Business Video

Zorela Sora – Emerging Markets Collaboration Technical Lead
Agenda

1. Video Basics & Network Requirements for Video
2. What is MediaNet?
3. Video Applications and Systems
   Desktop Collaboration & Conferencing
   Immersive Video Collaboration - TelePresence
   Live and On-Demand Streaming – Digital Media Suite
4. Conclusions and Q&A
Video Basics & Network Requirements for Video
Video
What Does It Mean?
## Video

### CODECs Difference

<table>
<thead>
<tr>
<th>Application</th>
<th>Bandwidth</th>
</tr>
</thead>
<tbody>
<tr>
<td>MPEG1 VCR</td>
<td>0.5 to 1.5Mbps</td>
</tr>
<tr>
<td>MPEG2 VCR-HDTV</td>
<td>1.5 to 20Mbps</td>
</tr>
<tr>
<td>MPEG4 P.2 Internet-VCR</td>
<td>64Kbps to 4Mbps</td>
</tr>
<tr>
<td>MPEG4 P.10 Internet-HDTV</td>
<td>500Kbps to 12Mbps</td>
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<tr>
<td>H.261 Video Conferencing</td>
<td>N x 64Kbps</td>
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<tr>
<td>H.263 Video Conferencing</td>
<td>32Kbps to 2Mbps</td>
</tr>
<tr>
<td>H.263+ Internet</td>
<td>24-64Kbps</td>
</tr>
<tr>
<td>H.264 AVC Internet-HDTV</td>
<td>500Kbps to 12Mbps</td>
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<tr>
<td>H.264/M 3G Mobile</td>
<td>64-128Kbps</td>
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<tr>
<td>Microsoft™ Internet-HDTV</td>
<td>128Kbps to 15Mbps</td>
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<tr>
<td>Real™ Internet-HDTV</td>
<td>64Kbps to 8Mbps</td>
</tr>
<tr>
<td>Sorenson™ Internet-DVD</td>
<td>128Kbps to 15Mbps</td>
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</table>
Video
Resolutions (Relative Sizes)

<table>
<thead>
<tr>
<th>CIF Formats</th>
<th>NTSC-based</th>
<th>PAL-based</th>
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</thead>
<tbody>
<tr>
<td>SQCIF</td>
<td>128 × 96</td>
<td>128 × 96</td>
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<tr>
<td>QCIF</td>
<td>176 × 120</td>
<td>176 × 144</td>
</tr>
<tr>
<td>QCIF+</td>
<td>176 × 220</td>
<td>176 × 220</td>
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<tr>
<td>CIF</td>
<td>352 × 240</td>
<td>352 × 288</td>
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<tr>
<td>2CIF</td>
<td>704 × 240</td>
<td>704 × 288</td>
</tr>
<tr>
<td>4CIF</td>
<td>704 × 480</td>
<td>704 × 576</td>
</tr>
<tr>
<td>9CIF</td>
<td>1056 × 720</td>
<td>1056 × 864</td>
</tr>
<tr>
<td>16CIF</td>
<td>1408 × 960</td>
<td>1408 × 1152</td>
</tr>
</tbody>
</table>

1080i (1920x1080)
Full HD
Network Infrastructure
Traffic Profiles and Requirements

---

**Voice**
- Smooth
- Benign
- Drop sensitive
- Delay sensitive
- UDP priority

**Video-Conf**
- Bursty
- Greedy
- Drop sensitive
- Delay sensitive
- UDP priority

**Data**
- Smooth/bursty
- Benign/greedy
- Drop insensitive
- Delay insensitive
- TCP retransmits

**TelePresence**
- Bursty
- Drop sensitive
- Delay sensitive
- Jitter sensitive
- UDP priority

---

**Bandwidth per Call**
Depends on Codec, Sampling-Rate, and Layer 2 Media

1. Latency ≤ 150 ms
2. Jitter ≤ 30 ms
3. Loss ≤ 1%

One-Way Requirements

**IP/VC**
Has the Same Requirements as VoIP, but Has Radically Different Traffic Patterns (BW Varies Greatly)
- Latency ≤ 150 ms
- Jitter ≤ 30 ms
- Loss ≤ 1%

Traffic Patterns for Data Vary Among Applications

*Note: Latency Here Is Referring to Network Latency*

**Telepresence**
bandwidth varies based on the resolutions and has Radically Different Traffic Patterns
- Latency* ≤ 200ms
- Jitter ≤ 10 ms
- Loss ≤ 0.05%
- Bandwidth (5 Mbps per screen @1080P)

