TEST RESULTS FOR CLEARONE COLLABORATE ROOM PRO 600

Manufacturer: **ClearOne**

Model: **Collaborate Room Pro 600**

Software Version: **1.0.1**

Optional Features and   **Multisite (8 + 1 Sites)
Modifications:**

Date of Test: **1st – 5th June 2015**

HD Camera

CODEC front view

CODEC rear view

Remote control and ClearOne Chat 150 Desk Microphone

C O N T E N T S

A: EXECUTIVE SUMMARY

The Collaborate Room Pro 600 high definition conferencing system is the top of the range ClearOne conferencing solution. The portfolio of products includes Standard and High Definition hardware solutions and a Desktop client. The Pro 600 is designed to be installed either in a small to medium sized conference room, classroom or rack-mounted in a larger installation.

The system supports a maximum transmitted image resolution of 1920x1080p @ 30fps or 1280x720 @ 60fps on the main video channel, 1920x1080p @ 60fps may be received by the system. Presentation material is transmitted or received up to 1920x1080p @ 30fps. The system includes a high definition (HD) camera, a table microphone pod, an infra-red remote control, PC connectivity, USB file presentation display and conference recording and streaming in the package. Two options are available: 3+1 or 8+1 Port embedded MCU.

The maximum point to point connection speed is 6 Mbit/s, compatibility with other H.323 CODECS is achieved across a range of resolutions from SIF (352x240) to 1080p (1920x1080) pixels. The quality of the conference is dependent upon the capability of the remote CODEC and the connection speed.

Pros:
- Presentation System when not in a call
- Recording in and out of a call
- Unicast and Multicast Streaming in and out of a call

Cons:
- Doubletalk Quality
- MCU lacks Previous Speaker

Feature Summary:

Video standards	H.261, H.263, H.263+/++, H.264/AVC High Profile,
Supported video resolutions	320 x 240 (QCIF)
	352 x 240 (SIF)
	352 x 288 (CIF)
	640 x 480 (VGA)
	704 x 480 (4SIF)

	704 × 576 (4CIF) 1280 × 720 (HD720p) 1920 × 1080 (HD1080p)
Communications	H.323 and SIP, 64Kbps ~ 6 Mbps
Audio standards	G.711, G.722, G.722.1, G.722.1c, G.723.1, G.728, G.729, ARM(3G), AAC-LD
Camera	12x optical zoom camera, PTZ function, 70° Horizontal field of view.
Video inputs	Two HDMI and one USB 3.0
Video outputs	One HDMI and one Display Port
Audio inputs	Desk microphone pod (USB), Left/Right Phoenix Balanced Audio, 3.5mm mini-jack microphone connection, HDMI 1 and 2
Audio outputs	HDMI, 3.5mm mini-jack
Auxiliary features	H.239 second video channel up to 1080p resolution @30fps. Far-end camera control. Recording In and out of a call Unicast and Multicast Streaming Presentation from USB Memory Stick Optional Embedded MCU (3+1 or 8+1 Sites)
Encryption	AES Encryption

B: SETUP PROCEDURE

Setting up the Collaborate Room Pro 600 system was straightforward. The CODEC can be mounted below the picture monitor/s and the HD camera positioned above the monitor/s; alternatively a rack mounting kit

is available for larger installations. A system microphone, 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 camera adjacent to the monitor(s)
- Connecting the USB 3.0 cable between the camera and the CODEC
- Connecting the VISCA to 9 Pin D cable to Com Port 1 for Camera control.
- Connecting the supplied HDMI-HDMI cables between the CODEC and the monitor/s, using a Display Port to HDMI adaptor for the second monitor.
- Cabling the microphone to the CODEC USB 3 Input
- Establishing an Ethernet IP network connection through the 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: 25 minutes

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

C: *Hardware Description*

General

This comprehensive fully featured CODEC system may be mounted within a monitor cabinet or adjacent to the monitor/s; alternatively a rack mount kit is available. Provided with one auto switching 10/100/1000

Ethernet connection and capable of conferencing up to a bandwidth of 6 Mbit/s, the system can transmit a maximum image resolution of 1080p @ 30 frames/second on the main video channel; it can receive and display up to 1080p @ 60. The Collaborate Room Pro 600 CODEC was silent in operation.

The main HDMI video output connection carries the digital audio, a separate 3.5mm analogue output connection is also provided.

