

TEST RESULTS FOR HUAWEI TE30

Manufacturer: Huawei

Model: TE30

Software Version: 1.1.13.4

Optional Features and Modifications: 1080p @30 and 720p @60

Date of Test: 7th – 11th April 2014



CODEC Front view



CODEC Rear view



Remote Control

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A: EXECUTIVE SUMMARY

The Huawei TE30 one piece, high definition conferencing system, is designed to be installed either permanently in a small or medium sized conference room or as part of a Roll-about unit.

The TE30 system is an all-in-one CODEC, camera and microphone system, which in its base form supports 720p@30fps on the main and presentation channels. Options provide 720p@60 or 1080p@30 on the main video with 1080p@30 on the presentation channel. An infra-red remote control, external power supply, CODEC mounting bracket and PC connectivity completes the package.

Options include:

1. 720p@60fps or 1080p@30fps main channel and 1080p@30fps presentation channel support.
2. External Microphone Array

The maximum point-to-point connection speed is 4 Mbit/s, compatibility with other H.323 CODECS is achieved across a range of resolutions from SIF (352x240) to 1920x1080 pixels (optional). The quality of the conference is dependent upon the capability of the remote CODEC and the connection speed.

Pros:

- Compact and easy to install.
- Extensive Web Diagnostics and Monitoring Facilities

Cons:

- Low frame rate experienced on the presentation channel, contrary to data sheet specification
- Audio quality issues when the camera is moving
- Presentation Input Analogue VGA Only

Feature Summary:

Video standards	H.263, H.263+, H.264, H.264 High Profile, H.264 SVC
Supported video resolutions	352 x 240 @25, 30 fps (SIF) 352 x 288 @25, 30 fps (CIF) 400 x 244 @25, 30 fps (SIF) 512 x 288 @25, 30 fps (wCIF) 576 x 336 @25, 30 fps (SIF) 704 x 480 @25, 30 fps (4SIF) 704 x 576 @25, 30 fps (4CIF) 768 x 448 @25, 30 fps (w448p) 1024 x 576 @25, 30 fps (w576p) 1280 x 720 @25, 30 fps (HD720p) 1280 x 720 @50, 60 fps (HD720p) (Optional) 1920 x 1080 @25, 30 fps (Optional)
Communications	H.323 and SIP 128Kbps ~ 4Mbps
Audio standards	G.711, G.722, G.722.1, G.722.1C, G.728, MPEG4 AAC-LD, HWA-LD
Camera	12x optical zoom camera, PTZ function, 1080 native resolution. 72° Horizontal field of view.
Video inputs	One VGA
Video outputs	One VGA, One HDMI
Audio inputs	Optional desk microphone, 3.5mm mini-jack connection for PC/DVD audio
Audio outputs	HDMI, 3.5mm mini-jack,
Auxiliary features	H.239 second video channel up to 1080p resolution @30fps option in point to point calls. Far-end camera control.
Encryption	AES Encryption

B: SETUP PROCEDURE

Setting up the TE30 system was straightforward. The compact combined CODEC, HD camera and microphone is mounted adjacent to the picture monitor/s using the supplied monitor/wall bracket. An infrared remote control and an external power supply completed the package.

The connections for basic operation were clearly illustrated on the quick installation guide and in the documentation and involved:

- Mounting the system adjacent to the monitor(s)
- Using the integration cable to connect power, IP network and the HDMI main monitor output.

System set up was conveniently configured through the “on-screen” menus via the hand held remote control; IP address, IP Gateway, Subnet mask and Gatekeeper address were all entered through these menus.

Approximate set-up time: 15 minutes

Documentation quality: The concise User and Installation Guides were all easy to follow.

C: HARDWARE DESCRIPTION

General

This compact TE30 all in one CODEC camera and microphone is mounted adjacent to the monitors/s using the supplied monitor/wall bracket. If required the TE30 may be mounted upside down and the image flipped in orientation. Provided with one auto switching 10/100 Ethernet connection, together with built in wireless network connectivity, the TE30 is capable of conferencing up to a bandwidth of 4 Mbit/s point to point. The system can display a maximum image resolution of 720p at 30 frames/second on the main and H.239 presentation channels with optional 1080p support. The Vari-Speed cooling fan produced a slight background noise in normal operation.

System options include:

1. 720p@60fps and 1080p@30fps main channel and 1080p@30fps presentation channel support.
2. External Microphone Array

Systems supplied for evaluation included the 1080p option.