One-Way Requirements
Network Impact for Streaming
Traffic Profiles and Requirements

**Surveillance**
- Bursty
- Drop sensitive
- Delay sensitive
- Jitter sensitive

**Media Streaming**
- Bursty
- Drop sensitive
- Delay and Jitter insensitive

1. Streaming with some additional needs
2. Camera feed is approx 1 – 3Mbps (UDP)
3. Uni-cast or, optionally, multi-cast
4. Storage uses iSCSI (TCP)
5. Operator viewing – HTTP
6. Total Bandwidth depends on simultaneous viewings
7. Latency* ≤ 150ms
8. Jitter ≤ 10 ms
9. Loss ≤ 0.05%
10. Bandwidth (200K bps to 3.5M bps)

**One-Way Requirements**

1. Traffic patterns could be engineered
2. Uni-cast or, optionally, multi-cast
3. Could leverage content networking
4. Total Bandwidth depends on simultaneous viewings
5. Latency. No real constraints could impact experience (i.e. channel change)
6. Jitter ≤ 1s (player will leverage buffering)
7. Loss ≤ 0.05% (for HD)
8. Bandwidth (250Kbps to 4M bps)
## Cisco Media Application Classes

### DiffServ QoS Recommendations (RFC 4594-Based)

<table>
<thead>
<tr>
<th>Application Class</th>
<th>Per-Hop Behavior</th>
<th>Admission Control</th>
<th>Queuing &amp; Dropping</th>
<th>Application Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>VoIP Telephony</td>
<td>EF</td>
<td>Required</td>
<td>Priority Queue (PQ)</td>
<td>Cisco IP Phones (G.711, G.729)</td>
</tr>
<tr>
<td>Broadcast Video</td>
<td>CS5</td>
<td>Required</td>
<td>PQ (recommended)</td>
<td>Cisco IP Video Surveillance / Cisco Enterprise TV</td>
</tr>
<tr>
<td>Realtime Interactive</td>
<td>CS4</td>
<td>Required</td>
<td>PQ (recommended)</td>
<td>Cisco TelePresence</td>
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<tr>
<td>Multimedia Conferencing</td>
<td>AF4</td>
<td>Required</td>
<td>BW Queue + DSCP WRED</td>
<td>Cisco Unified Personal Communicator</td>
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<tr>
<td>Multimedia Streaming</td>
<td>AF3</td>
<td>Recommended</td>
<td>BW Queue + DSCP WRED</td>
<td>Cisco Digital Media System (VoDs)</td>
</tr>
<tr>
<td>Network Control</td>
<td>CS6</td>
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<td>BW Queue</td>
<td>EIGRP, OSPF, BGP, HSRP, IKE</td>
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<tr>
<td>Call-Signaling</td>
<td>CS3</td>
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<td>BW Queue</td>
<td>SCCP, SIP, H.323</td>
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<tr>
<td>Ops / Admin / Mgmt (OAM)</td>
<td>CS2</td>
<td></td>
<td>BW Queue</td>
<td>SNMP, SSH, Syslog</td>
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<tr>
<td>Transactional Data</td>
<td>AF2</td>
<td></td>
<td>BW Queue + DSCP WRED</td>
<td>Cisco WebEx / MeetingPlace / ERP Apps</td>
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<tr>
<td>Bulk Data</td>
<td>AF1</td>
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<td>BW Queue + DSCP WRED</td>
<td>E-mail, FTP, Backup Apps, Content Distribution</td>
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<tr>
<td>Best Effort</td>
<td>DF</td>
<td></td>
<td>Default Queue + RED</td>
<td>Default Class</td>
</tr>
<tr>
<td>Scavenger</td>
<td>CS1</td>
<td></td>
<td>Min BW Queue (Deferential)</td>
<td>YouTube, iTunes, BitTorrent, Xbox Live</td>
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</table>
## Cisco MRN Campus Design
### 4-Queue Catalyst 3750 (1P3Q3T) Model Example

