity without reducing the capacity of another.

4.2.8.3 The MCU shall support an embedded or external management tool, scheduling and address book containing upto 200 entries or more.

4.2.8.4 The MCU shall support management of MCU loggers by enabling, disabling & renaming them.

4.2.8.5 The MCU shall support user management by implementing strong password, aging rules for passwords, displaying login records, implementing maximum no. of concurrent user sessions and user session timeout etc.

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- 4.2.8.6 The MCU shall support down-speeding and packet error/loss concealment methods to ensure optimum video and audio quality.
- 4.2.8.7 The system shall have Dynamic CP layout adjustment (MCU will choose the best video layout according to the number of participants in the conference). It must support embedded site naming, Active speaker with border highlight and active speaker indication for active video participant.
- 4.2.8.8 The MCU shall support a direct link to an external recording server and video-on-demand solution.
- 4.2.8.9 It should be possible to have SIP clients and H.323 endpoints in a single conference.

#### 429 **Conferences and Scheduling:**

- 4.2.9.1 The MCU shall support conferences that permanently exist but use no resources if no participants are in the conference.
- 4.2.9.2 The MCU shall support an embedded reservation plug-in for scheduling calls.
- 4.2.9.3 The MCU shall provide a built-in Web server, for configuration and administration.
- 4.2.9.4 The MCU shall support scheduled conferences and ad hoc conferencing mode at the same time.
- 4.2.9.5 The MCU shall allow different audio and video settings on individual conference basis i.e. different conferences with different profiles must exist simultaneously.
- 4.2.9.6 The MCU shall transcode video and audio on all ports, without loss of port count, regardless of bitrates, resolutions or codecs that endpoints connect with.
- 4.2.9.7 The MCU should have easy to use tool on the GUI to adjust video and audio resources which should get activated without restarting the MCU.
- 4.2.9.8 The MCU shall allow participants to change the layout they see using their endpoint's remote control. This shall not affect the layout that anyone else sees.
- 4.2.9.9 The MCU shall support forcing the video to all the connected endpoints in a resolution.
- 4.2.9.10 The MCU shall allow the operator of a conference to define a custom layout per conference and per participant, thus customizing global layouts or personal layouts and deciding how the conference is seen on the terminals' displays.
- 4.2.9.11 It should be possible for the operator to move the participants from one CP conference to another, this activity must be available in the call details recorded in the MCU.

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#### 4210 **Conference Features:**

- 4.2.10.1 It shall be able to see all sites in Continuous Presence Layout or higher.
- 4.2.10.2 It shall provide option for Personal layout.
- 4.2.10.3 It shall support auto layout.
- 4.2.10.4 It shall be able to choose site to see.
- 4.2.10.5 It shall have provision to choose from multiple Layout skins.
- 4.2.10.6 It shall be able to select lecture or presentation or Important mode.
- 4.2.10.7 It shall have Gathering Slide, Customized Welcome Slide.
- 4.2.10.8 It shall have Far-end camera control (FECC).
- 4.2.10.9 It shall support Conference dial out and dial in.
- 4.2.10.10 It shall have support for message overlay.
- 4.2.10.11 It shall allow conference participants to perform certain actions like mute/unmute, recording start/stop, enable roll call/disable roll call, terminate conference, secure/unsecure a conference using the remote control or Graphic User Interface of video system.
- 4.2.10.12 It shall support conference chairperson/Host.
- 4.2.10.13 It shall have customizable GUI.
- 4.2.10.14 It shall have speaker notification.
- 4.2.10.15 It shall have auto termination of conference should be supported when Chairperson or Last Person Leaves.
- 4.2.10.16 It shall support conference Templates for 200 virtual conference rooms or more.
- 4.2.10.17 The system should also have multi-conferencing capability to connect minimum 10 Video sites including host site and support multipoint in the following modes:
  - 4.2.10.17.1 Continuous presence.
  - 4.2.10.17.2 Voice switched.

#### 4211 **Network and Security:**

- 4.2.11.1 The MCU shall support AES encryption using H.235 V3 for every participant without affecting any other feature, functionality or port count.
- 4.2.11.2 The MCU shall have settings per conference for encryption.
- 4.2.11.3 The MCU should have strong password policy which can maintain password`s history check and their expiration time.
- 4.2.11.4 The MCU must support TLS (Transport Layer Security) for SIP, QoS - Diffserve, IP Precedence.
- 4.2.11.5 The MCU must provide standards based on method of compensating and correcting for packet loss of media streams.
- 4.2.11.6 All Infra should support IPV6 Day one.