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. Picture outside Picture (POP) only allows side by side same size images of near and far images.

Full screen of the Far- End image
Near- Image Picture in Picture (PIP)

Near and Far Image, side by side
Picture outside Picture (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.

Two Controls impact on the image display: PIP and Display; PIP changes the layout and Display swaps the image position.

Single Monitor Mode

In single monitor mode when not in a call the monitor displays:

	No presentation material selected	Presentation material selected
HDMI monitor	Near Image + Menu	PIP/Display Selection + Menu

Pip/Display Selection

- Presentation and near end images side by side POP
- Presentation image full screen
- Near image full screen

In single monitor mode in a call the monitor displays the following layout selections:

- Far image full screen
- Far image full screen, small near image PIP
- Far and near end images side by side POP
- Near image full screen, small far image POP

- Near image full screen, small far image PIP

In single monitor mode in a call when H.329 presentation material is either transmitted or received the monitor displays the following layout selections:

- Full screen of the presentation image
- Full screen of the presentation image and far image PIP
- Presentation and far end images side by side POP
- Full screen of the presentation image and near image PIP
- Presentation and near end images side by side POP

Note: In single monitor mode it is not possible to display the three images simultaneously: Near and Far video and Presentation Material.

Full Screen Presentation Image
Small Far Image (PIP)
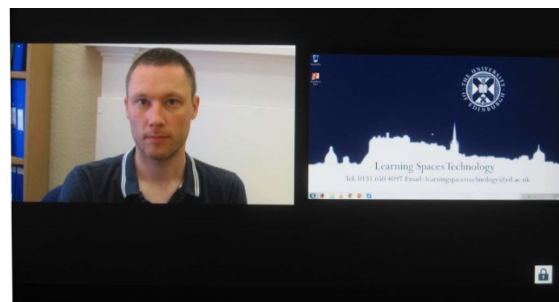
Presentation and Far Image
Side by Side (POP)

Dual Monitor Mode

In Dual Monitor mode when not in a call the monitors display:

	No presentation material selected	Presentation material selected
HDMI monitor	Near Image + Menu	Presentation + Menu
Display Port monitor	Graphic	Near Image

In Dual Monitor mode in a call the monitors display:

	No presentation material transmitted or received	Presentation material transmitted or received
HDMI monitor	Far Image + Menu	Layout Selection + Menu
Display Port monitor	Near image	Presentation

Layout Selection with presentation material transmitted or received

- Full screen of the far image and near image PIP

The PTZ (Pan Tilt and Zoom) HD camera includes a 12x Optical Zoom and a wide horizontal viewing angle of 70 degrees and supports 9 Preset Positions.

Far end camera control (FECC) is supported.

CODEC inputs include two HDMI and two USB 3 inputs; if the two HDMI inputs are used for Camera inputs one of the USB 3 inputs may be used with a Collaborate Datapoint-HD DVI-I to USB Adaptor to provide PC connectivity. The HDMI inputs support Extended Display Identification Data (EDID).

Dual video coding H.239 is supported, providing a second unidirectional video channel. Thus a camera image and presentation material from a PC could be transmitted simultaneously and displayed on two monitors at the remote site. When two systems were conferenced together over a 6 Mbit/s connection, it was possible to transmit two simultaneous high resolution images; the main camera and presentation channels both at 1080p @30fps.

Several audio formats are supported by the Collaborate Room Pro 600. AAC-LD is supported providing 20 KHz analogue audio frequency response.

The Collaborate Room Pro 600 system provides a number of microphone audio inputs: Collaborate Chat 150 desk microphone via USB, HDMI inputs 1 and 2, balanced audio input via Phoenix connector and a 3.5mm mini jack microphone level input. PC audio input is only available via HDMI input. Stereo audio outputs are available as a standard 3.5mm mini jack connector, balanced audio output via Phoenix connector and the main HDMI output also carries the digital stereo output.

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

USB Presentation

In addition to displaying presentation material from a connected PC or Laptop it is possible to share in or out of a call, files from a USB Data Stick connected to the front of the CODEC.

The Data Sheet states the following files are supported: Documents: PPT, PPTX, PPS, PPSX, DOC, DOCX, XLS, XLSX, Video clips AVI, MPEG, WMV, etc. Graphic files BMP, GIF, TIF etc.