<table>
<thead>
<tr>
<th>Application</th>
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<td>Internetwork Control</td>
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<td>Voice</td>
<td>EF</td>
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<td>Broadcast Video</td>
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<td>Multimedia Conferencing</td>
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<tr>
<td>Realtime Interactive</td>
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<td>Multimedia Streaming</td>
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<tr>
<td>Call Signaling</td>
<td>CS3</td>
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<tr>
<td>Transactional Data</td>
<td>AF2</td>
</tr>
<tr>
<td>Network Management</td>
<td>CS2</td>
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<tr>
<td>Bulk Data</td>
<td>AF1</td>
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<tr>
<td>Scavenger</td>
<td>CS1</td>
</tr>
<tr>
<td>Best Effort</td>
<td>DF</td>
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</table>

<table>
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<tbody>
<tr>
<td>AF1</td>
</tr>
<tr>
<td>Queue 4 (5%)</td>
</tr>
<tr>
<td>Q4T2</td>
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<tr>
<td>AF1</td>
</tr>
<tr>
<td>Default Queue</td>
</tr>
<tr>
<td>DF</td>
</tr>
<tr>
<td>Queue 3 (35%)</td>
</tr>
<tr>
<td>Q2T3</td>
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<tr>
<td>CS7</td>
</tr>
<tr>
<td>CS6</td>
</tr>
<tr>
<td>Queue 2</td>
</tr>
<tr>
<td>(30%)</td>
</tr>
<tr>
<td>Q2T2</td>
</tr>
<tr>
<td>CS3</td>
</tr>
<tr>
<td>AF3</td>
</tr>
<tr>
<td>Q2T1</td>
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<td>AF3</td>
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<td>AF2</td>
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<td>CS2</td>
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<tr>
<td>Priority Queue</td>
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<tr>
<td>AF1</td>
</tr>
<tr>
<td>CS5</td>
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<tr>
<td>CS4</td>
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</table>

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What is Medianet?
Medianet Architecture
Set of Challenges

**Delivery and Insuring the Experience**
- Provide relatively high bandwidth
- Meet performance tolerances (latency, jitter, loss, bursting, admission)
- Insuring wanted video streams service level, managing unwanted

**Digital Media Management**
- Capture, Storage, Archive, and Retrieval
- Distribution on-demand or live broadcast

**Client Access**
- Access controls, wired and wireless
- Network context/services aware – bridge device gap
- Conferencing and transcoding resources

**Security**
- Protection of video sources and content
- Securing content for intellectual property and/or compliance
- Access controls for clients, digital rights

**Integration**
- Standalone video applications constrain productivity
- Collaboration driving need for application integration
- Leverage endpoints and resources across multiple video services
Medianet Architecture
Putting All the Pieces Together

Clients

- Media Endpoint
  - Media Content
  - User Interface
  - Media I/O

Media Network Services

- Session Control Services
  - Call Agent(s)
  - Session/Border Controllers
  - Gateways
- Access Services
  - Identity Services
  - Confidentiality
  - Mobility Services
  - Location/Context
- Transport Services
  - Packet Delivery
  - Quality of Service
  - Session Admission
  - Optimization
- Bridging Services
  - Conferencing
  - Transcoding
  - Recording
- Storage Services
  - Capture/Storage
  - Content Mgmt
  - Distribution

High Availability Network Design

BRANCH
CORPORATE OFFICES

NAT / VPN
Internet (Fire Wall)
PSTN

CAMPUS
BUILDING Y

DATA CENTER

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Scope of Business Video Systems

Medianet

- Cisco TelePresence
  - Life-like, in-person video collaboration
- Interactive Desktop Collaboration
  - Video calling, WebEx, and interoperability
- Desktop video streaming
  - Video broadcast to desktop PCs
- Digital signage
  - Networked video signage
- Video surveillance
  - IP-based video surveillance
Video Applications and Systems
Unified Communications

Communicate
- Video Telephony & Unified Personal Communicator

Share
- Unified MeetingPlace
- WebEx – On-demand

Integrate
- TelePresence Interoperability

Network as the Platform
- RSVP
- Media Processing
- QoS
- Inter-company
Video Telephony: Why Is Video Telephony Different Than Video Conferencing?