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4.2.11.7 The MCU should support 100 Users joining from Web RTC/HTML5 Browser without installation of any Plug-in or software. The Users can join from the PC of Mobile Devices. This should be supported from Intranet as well as Internet.

### 4.3 RECORDING AND STREAMING SERVER

#### 4.3.1 Application Features:

4.3.1.1 It shall record single point or multipoint conferences with full BFCP content capture.

4.3.1.2 It shall have high definition (HD) support with 1080p & 720p with H.264 video coding.

4.3.1.3 It shall have high capacity recording for 5 recording simultaneous sessions.

4.3.1.4 It shall support playback of video content from endpoints or web browsers.

4.3.1.5 It shall have BFCP standards-based for use with conferencing systems.

#### 4.3.2 Audio/Video Support:

4.3.2.1 It shall support Video Resolutions: Upto HD 720p 30fps.

4.3.2.2 It shall have audio support: G.711, G.722, G.722.1 / G.728 / G.729, Annex C.

4.3.2.3 It shall record in Window Media (WMV) or MP4 video formats.

#### 4.3.3 Recording:

4.3.3.1 It should support 5 concurrent video conferencing recording sessions with full video, audio and content.

4.3.3.2 It shall record audio/video at varying bit rates – 128 kbps to 4 Mbps.

4.3.3.3 It shall support recording in resolution up to 1080p. It shall record stereo calls in single point and multipoint calls.

4.3.3.4 It shall be configurable recording templates to specify multiple bit rates for streaming/ recording, video file formats and content options.

4.3.3.5 It shall record presented content through BFCP standard.

4.3.3.6 It shall have IVR support to provide users verbal/visual indicators of status (recording, pause, etc.) or any other equivalent method.

4.3.3.7 It shall support multiple methods for recording – direct from a video endpoint, MCU/bridge or from the admin user interface.

#### 4.3.4 Playback:

4.3.4.1 It shall support archived playback to H.323 endpoint.

4.3.4.2 It shall have search and sorting options for archives from endpoint interface.

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4.3.4.3 It shall support offload converted video content for playback on other multimedia devices.

4.3.4.4 It shall have windows media download option for video editing or distribution.

4.3.4.5 It shall support 2 or more H.323 connections for media playback.

**4.35 Streaming:**

4.3.5.1 It shall have High Definition – 720p live stream, otherwise flexible enough to showcase 2 concurrent SD live streams.

4.3.5.2 It shall have unicast or multicast up to 200 concurrent web viewers.

**4.36 Capacity:**

4.3.6.1 It shall have up to 500 hours of storage of video, audio and content.

**4.37 Security:**

4.3.7.1 It shall support user and endpoint viewing and recording rights authorization.

4.3.7.2 It shall support AES media encryption.

4.3.7.3 It shall have TLS(Transport Layer Security) /SSL(Secure Sockets Layer) and HTTPS support.

**4.38 Management:**

4.3.8.1 It shall have embedded web server with Linux operating system.

4.3.8.2 It shall support for third-party Gatekeepers.

4.3.8.3 It shall have online status and control of recording functions of current connected H.323 devices.

4.3.8.4 It shall support dial out and record for easy recording by administrators.

4.3.8.5 It shall support User Management with Active Directory integration.

4.3.8.6 It shall support Network Time Protocol.

4.3.8.7 It shall have menu customization for the end user interfaces.

4.3.8.9 It shall have automatic backup and file management functions, diagnostic logging.

**4.39 Network Interface:**

4.3.9.1 It shall have 2 Nos. of 10/100/1000 Ethernet interface.

**4.4 GATEKEEPER AND DEVICE MANAGEMENT SERVER**

**4.41 System:**

4.4.1.1 The system should be built on a powerful platform to support registration of minimum 100 endpoints from day one on the same unit. The system should support 30 concurrent calls minimum.

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- 4.4.1.2 It should be 19" rack mountable type with minimum 1U size or more with redundant power supplies.
- 4.4.1.3 It should be supplied with necessary power cards, cables, connectors, CD's, manuals, bracket accessories, wire managers and other appropriate accessories.
- 4.4.1.4 It shall support 4 Nos. of 10/100/1000 Mbps Ethernet Interface.
- 4.4.1.5 It should provide gatekeeper functionality like:
  - 4.4.1.5.1 H.323 administrative zone establishment.
  - 4.4.1.5.2 Call establishment within a zone and between zones with admission control.
  - 4.4.1.5.3 Bandwidth and session management within a zone and between zones.
  - 4.4.1.5.4 Address lookup and resolution, and translation between E.164 and IP addresses.
- 4.4.1.6 The system should be able to generate automated mail with conference details etc. to all the concerned participants.
- 4.4.1.7 It shall have support for Web, GUI based management.
- 4.4.1.8 It shall have provisioning and scheduling of Conferences and Endpoints.

