Telepresence Perspectives and Interoperability

Cisco Interoperability Technical Overview

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Cisco TelePresence provides a unique "in-person" visual communications experience

- You feel as if you are in the same room, face-to-face, with the remote participants

Interoperability provides a transition strategy

- User migration from existing video conferencing to immersive visual communications

Cisco provides standards-based interoperability with existing standard-definition Videoconferencing / Video Telephony endpoints

- H.320, H.323 and SCCP

Seamless interoperation with >95% of the existing video conferencing equipment installed today
Cisco TelePresence Interop

Key Messages

- Cisco TelePresence is based on open standards, including SIP, H.264, AAC-LD and G.711
- Provides interoperability between TelePresence and standard-definition Videoconferencing / Video Telephony
- Solution will maintain the rich, immersive experience between TelePresence participants, while providing a bridge to existing Videoconferencing / Video Telephony devices
- Leverages the existing Cisco Unified Videoconferencing 3500 Series (CUVC) Multipoint and H.320 ISDN Gateway products

Cisco has been offering the CUVC family since 1999. CUVC has a proven track record of interoperating with virtually all vendors/models/versions of H.323 and H.320 –based Videoconferencing and SCCP –based Video Telephony equipment.
Cisco TelePresence Practical Info
Works With a Wide Range of Endpoints

- Tandberg 1700
- Polycom VSX 7000
- Polycom HDX 9000
- Tandberg 1000
- Cisco VT Advantage
- And many more...
- Cisco 7985

Supported Protocols
- H.323
- SIP
- SCCP

- Microsoft NetMeeting
- Mac XMeeting
- Microsoft Office Client
  Requires CUVC 5.6
  MOC client plugin

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Cisco TelePresence Interop
Software Version Recommendations

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<td>1.1.0</td>
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<td>6.0(1) or later</td>
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<td>1.5(x)</td>
<td>5.5 or 5.6</td>
<td>7.0(1) or later</td>
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- Cisco TelePresence Interoperability was introduced in CTS release 1.3 and CTMS release 1.1.0
- Scheduling of interop-enabled TelePresence meetings was introduced in CTS-MAN release 1.4
Today, TelePresence and Videoconferencing are fundamentally different experiences and are generally maintained as separate environments.

- CTMS provides multipoint switching for Cisco TelePresence.
- CUVC provides multipoint mixing for Videoconferencing.

Solution is to bridge the two environments by cascading the CTMS and CUVC together.
1. All CTS endpoints will send a copy of their audio in G.711 format
2. CTMS determines which CTS segment is emitting the most dominant audio and requests it to send a copy of that segment's video in CIF resolution
3. CTMS mixes the G.711 channels from all CTS endpoints into a single G.711 channel and switches CIF and G.711 to CUVC
4. As the dominant audio segment changes throughout the meeting, CTMS switches the CIF video stream accordingly
Cisco TelePresence Multipoint Switch
Interoperability – Media Plane

5. In the opposite direction, audio and video coming from CUVC to CTMS is switched to all CTS endpoints when the audio coming from CUVC is deemed to be the most dominant segment.

6. CIF image from CUVC is presented on the left screen of each CTS surrounded by black borders.
CIF video received from CUVC is scaled to 4CIF resolution by the CTS codec and then displayed on TelePresence 65” 1080p display surrounded by black borders.
Cisco TelePresence Interop
Benefits and Caveats

Benefits:

- Maintains the rich, immersive experience for Cisco TelePresence meeting participants
- Provides standards-based interoperability with minimal additional hardware requirements
  
  No-charge software update to CTS and CTMS
  
  Customer only needs to provide a CUVC 3500 Series MCU, which they may already have

Caveats:

- Will increase the amount of bandwidth required to/from each CTS by an additional 768kbps in order to transmit and receive the CIF and G.711 streams
- Interop segment is limited to CIF resolution video at 768kbps and G.711 audio in this release
## Cisco TelePresence Interoperability
### Max Bandwidth Per CTS – With Interop Added

<table>
<thead>
<tr>
<th></th>
<th>1080p</th>
<th>1080p</th>
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<th>720p</th>
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<td><strong>Resolution</strong></td>
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<td>2250</td>
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<td><strong>Motion Handling</strong></td>
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<td>Good</td>
<td>Best</td>
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<td><strong>Video per Screen (kbps)</strong></td>
<td>64</td>
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<td>64</td>
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<tr>
<td><strong>Audio per Microphone (kbps)</strong></td>
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<tr>
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<td>64</td>
<td>64</td>
<td>64</td>
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<td>64</td>
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<tr>
<td><strong>Auto Collaborate Audio channel (kbps)</strong></td>
<td>CTS-1000 / CTS-500</td>
<td>Tx 4,628</td>
<td>4,128</td>
<td>3,628</td>
<td>2,878</td>
<td>2,128</td>
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<tr>
<td></td>
<td>Rx 4,756</td>
<td>4,256</td>
<td>3,756</td>
<td>3,006</td>
<td>2,256</td>
<td>1,756</td>
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<td><strong>CTS-3000 / CTS-3200</strong></td>
<td>Total Audio and Video (kbps)</td>
<td>12,756</td>
<td>11,256</td>
<td>9,756</td>
<td>7,506</td>
<td>5,256</td>
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<tr>
<td><strong>CTS-3000 / CTS-3200</strong></td>
<td>+ 20% for Layer 2-4 overhead</td>
<td>15,307</td>
<td>13,507</td>
<td>11,707</td>
<td>9,007</td>
<td>6,307</td>
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<td><strong>Optional Feature</strong></td>
<td><strong>Additional Bandwidth (including layer 2-4 overhead)</strong></td>
<td>922kbps</td>
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<td></td>
<td></td>
<td></td>
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</table>
Cisco TelePresence Interop
Other Caveats / Limitations

