Cisco Telepresence SX20 Quick Set - Evaluation results main document

Manufacturer: Cisco

Model: SX20 Quick Set

Software Version: 5.1.4

Optional Features and Modifications:

12x Camera, 4x Camera, Natural Presenter Package, Dual Monitor, Premium Multisite

Date of Test: 15th – 19th October 2012

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B: SETUP PROCEDURE

Setting up the SX20 system was straightforward. The compact CODEC could be wall mounted below or behind a flat screen monitor and the HD camera was positioned above a picture monitor using the supplied camera monitor bracket. A system microphone, infrared remote control and an external power supply completed the package.

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

- Mounting the camera adjacent to the monitor
- Connecting the combined HDMI-HDMI video and power cables between the camera and the CODEC
- Connecting the supplied HDMI-HDMI cables between the CODEC and the monitor/s.
- Cabling the microphone to the CODEC.

- Establishing an Ethernet IP network connection through the single RJ45-RJ45 cable.
- Connecting the external power unit to the CODEC.

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 Installation Guide and web sourced Administrators Guide were both easy to follow.

C: Hardware Description

General

This compact CODEC may either be mounted within a monitor cabinet, adjacent to the monitor or wall mounted. Provided with a single auto switching 10/100/1000 Ethernet connection and capable of conferencing up to a bandwidth of 6 Mbit/s the system with the Premium Resolution Option can display a maximum image resolution of 1080p at 60 frames/second.

The SX20 system includes a rather noisy Vari-Speed cooling fan which at times was noticeable both locally and at the remote site via the system microphone.

System options include:

- Premium Resolution, 1080p resolution and 60fps
- Natural Presenter package, H.239
- Dual monitor, second monitor output
- 12x or 4x zoom camera
- Multisite working

Systems supplied for evaluation included a range of the above options.

The main HDMI connection carries the digital audio output but separate analogue audio input and output connections are also available.

The SX20 Plus system supports thirteen video resolutions including:

- The basic CIF format resolution of 352 x 288 pixels
- w288p (512 x 288)
- Optimal resolution w448p (768 x 448)
- High definition w720p (1280 x 720)
- High definition w1080p (1920 x 1080)*

* Requires the Premium Resolution option

The achievable image resolution and frame rate are dependent not only on the call connection bandwidth but also on whether “Sharpness” or “Motion” have been selected for the source video mode. Motion is the default setting for the camera that maximises frame rate, but if maximum resolution is required then “Sharpness” is selected.

To optimise picture quality to the available lighting conditions three, Optimal

Definition Profiles may be selected, these permit the frame rate and resolution to be increased for lower bandwidth connections when the room lighting is good enough.

• Normal - Standard meeting room. Default setting

• Medium - Good, stable light conditions

• High - Optimal light conditions for video conferencing

During the evaluation the Medium setting was used throughout.

Camera Video Mode	Motion		Sharpness	
Connection Bandwidth	Resolution	Frame rate	Resolution	Frame rate
128 Kbit/s	512 x 288	19	1280 x 720	3
384 Kbit/s	640 x 360	30	1920 x 1080	4
768 Kbit/s	1024 x 576	30	1920 x 1080	9
1 Mbit/s	1280x720	30	1920 x 1080	15
2 Mbit/s	1280x720	30	1920 x 1080	25
3 Mbit/s	1280x720	60	1920 x 1080	30
4 Mbit/s	1280x720	60	1920 x 1080	30
6 Mbit/s	1280x720	60	1920 x 1080	30

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 simultaneously on a single picture monitor.

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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 display mode the “layout-button” on the remote control selects the type of screen display:

- Full screen of the far end image
- Full screen of the far end image with near image PIP
- Large far image, small near image

Positioning the POP images vertically rather than side by side enables both images to be displayed wide screen while retaining the image aspect ratio.

In single display mode when H.329 dual images are either transmitted or received the layout button can select these combinations:

- Full screen of the presentation image
- Full screen of the presentation image with near image PIP
- Large presentation image, small near and far images
- Medium presentation and far images, small near image
- Large far image, small near and presentation images

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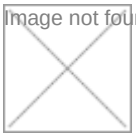
In Dual monitor mode without Presentation material the monitors display:

	Layout 1	Layout 2

Main monitor	Far image	Far image with near image PIP
Second monitor	Near image	Blank

When Presentation material is transmitted or received the remote control Layout button determines the second monitor display and these main monitor screen display combinations:

- Full screen of the far image
- Full screen of the far image with near image PIP
- Large far image, small near image



The main video output of the SX20 CODEC contains the on-screen menus including the soft key legends at the bottom of the screen.