#### 4.4.2 **Automatic Provisioning:**

- 4.4.2.1 The system should be capable of provisioning in which an administrator can configure one or more endpoints with the set of information (based on administratively configured user policies) the registering devices need to operate within the network. This eliminates the need to configure each endpoint individually.
- 4.4.2.2 The system should support two exclusive provisioning processes: automatic and scheduled. Automatic and scheduled provisioning are exclusive management scenarios.
- 4.4.2.3 It should be possible for the endpoint to automatically pull the device and site provisioning information from the system while start up.

#### 4.4.3 **Automatic Software Update:**

- 4.4.3.1 It should be possible to upgrade the software on one or more endpoints with a standard software package thereby eliminating the need to upgrade each endpoint individually.
- 4.4.3.2 The system must support two exclusive soft up date processes: automatic and scheduled.
- 4.4.3.3 It should be possible for the endpoint to automatically pull the software update profile and package from the device.

#### 4.4.4 **HD Desktop Client:**

- 4.4.4.1 Full set of security and privacy should be maintained by the application during log on. The application must support user ID/password during log on.

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- 4.4.4.2 The system must support PC-based software client applications for communicating over video and voice with content sharing.
- 4.4.4.3 The appliance should support at least 100 desktop clients from the day one so that video, voice, content features can be availed by the users in the network.
- 4.4.4.4 It must be possible to have an Integrated presence-awareness feature that allows users to verify contact availability and status, and seamless enterprise directory integration which simplifies management and ensures contact list accuracy.
- 4.4.4.5 It should be possible to manage PC- based application just like room-based video conferencing systems. It should be possible to call these clients on adhoc basis, scheduling of these desktop clients should also be possible in future via software upgrade key.
- 4.4.4.6 The users must be able to use any standard based web camera and head set for the use of the desktop client feature.
- 4.4.4.7 The desktop client must also be able to share content at anytime during a call either with another client or with hardware based endpoint.
- 4.4.4.8 The desktop clients should be able to control the far end camera in case when connected to hardware based endpoint.
- 4.4.4.9 It shall have provision of watching the self view should also be there to facilitate the user to feel his presence during a call.
- 4.4.4.10 The desktop client should support Windows 10 or latest platform.
- 4.4.4.11 It should support touch tone or DTMF codes while connecting to a bridge.

**4.4.5 Site Topology:**

- 4.4.5.1 The system must offer a graphical view of sites and site links and the ability to automatically generate functional multi-site links. The Site Topology page should supplement the existing sites and Site Links pages, and the functions and data available on the Sites and Site Links pages should also be available on the Site Topology page.
- 4.4.5.2 The administrator should be able to add, edit, or delete sites and site links on the Site Topology page.
- 4.4.5.3 The administrator should be able to generate multi-site links automatically on the Site Topology page.
- 4.4.5.4 The administrator should be able to make and save layout and presentation modifications.
- 4.4.5.5 The administrator should be able to view Tooltips on the Site Topology page that provide the pertinent data about sites and site links.
- 4.4.5.6 The administrator should be able to use the graphical Site Topology page as a dashboard to view real-time alarms and select an alarm to and see the message behind it.



**4.4.6 H.350/LDAP (Lightweight Directory Access Protocol) based Directory Services:**

- 4.4.6.1 The system should store video dialing information in H.350 format.
- 4.4.6.2 The system shall support Microsoft Windows XP, Vista, Windows 7 or latest.
- 4.4.6.3 The system and the Desktop client interfaces should be compatible to run on computers on Windows 10 or latest operating system.

**4.4.7 Increase User Efficiency:**

- 4.4.7.1 It shall support fast and simple scheduling through a Web-based interface or Microsoft Outlook or IBM Lotus Notes, etc.
- 4.4.7.2 It shall support automatic calendar updates keep users current.
- 4.4.7.3 It shall support Active Directory integration simplifies making and scheduling calls by providing users access to global corporate directories.
- 4.4.7.4 It shall have Hassle-free conference scheduling for users, eliminating the need for dedicated conferencing managers.
- 4.4.7.5 It shall have Call Detail Reports (CDR) and Statistics.
- 4.4.7.6 It shall have call details records on screen or number of incoming and outgoing calls and bandwidth usage. The necessary usage details like no. of calls, bandwidth used etc. should be available in for the ease of the administrator.