During the evaluation, in calls up to 4Mbit/s with the video and H.239 protocols set to Auto and using the advanced settings for Video and Presentation Resolution, the presentation frame rates described on the

data sheet "Dual Stream: Dual 1080p (Optional); Dual 720p@30" were unobtainable. The resolutions and frame rates experienced were:

	Sharp	Smooth
Main Channel	1080p @30	720p @60
Presentation Channel	1080p @4	4CIF @22

While the quality of the Presentation Channel image at 1080p @4fps was excellent for static images, it was very poor for moving images. 4CIF @22fps was acceptable for full frame moving images but very poor for PC desktop images with embedded video.

If the Video and H.239 protocols are pre-selected then additional resolution options are offered. During these detailed tests the highest HD presentation resolution and frame rate experienced was 720p @10fps.

H.264 BP

	Menu Setting	Conference Statistics
Video	720p @25/30	720p @30
H.239 Presentation	720p @25/30	720p @10
Video	720p @50/60	720p @60
H.239 Presentation	720p @50/60	4CIF @22
Video	1080p @25/30	1080p @30
H.239 Presentation	1080p @25/30	1080p @3

H.264 HP

	Menu Setting	Conference Statistics
Video	720p @25/30	720p @30
H.239 Presentation	720p @25/30	1080p @4

Video	720p @50/60	720p @60
H.239 Presentation	720p @50/60	1080p @4
Video	1080p @25/30	1080p @30
H.239 Presentation	1080p @25/30	1080p @4

H.264 SVC

	Menu Setting	Conference Statistics
Video	720p @25/30	720p @30
H.239 Presentation	720p @25/30	720p @10
Video	720p @50/60	720p @60
H.239 Presentation	720p @50/60	4CIF @22
Video	1080p @25/30	1080p @30
H.239 Presentation	1080p @25/30	1080p @4

The main HDMI connection carries the digital audio output; analogue audio input and output connections are also provided. Many HDMI monitors crop the image, this is also known as “Monitor Overscan”. This effect will particularly impact on the Presentation Image: the extremities of the image, for example the task bar, will appear cropped and not visible to the user. There is no adjustment within the TE30 system to compensate for this cropping. Using the monitor DVI input will resolve this issue. The TE30 VGA output displays the entire Presentation Image when connected to a monitor VGA input.

The TE30 system supports a number of video resolutions including:

- The basic CIF format resolution of 352 x 288 pixels.
- wCIF (512 x 288).

- Optimal resolution w448p (768 x 448).
- High definition w720p (1280 x 720).
- Optional High definition w1080p (1920 x 1080).

In addition to the traditional Picture in Picture (PIP) display format, the CODEC also supports Picture outside Picture (POP). This allows both near and far end images to be displayed side by side simultaneously on a single picture monitor.



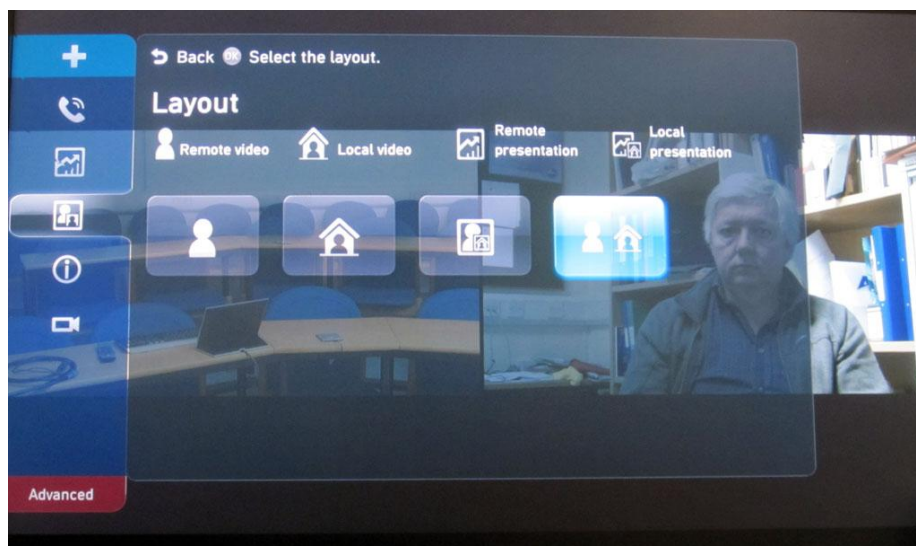
Full screen of the Far Image with Near Image Picture in Picture (PIP)



Far and Near Image, Side by Side (POP)

POP is particularly useful when a single large screen display device such as a plasma/LCD panel or video/data protector is used as it permits greater flexibility in the choice of image layout. In single monitor mode all three images may be displayed simultaneously: the near, far and presentation images.

