

APPENDIX 14/05

TEST RESULTS FOR VIDYOROOM HD 40 AND HD 100 SYSTEMS

Manufacturer:	Vidyo
Model:	VidyoRoom HD 40 and HD 100
Software Version:	0.0.2.8 and 3.3.0
Optional Features and Modifications:	Logitech Conference Cam CC3000e Sony PTZ Camera Phoenix Quattro 3 Conference Microphone
Date of Test:	24th – 30th March 2015



HD 40 Front



HD 40 Rear



Infra-Red Control Receiver (HD40 &100)



HDMI/DVI to USB3.0



Logitech CC3000 Conference Cam System (HD40)



HD100 Front



HD100 Rear

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A: EXECUTIVE SUMMARY

The overall Vidyo system supports a range of connection possibilities including VideoRoom using hardware devices, VidyoDesktop a software client for desktop and laptop systems, in addition to VidyoMobile for tablet and mobile phone devices. The Vidyo system requires central hardware which may be deployed in the cloud or onsite.

The elements of the central hardware include:

- | | |
|------------------|-------------------------------------------|
| 1. Vidyo Portal | Call Management |
| 2. Vidyo Router | Multisite capability |
| 3. Vidyo Gateway | Interoperability with H.323/SIP Endpoints |
| 4. Video Replay | Recording and Streaming |

This evaluation focuses on the VidyoRoom HD40 and HD 100 systems designed for small to medium rooms and used central hardware which is part of the v-scene service.

HD 40

The VidyoRoom HD 40 system supplied for evaluation included: Vidyo badged NUC Mini PC, Logitech Conference Cam CC3000e, DVI to USB3.0 capture device, power supply and infra-red remote control. It supports up to 720p@30fps transmit and 1080p@30fps receive on the main channel and 720p on the presentation channel; dual monitor is also supported.

HD 100

The VidyoRoom HD 100 system supplied for evaluation included: Vidyo badged Dell PC, Sony PTZ Camera, Phoenix Quattro 3 Conference Microphone, two DVI to USB3.0 capture devices and an infra-red remote control. It supports up to 1080p@15fps transmit and 1080p@30fps receive on the main channel and 720p on the presentation channel, dual monitor is also supported.

The maximum point to point connection speed is 3.0 Mbit/s for the HD 100 and 1.0 Mbit/s for the HD 40.

Pros:

- Integrated system supporting room hardware, desktop and laptop, tablet and mobile phone connectivity
- Presence and multisite “rooms” for ease of collaboration
- High frame rate presentation video sharing

Cons:

- Poor echo cancellation with recommended echo cancellation microphones
- PC audio I/P high level and distorted
- *HD40 Poor transmitted lip sync

*See Audio Quality Summary

VidyoRoom HD 40

Video standards	H.264, SVC
Supported video resolutions	Up to 1280 x 720@30 frames per second (HD720p) Transmit Up to 1920 x 1080@30 frames per second (HD1080p) Receive
Communications	Proprietary Vidyo
Audio standards	SPEEX32 Wideband Audio, up to 16 Khz
Camera	Logitech ConferenceCam CC3000e
Video inputs	Two USB3.0, USB3.0-DVI adaptor required for PC input
Video outputs	One HDMI, One Mini Display Port
Audio inputs	Via USB Connected echo cancelling microphone/speaker Via DVI PC Input 3.5mm mini-jack (microphone only)
Audio outputs	HDMI O/P Via USB Connected echo cancelling microphone/speaker 3.5mm mini-jack
Auxiliary features	Second video channel up to 720p resolution. Far end cameral control With other Vidyo Systems: <ul style="list-style-type: none">• Presence
Encryption	AES

VidyoRoom HD100

Video standards	H.264, SVC
Supported video resolutions	Up to 1920 x 1080@15 frames per second (HD1080p) Or 1280 x 720@60 frames per second (HD720p) transmit Up to 1920 x 1080@30 frames per second (HD1080p) receive
Communications	Proprietary Vidyo
Audio standards	SPEEX32 Wideband Audio, up to 16 Khz
Camera	Sony PTZ 1080p native resolution. USB3.0-DVI adaptor required for camera connectivity
Video inputs	Two USB3.0, USB3.0-DVI adaptor required for PC input
Video outputs	Two Display Port
Audio inputs	Via USB Connected echo cancelling microphone/speaker Via DVI PC Input 3.5mm mini-jack (microphone only)
Audio outputs	Via USB Connected echo cancelling microphone/speaker 3.5mm mini-jack
Auxiliary features	Second video channel up to 720p resolution. Far end cameral control With other Vidyo Systems: <ul style="list-style-type: none">• Presence
Encryption	AES

B: SETUP PROCEDURE

VidyoRoom HD 40 with Logitech ConferenceCam CC3000e

Setting up the HD40 system was straightforward but requires a significant amount of interconnecting cables, dongles and adaptors to connect the peripherals to the Vidyo NUC micro PC.