The User Guide states the following smaller list of files are supported: Documents: PDF, Video clips: AVI, MPEG, WMV, etc. Graphic files: BMP, GIF, TIF etc.

The evaluation confirmed the smaller list within the User Guide as correct for the evaluated version of software.

Recording System

The Collaborate Room Pro 600 provides recording to internal hard drive of USB memory stick of the video signal, recorded. Recordings may be made in Standard or High Definition as WVM or MP4 files. The files may be replayed on the Collaborate Room Pro 600 system or the web interface, video files may also be downloaded from the system via the web interface.

When a conference is being recorded an on-screen recording icon appears at both the near and remote sites.

Streaming

Multicast and Unicast streaming are supported and, as is the case when recording the system streams, near camera image is supported when not in a call; near and far image side by side is supported when in a call. When presentation images are shared, the three images are streamed side by side. When a conference recording is commenced, the stream player pauses; to continue to view the stream the play button on the player must be selected.

MCU

Optional embedded MCU Licenses are available which facilitate 3 remote sites plus the host site or 8 remote sites plus the host site. The MCU can operate in Voice Switched or Continuous Presence modes together with Auto Layout. In Auto Layout the system switches Continuous Presence layouts 2x2, 3x3 or 5+1 depending on the number of connected sites.

When the MCU operates in Voice Switched mode all sites see the "Current Speaker". So when speaking, the current speaker sees their own image fed back but it is delayed which is very distracting. Other MCU Systems operate where the "Current Speaker" image is seen by all the other sites but the "Current Speaker" display shows the "Previous Speaker".

D: SYSTEM OPERATION

The system may be operated locally from the infra-red remote control with the on-screen graphic interface or integrated with a room control system via telnet. The on-screen menus are logical and easy to follow. When not in a call, they support the use of the system for local presentation display from a connected PC or a memory stick.
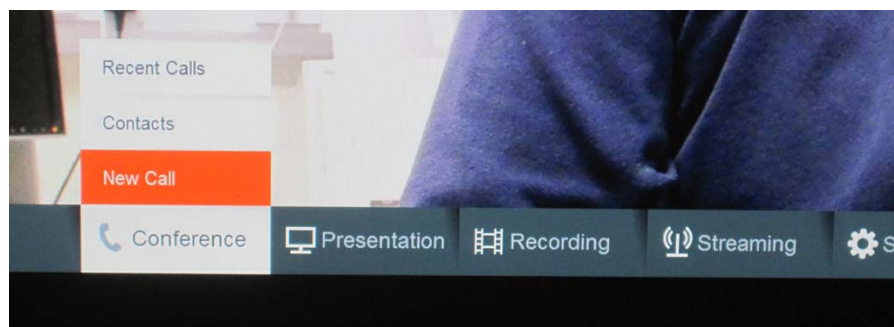
On-Screen Menu Bar
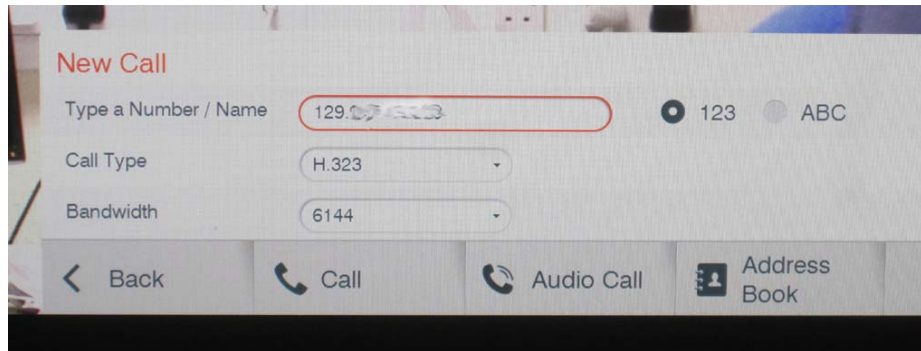
Dial Menu

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.

Remote Control

The remote control includes a comprehensive selection of single operation control buttons. The Help button displays context sensitive on screen help relevant to the current operation of the system.

An H.239 connection is initiated and terminated on the remote control via a single Data button:

- Pressing this button for a short period displays the presentation source selection: PC or USB, selecting the desired source opens an H.239 connection
- Pressing the button again for a short period closes the H.239 connection

The camera occupies one channel; the source connected to the second HDMI input - normally a PC or Laptop or a file on a USB stick - occupies the second channel. At the remote site these two images may either be viewed on two separate monitors or using POP displayed on a single screen.