Image layout selection may be achieved via two methods; using the “layouts” button on the remote control to cycle between the available layouts or by pressing and holding the “layouts” button to access more options via the graphic on screen user interface.



Layout Options Graphic Interface

The “layouts” button on the remote control cycles around the following layouts:

- Full screen of the far end image with near image PIP
- Near and far end images side by side POP
- Full screen of the far end image

The graphic interface provides access to additional options for example:

- Full screen of the near end image
- Local Presentation input Preview

When H.329 dual images are either transmitted or received in single monitor display mode the “layouts” button cycles around the following layouts:

- Full screen of the presentation image
- Full screen of the presentation image with far image PIP
- Presentation and far end image side by side POP
- Presentation image, small near and far image side by side POP
- Presentation image, small near and far image above and below POP

The graphic interface provides access to additional options for example:

- Full screen of the far end image
- Full screen of the near end image



Presentation Image, Near and Far Images Side by Side



Presentation Image, Near and Far Images Above and Below

In Dual monitor mode without Presentation material the monitors display:

	Not in a Call	In a Call
Main monitor	Near Image + Menu	Near Image + Menu
Second monitor	Near image	Far Image

When presentation material is transmitted or received the second monitor displays the presentation material and the main monitor normally carries the menu information. The “layouts” button then selects the following layouts for the main monitor:

- Full screen of the far end image with near image PIP
- Near and far end images side by side POP
- Full screen of the far end image

The layout’s graphic interface provides access to additional image options.

- Full screen of the near end image
- Local Presentation Full Screen Preview

The PTZ (Pan Tilt and Zoom) 1080p HD camera supplied has a native resolution of 1920 x 1080 pixels and horizontal viewing angles of 72 degrees. The camera includes 30 preset positions with locally grabbed images of each position facilitating preset selection.



Camera Preset Selection

At times the camera appeared to have difficulty in achieving focus. The participant in the centre of the frame appeared to continually go in and out of focus or at times the focus settled on the background behind the participant.

Far end camera control (FECC) is supported.

CODEC inputs include the integrated camera and a separate VGA analogue RGB interface for PC connection.

Dual video coding H.239 is supported, providing a second unidirectional video channel. Thus presentation material from a camera and material from a PC could be transmitted simultaneously and displayed on two monitors at the remote site. When two TE30 systems conferenced together over a 4 Mbit/s connection it was possible to transmit two simultaneous high resolution images at 1080p. However the presentation image 30fps described on the data sheet was unobtainable - the highest frame rate experienced was 720p @ 10fps with the H.239 protocol forced to H.264 BP. The bandwidth allocation between the two channels is automatic; alternatively the user may manually set the bandwidth allocated to the H.239 channel.

Several audio formats are supported by the TE30 CODEC, in point to point calls AAC-LD was negotiated by default. Huawei has also implemented a proprietary protocol HWA-LD - HUAWEI Audio Broadband Low Delay Stereo requiring 64 Kbit/s of connection bandwidth.

The Huawei TE30 includes two built in microphones with a pick up radius of 6 metres. On establishing a call it took a few seconds for the echo canceller to train and eliminate any echo. Moving the camera during a conference had two detrimental effects on the audio quality of the link:

- it impacted on the echo cancellation and therefore when the remote site was talking they experienced slight echo while the system retrained to compensate for the movement of the camera microphones
- noise suppression appeared to be applied to the audio picked up by the microphones to compensate for the noise of the camera movement, thus distorting the participants audio. In addition at times the Lip Sync appeared to drift to an unacceptable amount; this could only be rectified by reconnecting the call.