**Video Telephony**

**Applications:**
- Executive one-on-one
- Eventually, most or all “calls”

**Characteristics:**
- Personal tool
- Ad-Hoc conversations
- Easy to use and manage
- Video added to phone calls
- Highly scalable, easy to deploy
- Cost-effective, preserve existing investments
  - PBXs (i.e., Cisco Unified CallManager)
  - Multi-protocol: SCCP, H.323, SIP
  - Sophisticated dial plan capabilities, call routing, CDRs
  - Full digit manipulation
  - Telephony features (hold, transfer, conference, park, call forward)
  - Common bridging, GW and Network services resources

**Video Conferencing**

**Applications:**
- Department meetings
- Knowledge transfer
- Project, business meetings

**Characteristics:**
- Meeting rooms
- Scheduled
- Difficult to use
- Separate system/network
- Limited Scalability
- Costly
  - Gatekeepers (i.e., Cisco IOS®)
  - H.323 only
  - Limited dial plan, call routing, CDRs
  - Limited digit manipulation
  - No telephony features
Cisco Video Telephony Architecture

Cisco 7985, Cisco VT Advantage, Sony, Polycom and Tandberg all run Cisco SCCP and integrate tightly into CallManager with the same intuitive feature / functionality of an IP Phone (e.g. hold, transfer, conference, park/pickup, hunt groups, etc.)
SCCP Video Endpoint Offerings Today

Medium Group/Room systems
Partners

Small Group Partners

Personal Systems Cisco Endpoints

T- 550 PCS - 1 T2000 T-1500 VSX5000

T1000 TL-50 VSX3000

CUVA 7985G CUPC- SIP endpoint
Cisco Unified Video Advantage

Video is now Just a Phone Call!

Camera Icon on Phone Indicates that Video Capabilities are Enabled

Camera Icon Used to Lunch Unified Video Advantage

VT Advantage User Interface Indicates Status of Association

Video Support available with IP Phone and IP Communicator 2.1 & Unified Video Advantage 2.1
Cisco IP Communicator 7.0 + CUVA

1. Turns your PC into an IP phone allowing you to take your office phone extension with you on the road

2. Audio Improvements
   - Improved adaptive jitter buffer and packet loss concealment, Latency reduction,
   - Leverages MS Windows GQoS
   - Voice quality enhancements
   - iLBC & G.722 support

3. Enhance Security
   - Two-way authentication via Unified Communications Manager CAPF using Locally Significant Certificate (LSC)

4. SIP Softphone
   - Requires Unified Communications Manager 6.0 for SIP support
   - Media encryption: Secure Real-Time Transport Protocol (SRTP) for voice traffic

5. Support for Microsoft Vista

Makes Business Mobility Easy, Enabling Users to Be Anywhere and Have Same Telephony Capabilities as They Have at Their Desk
Cisco Unified Personal Communicator 7.0
Video Telephony (Soft Phone Only)

1. Point to Point – Communications Manager 5.1 and above

2. Multi-point ad hoc video conferences
   Supported on Personal Communicator 1.2 & Cisco Unified Communications Manager 6.0 and above
   Supports Cisco Unified Video Conferencing 5.x MCU SCCP Mode
   Supports MeetingPlace Express VT for video switching

3. Supports video resizing

4. Video on the PC (Cisco VT Camera I & II and other 3rd party cameras)

**Frame Rate Up to 30 FPS, Video Formats CIF and QCIF**
Signaling Protocols

Cisco Unified Communications Manager: The Universal Protocol Converter

Video Interoperability Between SCCP, H323, and SIP
Video Communication System
Video Conferencing Classified into Five Categories

1. Cisco Unified MeetingPlace 7.0
   - Day to day audio, web and video meetings for large enterprise
   - Designed on highly scalable hardware
   - Integrated Outlook scheduling, meeting notifications, Directory Service and more
   - 300 video participant in a conference

2. Cisco Unified MeetingPlace Express 2.0 (CUMPE)
   - Software based voice, video and web conferencing solution for mid-size organizations
   - Scheduled & reservationless support

3. Cisco Unified MeetingPlace Express VT 2.0 (CUMPE-VT)
   - Ad-hoc conferencing for CUPC and Video Telephony endpoints
   - No support for scheduled/reservationless conference

4. Cisco Unified Video Conferencing (CUVC)
   - Scalable, robust hardware-based video platform
   - Standalone deployment for video
   - Legacy endpoints support (H323, ISDN, SIP)
   - Optional software CUVC-M for scheduling and management

5. WebEx
   - Web collaboration with audio and video for small to large enterprise
   - Software as a service (SaaS)
   - On demand
   - Scalable Network (MediaTone)
Updated number of video participants
Eric Strevel, 1/21/2009
Cisco Unified MeetingPlace 7.0
Fully Integrated Enterprise Video