- CUVC 5.5 and 5.6 are the only supported model of MCU
- The CUVC MCU must be dedicated to TelePresence and controlled by Cisco TelePresence Manager. You cannot share this MCU with CUCV-M or Cisco MeetingPlace controlled meetings
- Encryption is not supported for interop-enabled multipoint meetings (e.g. Secure RTP (sRTP) on the TelePresence side does not interoperate with H.235 on the Videoconferencing side)
- TelePresence participants and CUVC participants will not be able to share slides, documents or document cameras (e.g. Auto Collaborate on the TelePresence side does not interoperate with H.239 on the CUVC side)
  
  Recommend using MeetingPlace or WebEx to facilitate collaboration
- Far End Camera Control (FECC) will not be provided. TelePresence participants will not be able to control (zoom, pan or tilt) the cameras of CUVC participants
- Reduces CTMS and CUVC port capacity by 1 per meeting. E.g. CTMS can support up to 48 segments, and CUVC-3515-24 can support up to 24 participants. Reduce by 1 each for each simultaneous meeting
Cisco TelePresence Multipoint Switch
Interoperability Signaling Plane

- Myriad ways to configure the signaling paths…the above represents the “recommended” way
Cisco TelePresence Interop
How It Works - Signaling Plane Summary

- Details on how the right ½ of the diagrams work can be found in the Video Telephony SRND at www.cisco.com/go/srnd, initially published for CallManager release 4.0 in 2004 and updated for CallManager release 4.1 in 2005.

- Details on how the left ½ of the diagrams work can be found in the Cisco TelePresence SRND at www.cisco.com/go/srnd, published in 2007.

- The integration of these two environments is documented in the CTMS Administration Guide at http://www.cisco.com/en/US/docs/telepresence/multipoint_switch/1_1/admin/guide/dhInterop_2.html.

- Other reference documentation:
  - CUCM Administration Guide(s)
  - CUVC 5.5 Administration Guide
  - CTS-Manager 1.4 Administration Guide

- Questions can be sent to ask-telepresence-technical@cisco.com.
Cisco TelePresence Interop
How It Works - Scheduling

- Step 1: User Schedules Meeting using Outlook or Notes
- Step 2: User accesses CTS-Manager using link in meeting confirmation email

From: ctsmanager
To: Alan Glowacki
Cc: Alan Glowacki
Subject: TelePresence meeting - CONFIRMATION

Your TelePresence meeting is confirmed.

Further instructions about TelePresence call launch and usage information may be found by clicking the following link.

Click Here*

Additional Meeting Options
Clicking the link above may allow:

- Include video conferencing sites,
- Hide your meeting subject on the TelePresence phone,
- Other options.

Note: Forward the Video Conference Access Number to participants who will be joining this meeting via video conferencing.

Meeting Details
Subject: Test Meeting 2
Scheduler: Alan Glowacki (aglowacki@TSBU-TME.COM)
Scheduled Start Time: Friday, September 26, 2008 05:30 PM (America/Los_Angeles)
Cisco TelePresence Interop
How It Works - Scheduling

- Step 3: User selects Video Conferencing tab
- Step 4: User enables interop for the meeting
- Step 5: User selects “Send Email”

After these steps are complete a new confirmation email is sent out containing the Videoconferencing access#
How to Setup an Interop call

1. From each CTS endpoint, dial into the CTMS static meeting

2. CTMS will automatically dial the CUVC Number to create the cascade connection

3. From each legacy videoconferencing endpoint, dial the CUVC service prefix

4. Your interop meeting is now established and everyone should be able to hear and see the active speaker(s)
Cisco TelePresence Interop

How It Works - Scheduling

Video conferencing units dial the video conferencing access number

Cisco TelePresence rooms get One Button to Push

CUVC

CTMS
Interop call

CTMS automatically dials out to 1110 to connect to CUVC

CTS endpoints dial the multipoint number Example: 3333

CTMS automatically dials out to 1110 to connect to CUVC

An Adhoc Conference is automatically created in the CUVC

CUVC 5.5 or greater with EMP

Videoconferencing endpoints dial in to CUVC using the CUVC number Example: 1110

H.323 Videoconferencing Endpoints

For multiple, concurrent interop meetings:
- Create multiple static meetings in CTMS with unique Meeting ID
- Create multiple service prefixes in CUVC with unique Conference ID
- Dial into the respective IDs from the endpoints to start each interop meeting
And now what you really came for....
Why No Direct Connections to Legacy Endpoints?