The system takes a significant period to boot up from cold (~60 seconds). When not in a call the system automatically goes into sleep mode after a user-definable period of time. An incoming call or a remote control button press will return the system to active mode.

The Stats menu accessed via the "Information" button on the remote control displays call status data including connection speed, compression protocols, packet loss and frame rate.

The system may also be configured, controlled and monitored via a password protected web browser from a network connected PC. This facility provides configuration, control and monitoring facilities; video images may only be viewed within the browser if the system is streaming.
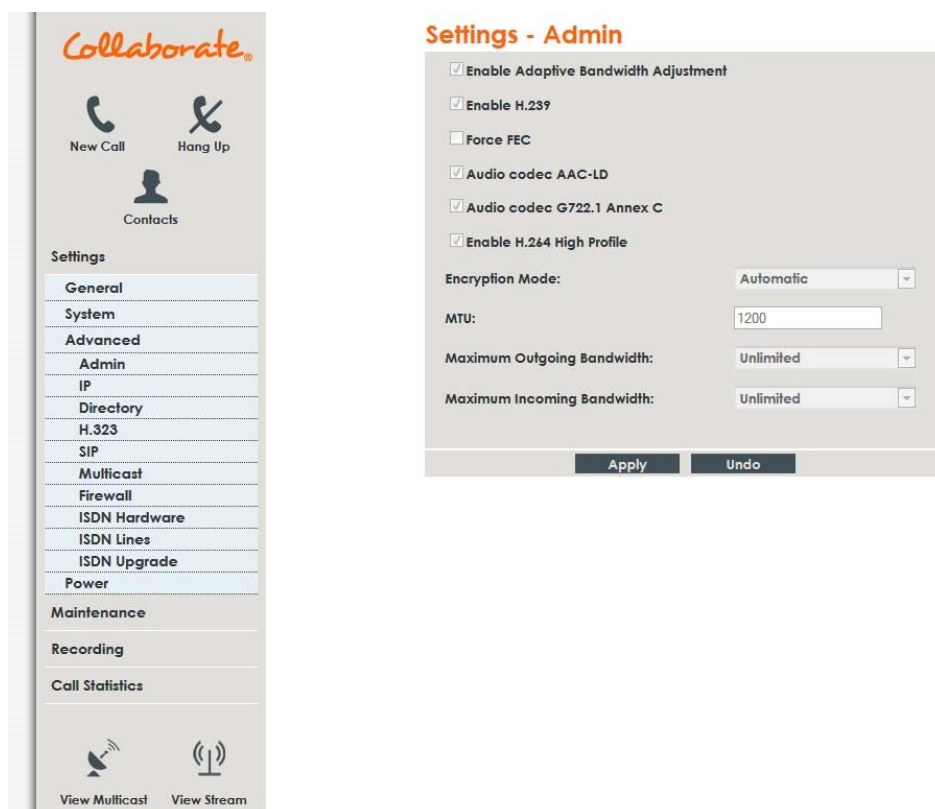
Web Interface Admin Menu
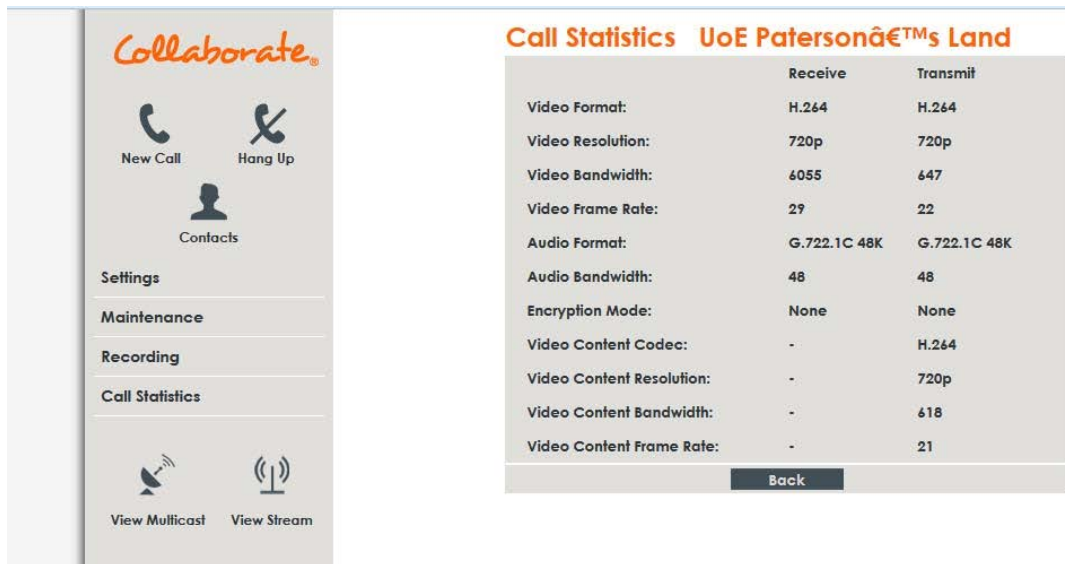
Web Interface Call Statistics Menu