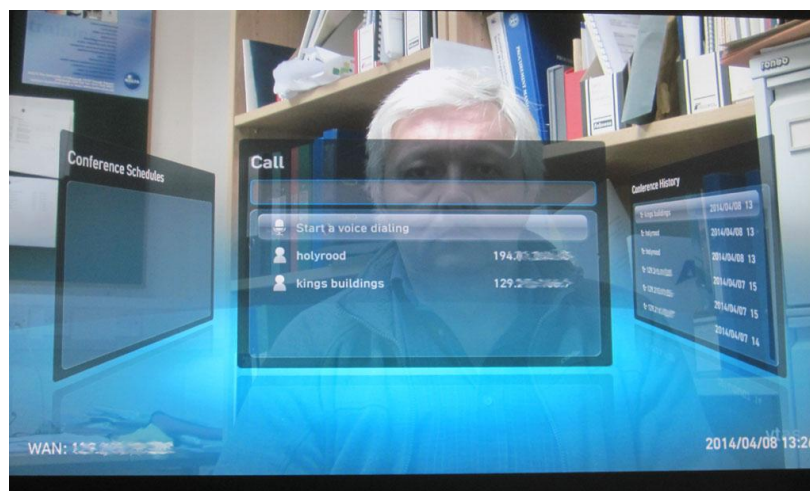
Alternatively, an optional desk microphone array may also be connected to the CODEC via the integration cable. PC audio input and stereo audio outputs are both available via industry standard 3.5mm mini jack connectors. The main HDMI output also carries the digital stereo audio signals.

Encryption is provided at all connection speeds through Advanced Encryption Standard (AES) with a 128 bit session key.

D: SYSTEM OPERATION

The system may be operated locally from the infra-red remote control. The on-screen menus are logical and easy to follow. The system may also be configured and controlled via a web browser interface from a network-connected PC. For security this remote web connection is password protected. The CODEC may also be interfaced to a room control system via an IP network.

Voice dialling is also available which selects locations from the address book using voice recognition.



Call Menu (not in a call)

The remote control includes a comprehensive selection of single operation control buttons including: Power, Home, Help, Call/End Call, Volume, Mic., Mute, Zoom, Near/Far Camera Select, Presentation Start/Stop and Layouts.

At times the system appeared to hang and while the system lights indicated that it was receiving signals from the remote control it did not respond to the remote control or the web interface, a reboot was required to regain remote control.



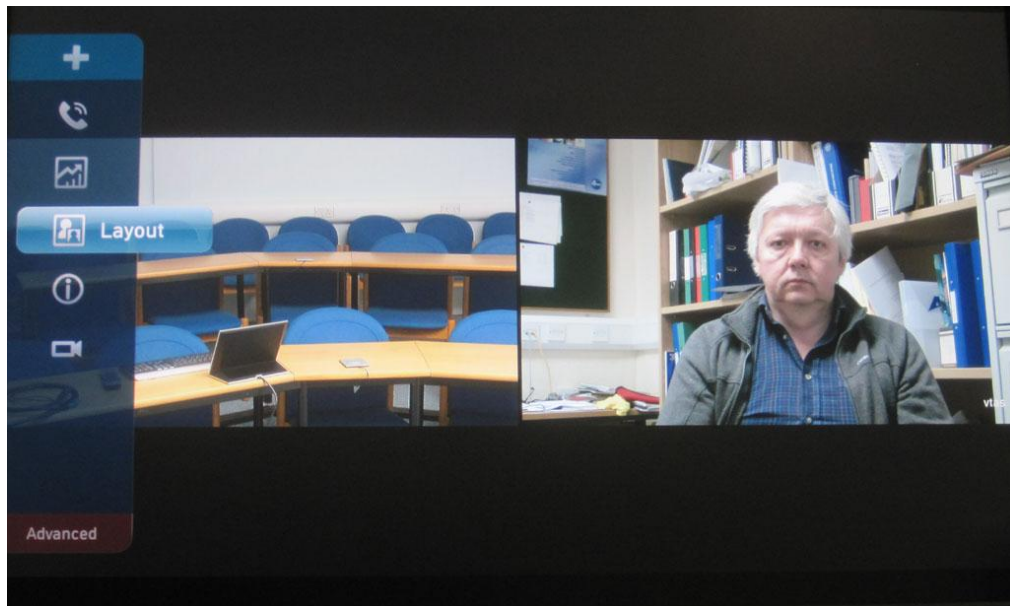
Remote Control

The CODEC remote control includes a single presentation start/stop button:

- Pressing this button for a short period selects the PC presentation source and opens an H.239 connection
- Pressing the button again for a short period closes the H.239 connection

The main camera occupies one channel and the source connected to the VGA input the second channel, normally a PC. At the remote site these two images may either be viewed on two separate monitors or using POP displayed on a single screen.

Alternatively several user controls are available during a call from the graphic user interface; this is accessed by pressing the “Home” button on the remote control.