**4.4.8 General Features:**

- 4.4.8.1 It shall have provision to set default configuration profiles for all terminals/end points of different brands for easy deployment of solution.
- 4.4.8.2 The management solution must have Features for scheduling, reservations and conference management.
- 4.4.8.3 The system must support the registration to multiple address books.
- 4.4.8.4 The system should provide open H.323 standard support of 3rd party IP endpoints, gateways, MCUs, and gatekeepers.

**4.5 DISPLAY DEVICE**

**4.5.1 High Resolution DLP or LCD projector:**

4.5.1.1	Brightness	4000 ANSI Lumens or better
4.5.1.2	Resolution	XGA (1024x768) or better
4.5.1.3	Contrast Ratio	2000:1 or better
4.5.1.4	Aspect Ratio	4:3
4.5.1.5	Diagonal Display(Screen) Size	30-300 inches (1.02-7.62 m)
4.5.1.6	Throw Ratio(Distance ,Width)	1.5-1.7:1
4.5.1.7	Wireless Network	IEEE 802.11b/g/n ready

4.5.1.8	Ethernet LAN connectivity (RJ45 Port)	1
4.5.1.9	HDMI Input Ports	1
4.5.1.10	Video Input Ports	2
4.5.1.11	VGA(RGB/Y Pb Pr) Inputs Ports	1
4.5.1.12	S- Video Input Ports	1
4.5.1.13	Serial Input Ports	1
4.5.1.14	Projector shall have USB connection to computer	
4.5.1.15	Accessories	Power Cord, Wireless Remote Control with batteries & software CD-ROM etc.

#### 4.5.2 **Motorized Projection Screen:**

- 4.5.2.1 Size should be 120" Diagonal Approx (6ft x 8ft) Motorized Projection pentagonal-shaped steel cover.
- 4.5.2.2 It should be of White Matt Scratch-resistant white polyester finish.
- 4.5.2.3 It should be controlled by a 3-position, in-line operating switch.

#### 4.6 **CABLES:**

##### 4.6.1 **STP CAT-6 CABLE:**

- 4.6.1.1 STP (Shielded Twisted Pair) CAT-6 Cable should be compliant with latest EIA/TIA-568-B.2-1 standard for CAT 6 cable.

##### 4.6.2 **POWER CABLE:**

- 4.6.2.1 Power Cable 3 Core, 2.5 sq mm, multi strand copper conductor, PVC insulated, Unarmoured, conforming to IS: 694:1990 reaffirmed 1995 or latest shall be provided.

#### 4.7 **LICENSING:**

- 4.7.1 Vendor should provide requisite number of licenses alongwith Hardware & Software, so that no extra license is required for making system operational. Any additional license shall be as per purchaser's requirement.
- 4.7.2 Vendor should clearly specify licensing of various features.

### 5.0 **TEST REQUIREMENTS:**

#### 5.1 **Conditions of Tests:**

- 5.1.1 Unless otherwise specified all tests shall be carried out at ambient atmospheric conditions.
- 5.1.2 Inspection and testing shall be carried out to the effect that all requirements of this specification are complied with.
- 5.1.3 Inspection shall be carried out for P/T/Z cameras, codecs, MCU, Gatekeeper, DLP projector, motorized screen including software.

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## **5.2 Acceptance Tests:**

- 5.2.1 The following shall constitute the acceptance tests which shall be carried out by the inspecting authority for the purpose of acceptance on randomly selected 10% of items offered from the lot (minimum 1 each type of item) offered for inspection by the supplier:
- a) Visual inspection of complete system (Clause 6.1)
  - b) Performance test (Clause 6.2)
  - c) Endurance test (Clause 6.4)
- 5.2.2 Any other tests shall be carried out as considered necessary by the inspecting authority.

## **5.3 Routine Tests/Factory Acceptance Test:**

- 5.3.1 The following shall comprise the routine tests/factory acceptance test and shall be conducted by manufacturer on every equipment and the test results should be submitted to the inspection authority before inspection. The application software in proper format shall also be submitted to the inspecting authority in advance.
- 5.3.1.1 Visual inspection of complete system (Clause 6.1)
  - 5.3.1.2 Performance test (Clause 6.2)
- 5.3.2 Any other tests shall be carried out as considered necessary by the inspecting authority.

## **6.0 TEST PROCEDURE:**

The test procedure shall be based on the system design. The methodologies to be adopted for various tests shall be decided taking into account the system design/configuration.

### **6.1 Visual Inspection:**

Each equipment of the system shall be visually inspected to ensure compliance with the requirement of clauses 2, 3 & 4 of this specification. The visual inspection shall broadly include:

- 6.1.1 System Level Checking:
- 6.1.1.1 Constructional details.
  - 6.1.1.2 Dimensional check.
  - 6.1.1.3 Configuration.