1. Flash-based Web conferencing
   - Dramatically improved user experience
   - Broad application support

2. Multi-protocol solution for broad video interoperability
   - H.323, H.320, SIP, SCCP

3. Reserve video MCU & endpoints from web interface
   - Reserved endpoints automatically connect at meeting start time
Cisco Unified MeetingPlace Express 2.0

1. Add video to scheduled, reservationless voice & web meetings
   On same server

2. More effective communication … “people hear what they see”
   >50% of communication is through body language

1. 6 to 200 concurrent users

2. Simple video capabilities for ease of use
   Voice-activated video switching
   SCCP, SIP & H.323 endpoints
   H.263 or H.264 (per meeting)
   G.711 or G.729a (per user)
   Single bit rate (64-768Kbps\*, per meeting)
   Single resolution (CIF, per meeting)

* 384 Kbps is the baseline for a video license; using bitrates > 384 Kbps may reduce capacity. See technical training for details.
Cisco Unified MeetingPlace Express VT 2.0

Ad-hoc Conferencing for Unified Communications Manager Video Telephony

1. Ad-hoc, rich-media conferencing
   - Voice/video/web for CUPC
   - Voice/video for other CUCM endpoints (e.g. CUVA, 7985, ...)
   - H.323, SIP, SCCP

2. Basic multipoint video switch

3. No scheduled/reservationless meetings

4. For Midsized Organizations
   - 40 concurrent voice, video & web users
Video Telephony with Unified MeetingPlace Express VT

CUMPE-VT

Video

Answer

Video

Conference

Answer

CallManager

Video

Video

Signaling

CALL ON HOLD
Cisco Unified Personal Communicator and MeetingPlace Express VT

CUMPE-VT

Video

CallManager

Video

Web

Video

Web

Web
Cisco Unified Video Conferencing Portfolio

Functionality

CUVC 5110
CUVC 5115

CUVC 3515
3522 GW 4BRI
3527 GW 2PRI

CUVC 3545
3545 GW 2PRI
3545 GW 4 Serial

CUVC 5230

Entry Medium Large

• High Definition (HD) flexible capacity up to 1080p
• Unlimited number of conferences (on prem solution)
• Increased capacity with CUV-Manager (up to 1000 ports)
• Single management (Manage both 35xx & 51xx/52xx MCU)
• New video layouts with custom layout per participant
• No Self See option for each participant (optional)
• New In-meeting indications (overlay banners & icons)
• Enhanced Auto-attendant & Video IVR
• New MCU Admin GUI
• New Reports and Real Time Monitoring
• Enhanced Room Based Device Management
CUVC 7.0 Components

CUV-Manager

MCS 7835/7845
- Network manager & Reporting
- Manage 3500 and/or 5000 MCUs
- Location Cascading
- Call Admission Control
- WinOS / MSDE or SQL database
- Internal ECS gatekeeper
- SIP B2B Agent
- SMTP Email Integration
- Outlook Plug-in / web scheduling
- Notes scheduling
- MOC integration (LCS/OCS)
- Directory Services and SSO
- Web based Administration
- Web Conference Manager
- End point management
- Optional Secondary Server

MCU

Services Definition and Config

3515 Fixed Hardware
12, 24 or 48 ports

3545 Modular Chassis
24/48 up to 96 ports with multiple EMP
Chassis provides power only
Optional Redundant boards
- MCU–voice & control
- EMP–video mixing

5230 Hardware Appliance
ATCA Standard
New In-meeting Indications
New Custom Layouts
New Admin GUI
30 HD ports, up to 120 SD ports
Flexible HD capacity model

CUV-Desktop

MCS 7835/7845
- H.239 Data share
- HD Desktop Client
- Chat and annotations
- Firewall Traversal
- Breakout sessions
- Recording (HD/SD)
- Optional Load Balancing
- Web Streaming (webcast)
- IBM Sametime Integration
- WebEx Integration
- Address book
- SVC error correction up to 20% pocket loss
- Point-To-Point calls

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CUVC—M Network Topology

CUVC-M and MP 7.0 Video Admin Functions Are Similar
Unified Videoconferencing Desktop