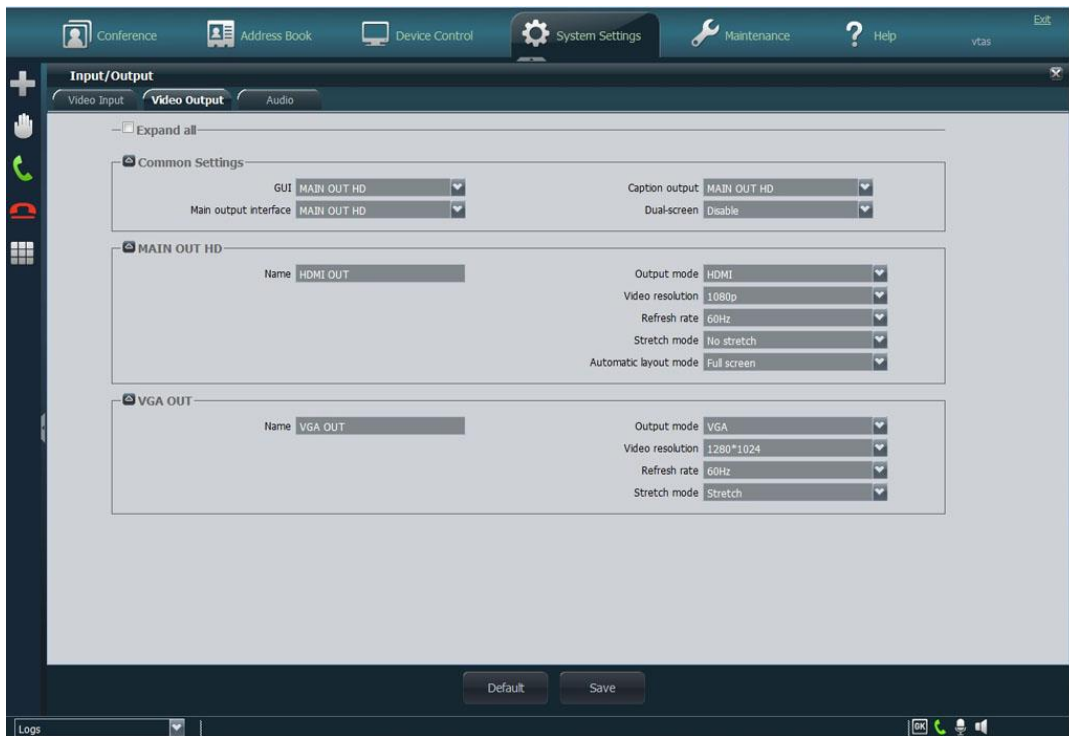
Graphic User Interface (in a call)

The system takes a significant period to boot up from cold (~50 seconds), on screen graphics provide useful user feedback that the system is booting up. When not in a call the system automatically goes into sleep mode after a user-definable period of time, it can also be put into standby mode via the remote control. An incoming call or a remote control button press will return the system to active mode. The system may also be scheduled to turn off and on to a user defined daily schedule.

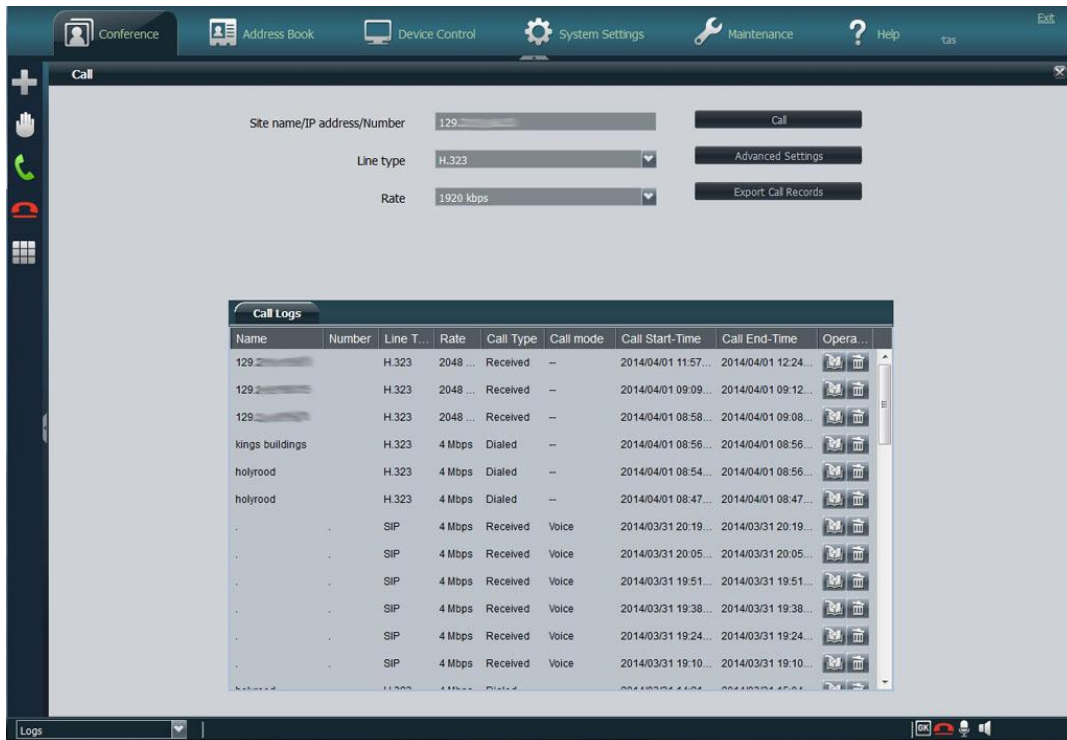
The Status menu displays call status data including connection speed, compression protocols and packet loss.