Two precision PTZ (Pan Tilt and Zoom) 1080p HD cameras with a native resolution of 1920 x 1080 pixels at 60 frames per second were supplied for evaluation with 4x and 12x zoom lenses and horizontal viewing angles of 70 and 72 degrees respectively. A lens hood was included with the 12x to reduce flare. If ceiling mounted (i.e. upside down), the camera images will automatically switch to the correct vertical orientation when the CODEC is turned on.

Both cameras produced some noticeable mechanical noise and the 12x camera at times struggled to find focus at the lower light levels. Far end camera control (FECC) is supported and a Kensington lock slot is provided on the camera body for increased security.

CODEC inputs include the HDMI HD camera input and a separate DVI-I interface for PC connection which may be set manually to:

- Analogue RGB
- Digital

Alternatively the CODEC will auto detect the signal input type. This input supports Extended Display Identification Data (EDID)

The HDMI and DVI inputs do not support High Definition Content Protection (HDCP)

The optional Natural Presenter Package provides Dual video coding H.239 conferences, i.e. 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 SX20 systems conferenced together over a 6Mbit/s connection with the camera input set to Motion and the presentation input set to Sharpness it was possible to transmit two

simultaneous high resolution images, the main channel at1080p @60fps and the H.239 channel at 1080p @15fps.

Depending on the type of presentation material being transmitted the user may choose to prioritise either motion or resolution (sharpness). If “motion” is chosen to preserve the integrity of moving sequences then as the call bandwidth is reduced, to maintain reasonable rendition of movement (i.e. a high frame rate) the resolution is reduced accordingly. If “sharpness” is chosen then the frame rate reduces as the call bandwidth is reduced.

The table illustrates this:

	Main Channel Only		Main Plus Presentation		Main Plus Presentation	
Call Bandwidth	Main set to Motion	Main set to Sharpness	Main set to Motion	Presentation set to Motion	Main set to Motion	Presentation set to Sharpness
6Mbit/s	1920x1080 @60fps	1920x1080 @60fps	1920x1080 @60fps	1280x720 @30fps	1920x1080 @60fps	1920x1080 @15fps
4Mbit/s	1920x1080 @60fps	1920x1080 @60fps	1280x720 @60fps	1280x720 @30fps	1920x1080 @60fps	1920x1080 @15fps
2Mbit/s	1280x720 @60fps	1920x1080 @30fps	1280x720 @30fps	1024x576 @30fps	1280x720 @30fps	1920x1080 @10fps
1Mbit/s	1280x720 @30fps	1920x1080 @20fps	1280x720 @30fps	768x448 @30fps	1280x720 @30fps	1920x1080 @6fps
768 Kbit/s	1280x720 @30fps	1920x1080 @12fps	1024x576 @30fps	640x360 @30fps	1024x576 @30fps	1920x1080 @4fps
384 Kbit/s	767x448 @30fps	1920x1080 @6fps	640x360 @30fps	512x288 @24fps	640x360 @30fps	1280x720 @4fps

128 Kbit/s	512x288 @28fps	1920x1080 @2fps		512x288 @20fps	352x288 @11fps	512x288 @20fps	1024x576 @2fps

Several audio formats are supported by the SX20 CODEC. Cisco has implemented the ITU standard MPEG-4 AAC-LD audio protocol giving 20KHz analogue audio bandwidth with low latency/delay requiring 64Kb/s or 128Kbit/s connection bandwidths.

PC audio and analogue stereo audio are both available via industry standard 3.5mm mini jack connectors. The main HDMI output carries the digital stereo signals.

Encryption is available 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 via a web browser 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 connection.

An optional touch panel may also be used to control the system, this touch panel the Cisco Telepresence Touch also connects to the CODEC over the IP network.

The CODEC remote control includes a single presentation source button:

- Pressing this button for a short period selects the PC presentation source.
- Pressing the button again for a short period reselects the main camera.
- Pressing and holding down for a longer period displays a sub-menu, the appropriate source selection is then enabled through the cursor keys and the ? menu button.

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Five context sensitive soft keys are located at the top of the remote control. The function of these keys is indicated by on-screen menus which appear when the soft key functions are available. The text within these on-screen soft keys was fairly small so care is required in selection of screen size to ensure accurate selection.

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With some HD monitors the menu information at the edge of the screen may be “cropped”, To avoid this problem an HDMI Over-scan Level control is provided within the set-up menu which adjusts the size of the overall display ensuring that all on screen menu information is visible.

Useful icons appear at the lower right of the screen to indicate conference parameters e.g. local and remote microphone mute, encryption status, whether a PC input is connected to the system etc.

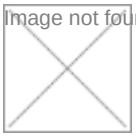
In the image below the icons indicate that encryption is Off and a PC source is connected to the system.

An H.239 connection is initiated and terminated on the remote control via the on-screen graphical interface. The main camera occupies one channel and the source connected to the DVI-I input the second channel, this is normally a PC or laptop. At the remote site these two images may either be viewed on two separate monitors or using POP displayed on a single screen. The DVI-I input may also be switched to transmit on the main channel if H.239 is not in use thus providing increased frame rate for the display of high quality video material.