Streaming Integration

1. Uses standard Quicktime web plugin for viewing in browsers
2. Accessed through CUV Desktop home page
3. Streams entire CUV Desktop experience—audio, video and data
4. Cisco ACNS compliant for unicast<->multicast, unicast stream splitting, etc
Meeting Center CUVVC Video Integration

1. Display standards-based video in Meeting Center UI
2. Video Conferencing units’ video displayed in a WebEx Meeting (16 max)
3. PCs and video devices can participate in the same meeting
4. Extend video conferencing to remote and external users
5. WebEx Meeting Center only
WebEx Business Suite
Easy and Affordable Online Meetings and a Lot More

Meeting Center
- Online Meetings

Event Center
- Webinars
- Online Events

Sales Center
- Online Sales

Training Center
- Online Training

Support Center
- Remote Support
- and Access

Collaboration
- Network-Based Recording
- Audio
- Productivity Tools
WebEx Business Suite

Video Capabilities

1. Host Controlled
2. Live Web Cam
   - Single Point
   - Multipoint
3. Adjustable speeds and feeds
4. Playback
   - Flash
   - Streaming audio & video
   - Webex Recordings
5. Analog video input into webex meeting

1. Video works in Meeting, Sales, Event and Training Center
2. Optionally tie in H.323, SIP, and Telepresence endpoints via CUV-C plug-in

Meet instantly with Anyone, Anywhere and Show Them High-Impact Sales Presentations with Video Right From Your Browser
Video Enhancements

1. Video
   - Personalize your web meeting experience
   - Ensure better control over meeting
   - Video button easier to find

2. Enhancements
   - Presenter can lock video
   - Attendee can pause his own video
   - Multi-Point Video (MPV) added to Sales Center, also available in Meeting Center
   - MPV Video is the set default for meetings
WebEx LiveStream
What Is It?

1. A streaming video/audio solution
2. Attendee scalability to 35,000 participants
3. High quality video/audio synchronized with PowerPoint
4. Branded SKIN with company logo and colors
5. Choice of desktop snapshot or PowerPoint content streaming
6. Onsite producer/encoder
7. Event recording
8. Optional Q and A, registration, polling

Simon & Schuster Worldwide Book Launch
http://webexcomm.vo.llnwd.net/o16/ls/philippaod/

Used in Conjunction with the WebEx Universal Communications Toolkit
Cisco WebEx Meeting Center on Smart Phones

1. Integrated audio and web conferencing on 3G or WiFi
   Also supports integrated data on WiFi and audio on 2g

2. Attend a scheduled meeting

3. View presentations, applications, desktops with live annotations, view and chat with attendees

4. iPhone and Most 3G smart phones
   - Blackberry 3G (e.g. Bold, Storm EMEA version)
   - Windows Mobile 6.0+ (e.g. Samsung BlackJack, HTC Touch, etc.)
   - Symbian Nokia S60 (e.g. E71, E61i, etc.)

5. OS: Blackberry browser, IE, Opera Mini, Firefox

6. Available in 10 languages
# WebEx Network Requirements

## Average Video Bandwidth Consumption

### Average Bandwidth consumption per attendee for single point Video

<table>
<thead>
<tr>
<th>Resolution</th>
<th>Frames Per Second</th>
<th>Low Resolution</th>
<th>Medium Resolution</th>
<th>Medium Resolution</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>128x96</td>
<td>176x144</td>
<td>352x288</td>
</tr>
<tr>
<td>Low</td>
<td>5</td>
<td>35 Kbps</td>
<td>45 Kbps</td>
<td>70 Kbps</td>
</tr>
<tr>
<td>Medium</td>
<td>10</td>
<td>45 Kbps</td>
<td>60 Kbps</td>
<td>110 Kbps</td>
</tr>
<tr>
<td>Medium</td>
<td>15</td>
<td>60 Kbps</td>
<td>80 Kbps</td>
<td>n/a</td>
</tr>
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### Average Bandwidth consumption per attendee for Multipoint Video with 4 participants

<table>
<thead>
<tr>
<th>Resolution</th>
<th>Frames Per Second</th>
<th>Low Resolution</th>
<th>Medium Resolution</th>
<th>Medium Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>128x96</td>
<td>176x144</td>
<td>352x288</td>
</tr>
<tr>
<td>Low</td>
<td>5</td>
<td>60 Kbps</td>
<td>90 Kbps</td>
<td>160 Kbps</td>
</tr>
<tr>
<td>Medium</td>
<td>10</td>
<td>90 Kbps</td>
<td>150 Kbps</td>
<td>280 Kbps</td>
</tr>
<tr>
<td>Medium</td>
<td>15</td>
<td>120 Kbps</td>
<td>180 Kbps</td>
<td>340 Kbps</td>
</tr>
<tr>
<td>Medium</td>
<td>30</td>
<td>180 Kbps</td>
<td>240 Kbps</td>
<td>420 Kbps</td>
</tr>
</tbody>
</table>
ERS3

Replaced max bandwidth slide with this one.