- Connecting the mini HDMI-HDMI lead between the CODEC and the main high definition monitor
- Connecting the mini Display Port to DVI Dongle to the second monitor via a DVI-HDMI Cable
- Connecting the Inogeni DVI to USB3.0 capture device to enable PC Connectivity
- Connecting the Logitech ConferenceCam CC3000e system via a USB Cable
- Connecting the Infra-Red remote control receiver to a USB connector
- Establishing an Ethernet IP network connection to the CODEC through the single RJ45-RJ45 cable
- Connecting power to the Vidyo NUC micro PC and the Logitech ConferenceCam CC3000e system via their external power supplies

VidyoRoom HD 100 with Sony PTZ Camera and Phoenix Quattro 3 Conference Microphone

Setting up the HD100 system was straightforward but requires a significant amount of interconnecting cables, dongles and adaptors to connect the peripherals to the Vidyo Dell mini PC.

- Connecting the two Display Port to HDMI dongles to the VidyoRoom HD100 and HDMI-HDMI cables to the main and second monitors
- Connecting the Inogeni DVI to USB3.0 capture device to enable PC Connectivity
- Connecting the Inogeni DVI to USB3.0 capture device to enable Camera Connectivity
- Connecting the VISCA to 9 Pin Serial cable to enable camera control
- Connecting the Infra-Red remote control receiver to a USB connector
- Establishing an Ethernet IP network connection to the CODEC through the single RJ45-RJ45 cable
- Connecting power to the VidyoRoom Dell mini PC and the Sony PTZ Camera via its external power supply

System set up was conveniently configured through the IR Remote control and the onscreen user interface and mainly involved inserting the network settings for the system, together with the Vidyo Portal address, user name and password. Once the system had signed into the portal the latest version of system software was automatically downloaded and installed.

Approximate set-up time: 30 minutes

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

C: HARDWARE DESCRIPTION

General

The HD40 and HD100 systems operate from an identical user interface and remote control. The key differences between the systems are the physical size, input and output connector configuration and maximum transmit and receive resolution, frame rate and connection speed. Both systems support Dual Monitor and Content Sharing and can operate with a variety of cameras and echo cancelling microphones. The units supplied for evaluation included the camera and loudspeaker Logitech ConferenceCam CC3000e system for the HD 40 and a Sony PTZ Camera with the Phoenix Quattro 3 Conference Microphone/Speaker for the HD100.

The systems support traditional Picture In Picture (PIP) when in a call with no shared content; the near view PIP may be toggled ON/OFF using the Selfview button.



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

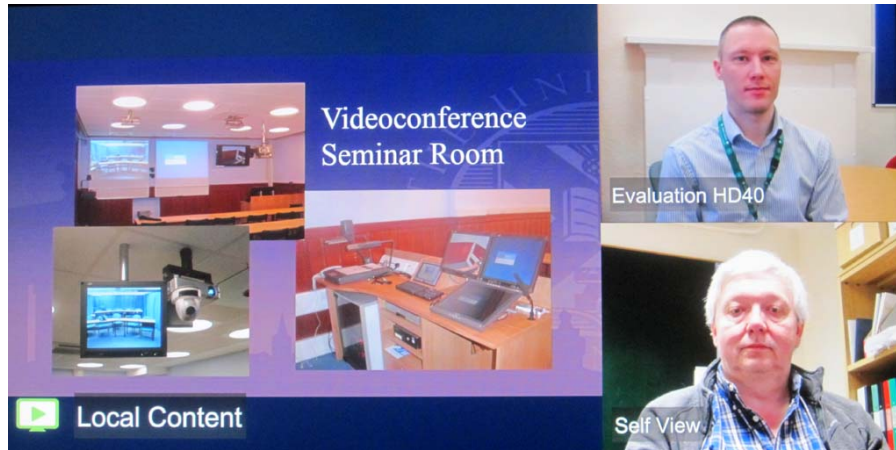
When Presentation content is either transmitted or received in single monitor display mode, the default layout with selfview off, is the Presentation and Far images side by side, same size Picture Outside Picture (POP). The Toggle Button cycles between the following two layouts:

1. Presentation and Far images side by side same size
2. Far Camera image full screen

With selfview on, the Toggle Button cycles between the following two layouts:

1. Large Presentation image, small Near and Far images.
2. Far Camera image full screen plus Near image PIP

It is not possible to display the Presentation Image full screen in single monitor mode.



Presentation Image Large, Near and Far Images Small POP

In Dual monitor mode, without Presentation material connected, the monitors display:

	Not in a Call	In a Call
Main monitor	Black with Vidyo Logo	Far Image + Near Image PIP
Second monitor	System Menu	Black with Vidyo Logo

In Dual monitor mode, with Presentation material connected, the monitors display:

	Not in a Call	In a Call
Main monitor	Presentation material + Near Image PIP	Far Image + Near Image PIP
Second monitor	System Menu	Presentation material

When presentation material is transmitted or received, the second monitor displays the presentation material and the main monitor displays Full Screen of the far end image with near image PIP. The local presentation material may also be previewed full screen when receiving presentation material.

The presentation content is shared at a resolution of 1280 x 720 and 30 frames per second.

The systems use external echo cancelling microphones, for example, the Logitech ConferenceCam CC3000e system or the Phoenix Quattro 3 Conference Microphone/Speaker.



Logitech



Phoenix

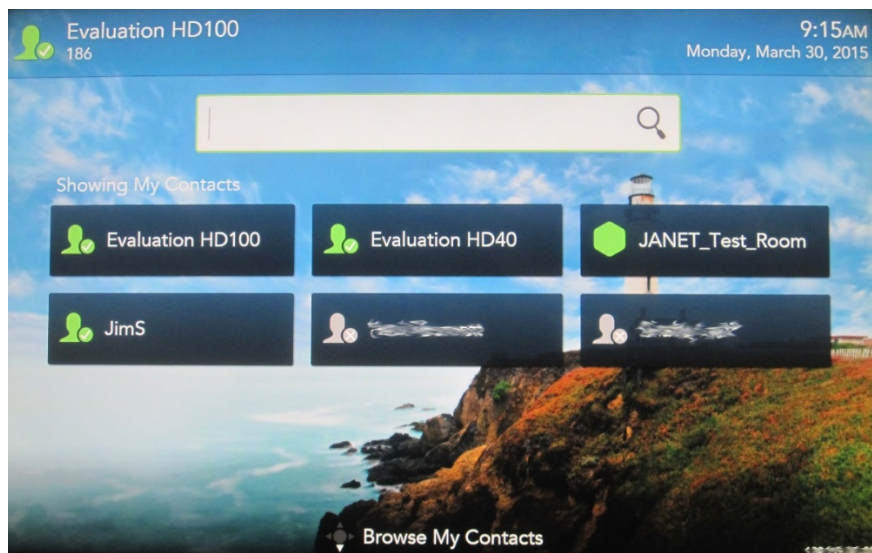
PC audio input may only be shared using the HDMI/DVI input; there is no analogue audio content input. This input appeared very high level and distorted; reducing the audio output level from the PC or laptop to a very low level resolved the level issue, however, the audio still gave some indication of distortion.

VidyoDesktop and VidyoMobile

In addition to connecting with other VidyoRoom Systems, full connectivity with desktop, laptop, tablet and mobile devices is available via the VidyoDesktop and VidyoMobile applications.