The system takes a significant period to boot up from cold (~70 seconds), during this time there is no on-screen indication that the system is booting up, a rotating light on the CODEC offers the only indication. The user could therefore be misled into thinking that the system is inoperative due to the lack of any on-screen feedback. During boot up the vari-speed fan is noisy and at times during normal operation is noticeable. When not in a call the system automatically goes into sleep mode after a set period of time, it can also be put into standby mode via the remote control. An incoming call or movement of the remote control (picking it up), will return the system to active mode.

The system information 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. Limited snapshots of the input camera and local Presentations sources are available. Received Presentation material is not however available as a snapshot.



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The SX20 system includes a Cisco proprietary microphone with an in built mute button, the button is illuminated green when live and red when in mute. A second microphone may also be connected to the CODEC.

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Optional MCU

An optional four site MCU supports up to three remote sites plus the host SX20 MCU CODEC. The maximum combined conference bandwidth of 6 Mbit/s will provide resolutions of up to w576p at 30 frames per second.

Controlling an MCU conference is a simple procedure:

1. Select the “Connect” button during a call.

2. Enter the number of the additional site into the call menu or select the site from the directory or the recent call list.

3. Press the “OK” button.

4. The additional site will then be connected to the conference.

Individual connections or all connections may be disconnected using the graphic interface.

The three remote sites only receive a continuous presence split screen display but the local MCU CODEC offers several layout options. In single display mode with no Presentation material transmitted or received these are:

- Remote sites equal size with local PIP
- Large voice switched current speaker image with small images of other sites
- Voice switched full screen image of current speaker with local PIP

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When presentation material is transmitted or received the available layouts include:

- Full Screen presentation with local PIP
- Large presentation image with small images of other sites

- Large voice switched current speaker image with small images of other sites and the presentation

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E: VIDEO TESTS SUMMARY

The video quality experienced between SX20 systems at 1080p 60fps was excellent; the high resolution images and the superb motion rendition at 1080p 60fps were impressive. The 12x Precision camera exhibited some issues including mechanical noise and struggled to find focus at times particularly at lower light levels. For connections exceeding 2Mbit/s the video quality was of a high quality, even fast moving movie trailer material that challenge conference links to the limit were almost artefact free.

At lower connection speeds on standard VC material the video quality was also very good. The detailed video test scores below confirm the products exceptional performance across the board.

F: AUDIO TESTS SUMMARY

Setup

The echo canceller is fully automatic in operation. The quality of echo cancellation and doubletalk from the system was excellent.

	Lecture Theatre	Room
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

G: DATA TESTS

A PC may be directly connected to the SX20 CODEC via the DVI-I interface.

H: CONNECTIVITY

H.323

There were no problems connecting between the Cisco SX20 units.

Time to Connect with encryption On

H.323

All speeds	3 seconds

During an H.323 call the network connection was removed and reconnected after a specific time.

5 Seconds	Picture froze – picture goes to black - successful reconnection, call does not terminate
15 Seconds	Picture froze – picture goes to black - successful reconnection, call does not terminate
30 Seconds	Picture froze - picture goes to black, call then terminates on network reconnection

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.

Small incompatibilities between different manufactures CODECS is the norm but during these tests the SX20 was error free.

CODEC	**Call Bandwidth**	**Resolution Transmitted by the SX20**	**Resolution Received by the SX20**
Polycom® VSX7000 S/W 9.0.5.1	2 Mbit/s	352x288	353x288
Polycom HDX 9002 S/W 2.6.0	4 Mbit/s	w720p	w720p
Tandberg 6000 MXP S/W F9.0 PAL	4 Mbit/s	w720p	w720p
Cisco C40 S/W TC5.1.1	6 Mbit/s	w720p	w720p
Cisco C60 S/W TC4.2.1	6 Mbit/s	w720p	w720p
Cisco C90 S/W TC4.2.1	6 Mbit/s	w720p	w1080p
Lifesize Express 220 S/W 4.9.00	4 Mbit/s	w720p	w720p

Connectivity with Janet Videoconferencing Switching Service			
Lifesize Team **H.323** S/W 4.7.19	4 Mbit/s	w720p	w720p
Lifesize Room 200 S/W 4.7.10	4 Mbit/s	w720p	w720p

The SX20 system connected successfully to the Janet Videoconferencing Codian MCU negotiating H.264 video, 720p resolution and AAC-LD audio with video and audio in both directions. H.239 content was also successfully shared via the MCU. The received audio level was measured as peaking to 0dBm.

Procedure for making a call

1. Press Connect button on the remote control
2. Input IP address
3. Press the Connect button

Or use the local contacts directory available from the user interface Phone Book or the Recent Calls lists.