The system may also be configured, controlled and monitored via a password protected web browser from a network connected PC. This facility provided control and monitoring facilities including an online version of the system remote control. Snapshot images of the local video, remote video and presentation images at the CODEC are also provided. This web video image is available both in and out of a call. Scrolling captions and banners may also be added to the CODEC output via the web interface.

Extensive diagnostic and monitoring tools are also available from the web interface including audio and colour bar test signals and system loop back tests. The Web and CODEC interfaces also provide access to audio level meters and level adjustments for all input and output connections.



Web Configuration Interface

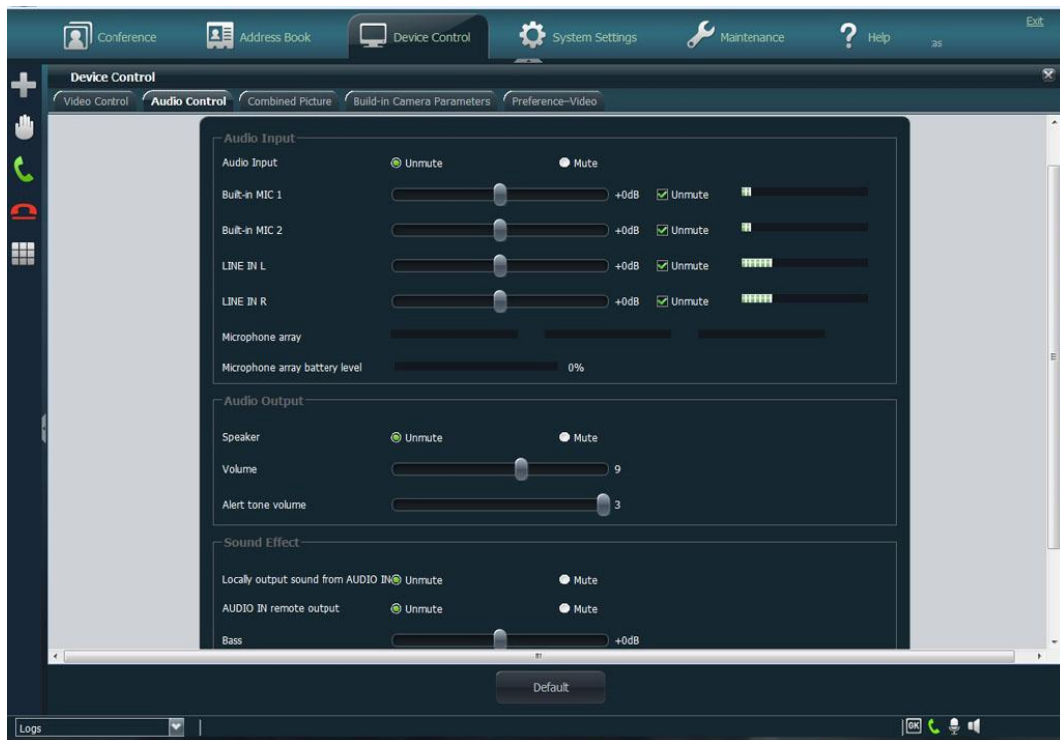


Call Control Interface

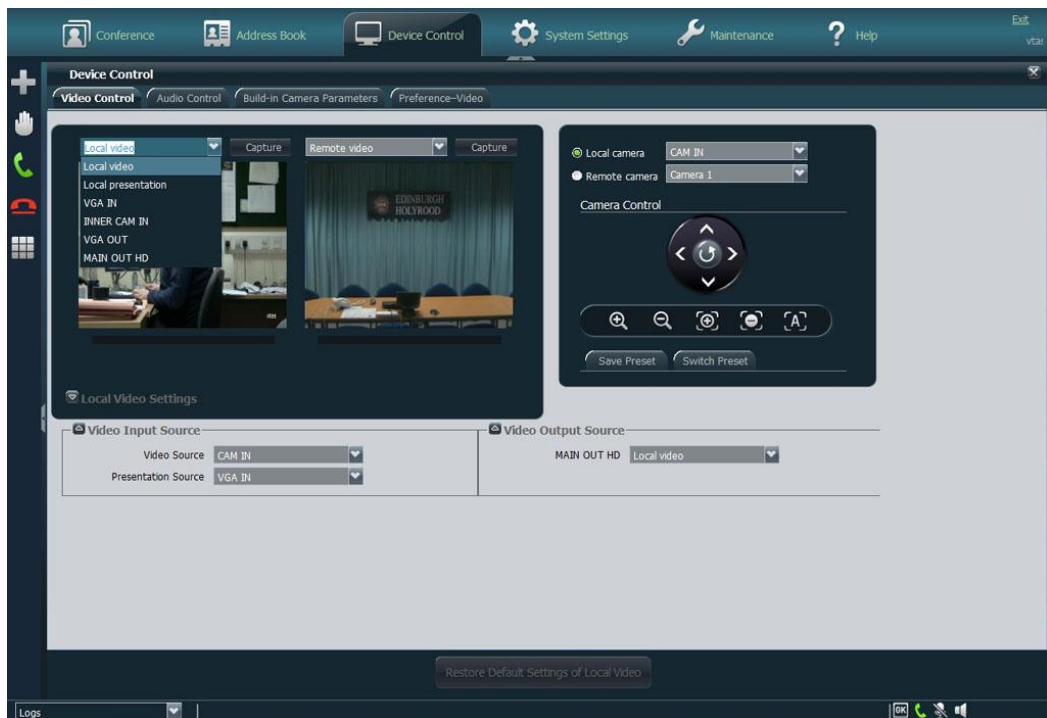
The screenshot displays the 'System Status' window of the janet interface. The window has a dark blue header with navigation icons for Conference, Address Book, Device Control, System Settings, Maintenance, and Help. Below the header, there are tabs for Line Status, Call Status (selected), Conference Parameters, and Input Interface Status. The main content area shows a table of statistics with columns for the metric name, 'Sent', and 'Received'.

	Sent	Received
Line rate	1,540.53k	2,074.46k
Video resolution	720p	720p
Video rate [frame rate]	1,248.38k[29]	2,026.46k[23]