D: SYSTEM OPERATION

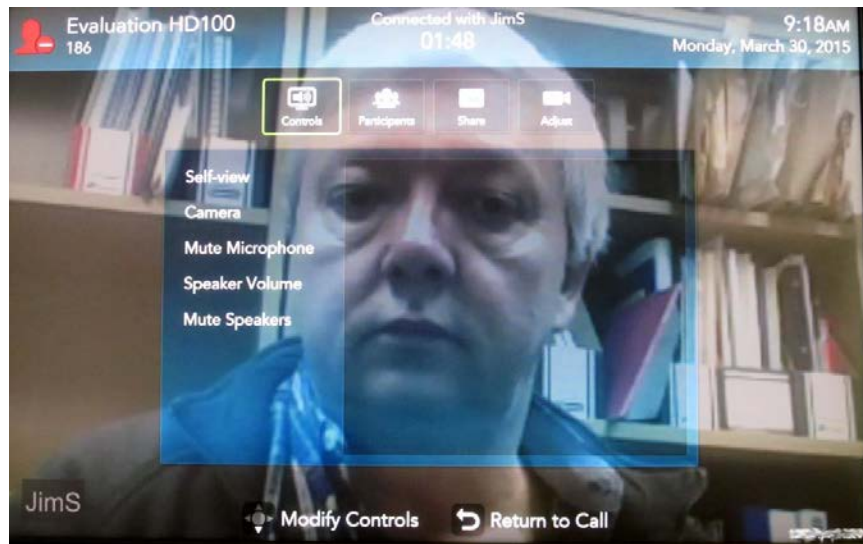
The system is operated locally from the IR remote control and graphic user interface; the on-screen menus are logical and easy to follow. The system may be configured via a password protected web interface from a network connected PC. The systems can also be interfaced to a room control system via a remote control API with support for AMX and Crestron systems.



Dial Menu (not in a call)



Settings Menu (not in a call)



Settings Menu (In a Call)



Remote Control

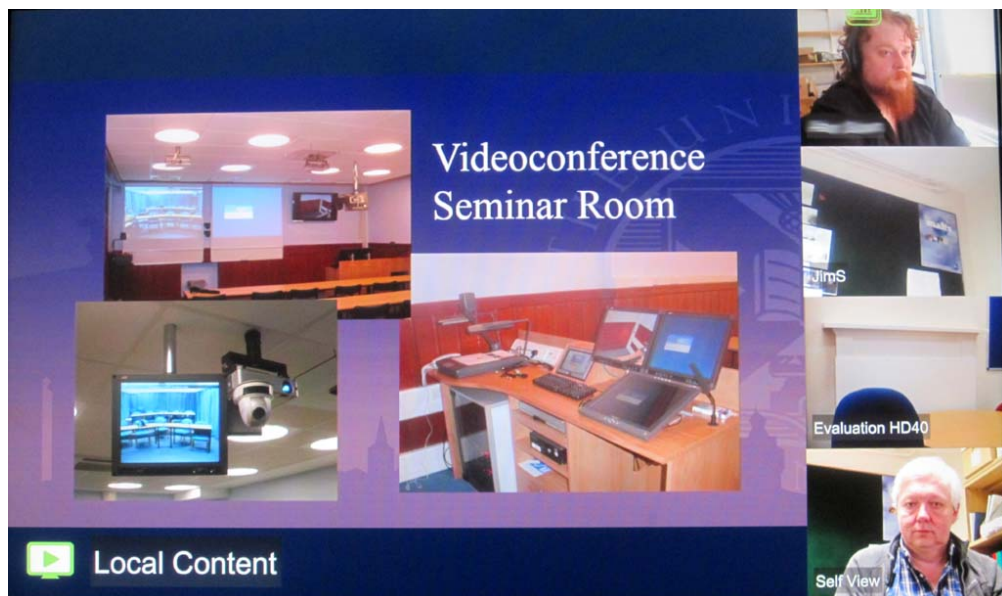
The comprehensive remote control provides single buttons for Volume, Zoom, Mic Mute, Selfview and Presentation Share.

The user connect interface reports “Presence” indicating whether other systems registered with the Vidyo portal are available, in a call or offline. The online directory of registered users and room systems may be searched via the user interface and favourites added to the My Contacts list within the system.

There are two ways to connect with other Vidyo systems: directly calling the user in a point to point connection or joining their “room” - this allows other users to also join the “room” creating a multisite conference. When in a “room”, content may also be shared.