The Collaborate Room Pro 600 system includes a Chat 150 desktop array microphone pod with an in-built mute button and volume control. LED indicators are illuminated red when muted. The system may also operate with the ClearOne Beamforming Microphone Array or an external system of microphones and a microphone mixer.

ClearOne Chat 150 Desk Microphone

E: VIDEO TESTS SUMMARY

The video quality experienced from the Collaborate Room Pro 600 system at 1080p @ 30fps was very good. The ability to transmit two simultaneous channels of 1080p resolution, high frame rate images on both the main video and presentation channels is a welcome provision. For connections at 6Mbit/s where the bandwidth was split between the main and presentation channels, movie trailer material that normally challenges conference links, was transmitted with few artefacts.

However the video image appeared to contain significant video noise displayed locally and when transmitted to the remote site. When the camera was connected directly to the display monitor no video noise was experienced.

While the codec display output is set to 1080p and the Presentation input from a laptop is also set to 1080p, the image displayed locally and transmitted to the remote site is scaled down in size, with a significant black border all around the image.

F: AUDIO TESTS SUMMARY

Setup   The echo canceller is fully automatic in operation. The quality of echo cancellation was acceptable, however, doubletalk from the system was very poor.

	Room
Audio levels adequate? (Yes/no)	Yes
Audio quality acceptable? (Yes/no)	Yes
Echo cancellation acceptable? (Yes/no)	Yes
Quality of double talk	Very Poor

Doubletalk experienced in connections with the Collaborate Room Pro 600 system was very poor. In a connection between a Cisco SX20 and the Collaborate, any small level of background noise at the Cisco location resulted in severe breakup of the audio being received from the Collaborate Room Pro 600.

For example rubbing ones fingers together over the Cisco microphone resulted in the breakup of the audio from the Collaborate. Turning off the echo cancellation at the Collaborate resulted in good quality audio when this test was repeated with this small level of background noise.

G: INTEROPERABILITY

There were no problems connecting from the Collaborate Room Pro 600 unit.

Time to Connect with encryption On

All speeds   4 seconds

Connectivity with Other Machines (models listed with comments)

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 ****	Resolution Received by The ****
Tandberg 6000 MXP S/W F9.0 PAL	2 Mbit/s	720p @ 30	720p @ 30
Cisco SX20 * S/W TC7.1.1	4 Mbit/s	720p @ 30	720p @ 30
Cisco C40* S/W TC7.2.0 (No Premium Res)	4 Mbit/s	720p @ 30	720p @ 30
Cisco C90 (Prem Res)* S/W TC7.02	6 Mbit/s	1080p @ 30	1080p @ 30
Lifesize Express 220 S/W 4.9.00	4 Mbit/s	720p @ 30	720p @ 60
Lifesize Room 200 S/W 4.7.22	4 Mbit/s	720p @ 30	720p @ 30

Connectivity with   the JANET

Videoconferencing Service (v-scene)

H.323

The Collaborate Room Pro 600 connected successfully to the v-scene Codian MCU at high definition using H.264 video, 720p resolution and AAC-LD audio with video and audio in both directions. The received audio level was measured as peaking to -4dBm.

H.239 also interoperated correctly. However when an1080p image was shared from the Collaborate to the MCU, 672 x 384 low resolution was negotiated.

Procedure for making a call

1.   Press the "Call" button on the remote control
2.   Input IP address and select connection speed
3.   Press the "Call" button

Or use the local contacts directory or the Recent Calls lists.

New section (Jisc Heading 1)