- Ease of use is paramount to this experience
  - Interoperability problems are not tolerable
  - Dial plan problems are not tolerable
  - Inadequate room environments are not tolerable
  - System peripheral issues are not tolerable
Interoperability Issues

- **Black and White lists**
  The practice of using vendorId, productId, and versionId to determine compatible capabilities and signaling procedures

  Imagine the telephony network if every phone had to know the identity of the other phone in order to work

- **Changes in basic call setup**
  Recently the basic sequence of SETUP/CONNECT, TCS exchange, Master/Slave negotiations and even OLC messages have deviated from the conventions used for years

  These changes were not required to implement new features so why were they made?

- **Inconsistent codec expressions under H.264**

- **No standard for multichannel video and audio**
Dial Plan Issues

- Enterprises have not adopted GDS
- The dominant call control architecture is voice and therefore E.164 based
- There is no universally agreed upon dial plan which allows calls to traverse the Internet
- Therefore, a coalition of service providers who have authority over the E.164 name space and will allow rich media connections
- “Provider” ENUM is on the horizon
  
  I strongly suggest that the academic community re-join the call control infrastructure authorized by the ITU
There are many external conditions that can effect Cisco TelePresence.

Lighting, acoustics and room size are extremely important for a proper TelePresence experience. For example, windows in a room, whether they are interior or exterior facing, allow transmission of extraneous noise, light, and temperature.

For the completely immersive, TelePresence experience, proper room remediation must be made.
Cisco TelePresence Room Requirements
Room Dimensions: CTS-3000 (Standard)

Room Dimensions*:  
Minimum:  
15’ x 20’ x 8’  
Recommended:  
19’ x 22’ x 9’  
Maximum:  
23’ x 31’ x 10’ **

Table provided as integrated part of system
Chairs provided by customer

*With executive and professional level designs, the room size may exceed maximum recommendation.

**Ceiling height required for external display mounted above system.
Cisco TelePresence Room Requirements
3200 (Preliminary) and Large Room Acoustics

- **Minimal or Asymmetrical Treatment with Acoustic Panels**
  Notice how no opposing drywall surfaces are exposed.

- **Complete Treatment Acoustic Panels/Fabric Walls**
  Wall surfaces covered around perimeter (Not necessarily floor to ceiling).
Cisco TelePresence Room Requirements
Room Components to Consider

Sound reflection
- Evaluate existing flat surfaces in room
  - Walls
  - Ceiling Tiles
  - Flooring
  - Room Size
  - Window glass

Sound transmission
- Block outside noise permeating room
  - Doorway seal
  - Build wall beyond ceiling line

Sound diffusion
- Diffuse reverberation by introducing decorative elements
  - Furniture
  - Wall Hangings
  - Décor Accents
Cisco TelePresence Room Requirements
Affects of Lighting Inconsistencies

When rooms are not tuned for lighting continuity, color temperatures will vary and affect the on-camera experience.
Cisco TelePresence Room Requirements

Lighting Requirement

- **Proper lighting is critical to the experience!**

  - 300-400 lux of well dispersed, *horizontal*, ambient light throughout the room. 4100k fluorescent bulbs with indirect fixtures; Provide 4100k color temperature light source

  - Minimum illumination of **250** lux is acceptable if the room is not too deep and light cove helps to light up the face;

  - The lighting in the room should be well controlled. It means block natural sun light or other type of office light through glass or thin blinds

  - Lighting source shouldn’t create any Temporal Flickering

Room Environment

- My point: we won’t even sell you our endpoints if you don’t remediate the room

- The point of telepresence is to fool your brain
  
  There are some elements of theatre/studio craft necessary to pull this off
  
  My analogy: folks that call into conference calls from noisy environments
System Peripherals

- No remote control
- System control of screens
- No need for PTZ cameras
- All this adds up to minimal user knowledge
  The tool is allowed to simply be a tool
  In fact, it’s so transparent to use, folks don’t even see it as using a tool
OK, so were we right?
“Many videoconferencing systems deployed today are not delivering the benefits that were anticipated for a variety of technical and human factor reasons – but the end result is that the systems are not delivering benefits because they are not being used. Hence, despite their relatively low costs, the return on investment for most videoconferencing systems is limited. Telepresence systems, on the other hand, typically experience higher demand and higher usage, and through this usage deliver the benefits anticipated when the purchase decision was made.”

Andrew W. Davis
E. Brent Kelly
Wainhouse Research