### **6.2 Performance Test:**

- 6.2.1 The following equipment shall comply with the requirements as specified in clauses 3 & 4.
- 6.2.1.1 HD P/T/Z Camera.
  - 6.2.1.2 MCU.

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6.2.1.3 Gatekeeper & Device Management Server.

6.2.1.4 DLP/LCD Projector.

6.2.1.5 Motorized projection screen.

### **6.3 Factory Acceptance Test:**

6.3.1 Factory Acceptance Tests (FAT) results in for video conferencing equipments shall be submitted by the Original Equipment Manufacturer (OEM), if these items are being manufactured abroad. Otherwise tests will be conducted in manufacturing premises of the firm and shall be submitted to inspecting officials.

6.3.2 All software features are to be tested in premises of vendor for which all required setups are to be arranged.

6.3.3 The FAT shall be able to prove compliance to the specifications through test or test certificates.

6.3.4 All compliances to various standards as given in specifications shall be submitted with documentary proof. These shall include certificates for EMI/EMC / safety / environment protection.

6.3.5 Test results of various type of cables of the specification are to be submitted from the manufacturers of these items.

### **6.4 Endurance Test:**

6.4.1 During acceptance test, endurance test shall be conducted on complete system for continuous operation which shall be 48 hrs at ambient room temperature without giving any deterioration of video quality.

### **7.0 QUALITY ASSURANCE:**

7.1 All materials & workmanship shall be of good quality.

7.2 Since the quality of the equipment bears a direct relationship to the manufacturing process and the environment under which it is manufactured, the manufacturer shall ensure Quality Assurance Program of adequate standard.

7.3 Validation and system of monitoring of QA procedure shall form a part of type approval. The necessary Plant, Machinery and Test instruments as mentioned in Schedule of Technical Requirements (STR) shall be available with the manufacturer.

7.4 Along with the prototype sample for type test, the manufacturer shall submit the Quality Assurance Manual.

## 8.0 MARKING & PACKING:

8.1 The following information shall be clearly marked at a suitable place on each equipment:

8.1.1 Name and address of the manufacturer.

8.1.2 Year of the manufacturer.

8.1.3 Serial number of equipment.

8.1.4 Schematic diagram of the equipment at suitable place.

8.2 The equipment and its sub assemblies shall be packed in suitable boxes and the empty spaces shall be filled with suitable filling material. The equipment shall be finally packed in a wooden/suitable case of sufficient strength so that it can withstand bumps and jerks encountered in a road/rail journey.

## 9.0 INFORMATION TO BE SUPPLIED BY THE PURCHASER:

9.1 The purchaser should clearly indicate details of required items which shall mainly consist of following items as per site requirement.

SN	Description	Qty	Remarks
i)	HD Camera with lens, housing and mount	As specified by the purchaser	
ii)	MCU	As specified by the purchaser	The port size of 10 or 15 or 20 port shall be mentioned by the purchaser
iii)	Gatekeeper & Device management Server	As specified by the purchaser	
iv)	Projector	As specified by the purchaser	
v)	Motorized projection screen	As specified by the purchaser	
vi)	Licensing for various features	As specified by the purchaser	
vii)	Armoured power cable	As specified by the purchaser	The quantities of cables are to be quantified based on drawings of the railway premises according to Location of cameras.
viii)	CAT 6 cable		
ix)	Installation, testing & commissioning of the entire system.		

9.2 Any other item(s) required for completion of video conferencing system other than stated above, shall be arranged by vendor.

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**10.0 TRAINING:**

- 10.1 On site training shall be provided to the Railway staff which shall include complete assembly of the system through the use of various modules, integration of hardware with software and complete operation of the system.
- 10.2 Sets of training manual in two hard copies and two soft copies containing details of technical specifications, installation and commissioning, trouble shooting & maintenance schedule etc. shall be supplied along with the equipment.

**11.0 DOCUMENTATION:**

- 11.1 The following documents should be supplied along with the system:
  - 11.1.1 Mechanical drawings of each sub system/ rack.
  - 11.1.2 Installation and maintenance manual incorporating trouble shooting exercises, printed cards patterns, software etc.
  - 11.1.3 Operating and troubleshooting manual including maintenance schedule.
  - 11.1.4 Pre-commissioning check list.
  - 11.1.5 Detailed installation and commissioning document including site topology diagram.
  - 11.1.6 Documents related to warranty/Guaranty of the system should be clearly mentioned by the supplier.

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