Presentation resolution	720p	--
Presentation rate[frame rate]	260.15k[8]	--
Audio rate	32.00k	48.00k
Video packet loss rate	--	0.00%[1]
Presentation packet loss rate	--	--
Audio packet loss rate	--	0.00%[0]
Conference participating duration	10 min	
Presentation rights	The local site has presentation rights.	

Connection Statistics Interface



Audio Control



Video Control

E: VIDEO TESTS SUMMARY

The video quality experienced between Huawei TE30 systems at 720p @60fps and 1080p @30fps was very good; the high resolution images and the motion rendition at 720p 60fps were impressive. At times the camera had difficulty in achieving and maintaining focus.

During the evaluation in calls up to 4Mbit/s, using the advanced settings for Video and Presentation Resolution, the presentation frame rates described on the data sheet "Dual Stream: Dual 1080p (Optional); Dual 720p@30" were unobtainable. The resolutions and frame rates experienced were:

	Sharp	Smooth
Main Channel	1080p @30fps	720p @60fps
Presentation Channel	1080p @4fps	4CIF @22fps

While the quality of the Presentation Channel image at 1080p @4fps was excellent for static images, it was very poor for moving images. 4CIF @22fps was acceptable for full frame moving images but very poor for PC desktop images with embedded video.

If the Video and H.239 protocols are pre-selected then additional resolution options are offered. During these tests the highest HD presentation resolution and frame rate experienced was 720p @10fps.