Three Sites in a “room” with shared content



Four Sites in a “room” with shared content

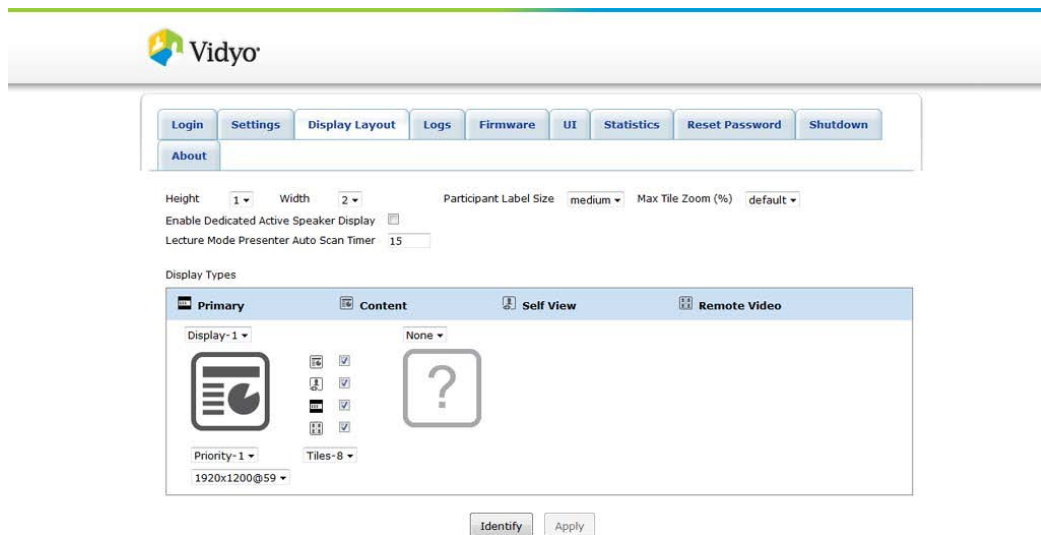
H.323 and SIP endpoints may also be dialled directly using their E164 Number; this connection will be routed via the VidyoGateway.

During a call to a system that includes a PTZ (Pan Tilt and Zoom), remote camera control is supported.

The hardware systems takes a significant period to boot up from cold (~2 Minutes), on screen graphics displayed on the monitor output provide useful user feedback indicating that the system is booting up. When not in a call, the system adopts 'screen saver mode' then 'display sleep mode' after user defined timings.

Call statistics are not available from the system menu, they are only available from the web interface.

The system may be configured and monitored via a password protected web connection. This facility provides endpoint configuration and call statistics monitoring facilities.



Web Configuration Menu

Audio

Microphones: Echo Cancelling Speakerphone (ConferenceCam CC3000e Speakerphone) ▾
 Microphone: 60%
 Speakers: Echo Cancelling Speakerphone (ConferenceCam CC3000e Speakerphone) ▾
 Speaker: 44%

Video

Cameras: ConferenceCam CC3000e Camera ▾
 Transmit Bandwidth: 384Kb/s | 512Kb/s | 768Kb/s | 1Mb/s | 2Mb/s | 3Mb/s
 Transmit Resolution: 640x360 | 960x540 | 1280x720 | 1920x1080
 Transmit Framerate: 30fps | 15fps | 60fps
 Apply Transmit Settings
 Camera Control: Reset Camera | Backlight On | Backlight Off
 Anti-Flicker Mode: Off | 50Hz (Europe) | 60Hz (North America)

Content Capturer

Devices: INOGENI DVI/USB ▾
 Transmit Bandwidth: 512Kb/s | 1Mb/s | 768Kb/s | 2Mb/s
 Transmit Resolution: 1280x720
 Capture Framerate: 15fps | 30fps
 Apply Transmit Settings

Preferences

Auto Answer: SNMP: Enable Settings Access Code:
 Join/Exit Tones: Show Participant Labels: Settings Access Code:
 Allow Remote User to Control Camera: Auto Join My Meeting: Button Press URL:
 Enable On-Screen UI: Auto Upgrade: Auto-Share Connected Devices: Remember Last
 Selfview Loopback: Preview Local Content: Off
 Screen Saver Timeout: 900 secs Display Sleep Timeout: 3600 secs Power Saving Mode:
 RIP Listener Service:

Save

Settings Menu Tab

Bandwidth

Send					Receive				
	Video	Audio	Content	Total		Video	Audio	Content	Total
Available	3695	3695	3695	3695	Available	100000	100000	100000	100000
Actual	1553	138	370	2037	Actual	9	36	0	45

Video

Send

Source Name	Encode Layers	Resolution	FPS [C/E/S]	I-Frames	FIRs	NACKs	kbps
ConferenceCam CC3000e Camera	SL2 TL3	1280 x 720	29/29/29	18	8	0	1553

Receive

Participant	Resolution	FPS	FIRs	NACKs	kbps
JimS	240 x 320	0	1	0	9

Content

Send

Source Name	Resolution	FPS [C/E/S]	FIRs	NACKs	kbps
AppRoomSystem	1280 x 720	59/30/30	4	0	370

Receive

Participant	Resolution	FPS	FIRs	NACKs	kbps
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Audio

Send

Source Name	Codec	kbps
Microphone (5- INOGENI DVI/USB)		138

Receive

Participant	Dropped	Jitter Buffer Size (ms)	kbps
JimS	0	160	35

Echo Coupling: 0

Connection Call Statistics Tab

E: VIDEO TESTS SUMMARY

The video quality experienced between Vidyo systems - both hardware (HD40 and HD100) and software (Desktop and Mobile) - was very good. When presentation material was transmitted the high frame rate presentation image quality was also very good.

The integrated system delivered a similar user experience across the full range of platforms: VideoRoom, VidyoDesktop and VydioMobile. The system performed very well where it automatically adjusted for the available bandwidth.

F: AUDIO TESTS SUMMARY

Setup The echo canceller is fully automatic in operation.

	<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	Acceptable*

*During the evaluation using a Logitech Conference Cam CC3000e system on the HD40 and a Phoenix Quattro 3 Conference Microphone on the HD100 the quality of audio experienced was at times poor; the system appeared to struggle with echo cancellation, with strange squeaking noises at the end of sentences and at times randomly during the conference. The overall quality of the audio was also not as good as one would have expected. Using headsets with microphones directly into the systems, bypassing the echo cancellation microphones, produced much improved audio quality.

Tests using two Logitech Conference Cam CC3000e systems on both the HD40 and 100 systems produces similar results, while using the Logitech systems with the Lync client on standard PCs produced more acceptable results.

The Lip Sync transmitted by the HD40 was very poor and was significantly out, the Lip Sync transmitted by the HD100 was acceptable. On completing a software upgrade after the evaluation was complete to Version 0.0.2.15 and 3.3.4, the Lip Sync from the HD 40 was satisfactory.

Presentation audio input via the DVI to USB3 adaptor was high level and distorted; reducing the audio output level from the PC or laptop to a very low level resolved the level issue, however, the audio still gave some indication of distortion.

G: INTEROPERABILITY

H.323

There were no problems connecting between the HD40 and HD100 systems.

Time to Connect with encryption On – Almost Instantaneous

Connectivity with Other Systems via VidyoGateway (models listed with comments)

Successful connections were made in each direction using the v-scene VidyoGateway with the following CODECs; where the systems supported H.239, presentation material was also shared.

Note: The v-scene VidyoGateway is currently limited to 768Kbit/s Connections

CODEC	Call Bandwidth	Resolution Transmitted by The HD40	Resolution Received by The HD40
Cisco SX20 (JCMB) S/W TC7.1.1 (No Premium Res)	768kbps	w448p @ 30 Pres: w720p @ 4	w448p @ 30 Pres: None
Cisco C40 S/W TC7.2.0 (No Premium Res)	768kbps	w448p @ 30 Pres: w720p @ 4	w448p @ 30 Pres: 640x360 @ 30
Cisco C60 (Prem Res) S/W TC4.2.1	768kbps	w448p @ 30 Pres: w720p @ 4	w448p @ 30
Cisco C90 (Prem Res) S/W TC7.2.0	768kbps	w448p @ 30 Pres: w720p @ 4	w448p @ 30 Pres: w448p @ 25
Lifesize Express 220 S/W 4.9.00	768kbps	w576p @ 30 Pres: w720p @ 4	w576p @ 30 Pres: w720p @ 4
Lifesize Room 200 S/W 4.7.22	768kbps	w576p @ 30 Pres: w720p @ 4	w576p @ 30 Pres: w720p @ 4

Connectivity with the v-scene MCU

H.323

The VidyoRoom systems connected successfully to the JVCS Codian MCU, negotiating H.264 video at 720p resolution with corresponding audio coding of G722.

Procedure for making a call

There are a number of ways to initiate a call.

1. Select one of “My Contacts” on the user interface.
2. Search within the contacts registered with the Vidyo Portal.
3. Insert an E164 number in the search box.