H.264 BP

	Menu Setting	Conference Statistics
Video	720p @25/30	720p @30
H.239 Presentation	720p @25/30	720p @10
Video	720p @50/60	720p @60
H.239 Presentation	720p @50/60	4CIF @22
Video	1080p @25/30	1080p @30
H.239 Presentation	1080p @25/30	1080p @3

H.264 HP

	Menu Setting	Conference Statistics
Video	720p @25/30	720p @30
H.239 Presentation	720p @25/30	1080p @4
Video	720p @50/60	720p @60
H.239 Presentation	720p @50/60	1080p @4
Video	1080p @25/30	1080p @30
H.239 Presentation	1080p @25/30	1080p @4

H.264 SVC

	Menu Setting	Conference Statistics
Video	720p @25/30	720p @30
H.239 Presentation	720p @25/30	720p @10
Video	720p @50/60	720p @60
H.239 Presentation	720p @50/60	4CIF @22
Video	1080p @25/30	1080p @30
H.239 Presentation	1080p @25/30	1080p @4

For connections exceeding 2Mbit/s the video was of a high quality. At lower connection speeds on standard videoconference material the video quality was also very good. However at times the camera appeared to have difficulty if achieving focus - the participant in the centre of the frame appeared to continually go in and out of focus or at times the focus settled on the background behind the participant.

F: AUDIO TESTS SUMMARY

Setup

The echo canceller is fully automatic in operation. On establishing a call it took a few seconds for the echo canceller to train and eliminate any echo. Moving the camera during a conference had two detrimental effects on the audio quality of the link:

- it impacted on the echo cancellation and therefore when the remote site was talking they experienced echo while the system retrained to compensate for the movement of the camera microphones; in addition noise suppression appeared to be applied to the audio picked up by the microphones to compensate for the noise of the camera movement, thus distorting the participants' audio
- At times the Lip Sync appeared to drift to an unacceptable amount.

	<u>Lecture Theatre</u>	<u>Room</u>
Audio levels adequate? (Yes/no)	Not tested	Yes
Audio quality acceptable? (Yes/no)	Not tested	Yes
Echo cancellation acceptable? (Yes/no)	Not tested	Yes*
Quality of double talk	Not tested	Excellent

*When the camera is stationary

G: INTEROPERABILITY

H.323

There were no problems connecting between the Huawei TE30 units.

Time to Connect with encryption On

H.323

All speeds 4 seconds

Connectivity with Other Machines (models listed with comments)

H.323

Successful connections were made in each direction with the following CODECs, where the systems supported H.239, presentation material was also shared.

CODEC	Call Bandwidth	Resolution Transmitted by The Huawei TE30	Resolution Received by The Huawei TE30
Tandberg 6000 MXP S/W F9.0 PAL	2 Mbit/s	w720p@10	w720p@30
Cisco SX20 (JCMB) S/W TC7.0.2	4 Mbit/s	w720p @ 30	w720p @ 30
Cisco C40 S/W TC7.0.2 (No Premium Res)	4 Mbit/s	w720p @ 30	w720p @ 30
Cisco C60 (Prem Res) S/W TC4.2.1	4 Mbit/s	w1080p @ 30	w720p @ 60
Cisco C90 (Prem Res) S/W TC7.02	4 Mbit/s	w1080p @ 30	w1080p @ 25
Lifesize Express 220 S/W 4.9.00	4 Mbit/s	w720p @ 60	w720p @ 30
Lifesize Room 200 S/W 4.7.22	4 Mbit/s	w720p @ 60	w720p @ 30

H.239 PresH.239 presentation material

In general the TE30 transmitted 720p at low frame rate 3-12fps to the other vendors systems. In addition it negotiated low resolution for example 4CIF,

448p, 640x360 at high frame rate 15-30fps received from the other vendors systems.

Connectivity with JANET Videoconferencing Switching Service (JVCS)

H.323

The Huawei TE30 system connected successfully to the JVCS Codian MCU negotiating H.264 video at 720p resolution with corresponding audio coding of G.722.1, H.239 content was also successfully shared via the MCU. The received audio level was measured as peaking to -4dBm.

Procedure for making a call

1. Press the “Call” button on the remote control
2. Input IP address
3. Press the “Call” button

Or use the local contacts address book available from the user interface or the Conference History list lists in the Call menu. Voice recognition may be used to select location from the Address Book list.