Eric Strevel, 1/21/2009
Cisco TelePresence
The Cisco TelePresence Meeting

What It Is
What It Isn’t
# Cisco TelePresence Endpoints

## A Complete Portfolio for Every Application

<table>
<thead>
<tr>
<th>Model</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CTS 500</td>
<td>Personal Unit</td>
</tr>
<tr>
<td>CTS 1000</td>
<td>Two Users</td>
</tr>
<tr>
<td>CTS 1300</td>
<td>Six Participants</td>
</tr>
<tr>
<td>CTS 3000</td>
<td>Six Participants</td>
</tr>
<tr>
<td>CTS 3200</td>
<td>Large Groups</td>
</tr>
</tbody>
</table>

### Personal
- Single seat
- Private office
- 5 Mbps at 1080p
- Wideband audio

### Multipurpose Collaboration
- 2 seats
- General purpose room
- 5 Mbps at 1080p
- Wideband audio

### Group / Team Collaboration
- 6 seats
- General purpose rooms
- 5 Mbps at 1080p
- Wideband audio

### CTS 3000
- 6 seats
- Purpose-built room
- 15 Mbps at 1080p
- Spatial wideband audio

### CTS 3200
- 18 seats
- Purpose-built room
- 15 Mbps at 1080p
- Spatial wideband audio
Cisco TelePresence Codec
(i.e. Work’s Like Phone)

1. Operates just like a Cisco IP Phone:
   - CDP and 802.1Q for VLAN assignment
   - DHCP and TFTP for configuration and firmware
   - SIP for signaling to Cisco UC Manager
   - XML for making/terminating scheduled and ad hoc calls

2. Industry leading, extremely low-latency audio/video architecture
   - Ultra high definition 1080p and 720p video
   - H.264 encoding/compression
   - Advanced Audio Coding–Low Delay (AAC-LD)
   - G-711 (fourth Audio Channel)
   - CIF resolution for Interop
Cisco TelePresence Network Requirements

Why Is TelePresence so Sensitive?

Cisco TelePresence Codecs Use 1080p30 Resolution

1920 Lines of Vertical Resolution (Widescreen Aspect Ratio is 16:9)

1080 x 1920 lines = 2,073,600 Pixels per Frame
x 3 Colors per Pixel
x 1 Byte (8 bits) per Color
x 30 Frames per Second
= 1,492,992,000 bps
or 1.4 Gbps Uncompressed

Cisco TelePresence Codecs Transmit 3-5 Mbps per 1080p Screen, Which Represents over 99% Compression
Therefore Packet Loss Is Proportionally Magnified in Overall Video Quality
Cisco TelePresence Solution Components

Cisco Unified Communications Manager
- Calendar Integration – Exchange/Lotus
- Web Scheduling
- Management of CUCM
- Reports
- Resource Availability
- One solution to manage CTS-Point to Point
- Monitoring of CUCM/CTMS
- System-level information

Cisco TelePresence Manager
- CTS Endpoints register to CUCM
- CTS Endpoints are SIP “phones”
- Call Control, Call Signaling
- CTS Registration
- Dial Plan and Corp Dial Plan Integration
- Call Admission Control
- QoS marking – AF41

Cisco TelePresence Multipoint Switch
- CUCM and CTPC
- Call Control Call Signaling
- CTS Registration
- Dial Plan and Corp Dial Plan Integration
- Call Admission Control
- QoS marking

Cisco Unified Videoconferencing
- Calendar Integration – Exchange/Lotus
- Web Scheduling
- Management of CUCM
- Reports
- Resource Availability
- One solution to manage CTS-Point to Point
- Monitoring of CUCM/CTMS
- System-level information

Service Provider B2B Network
- Interoperability point for H.323, H.320, SCCP & SIP
- Interoperability with CUVC
- Segment/Site/VIP/Lecture/Announce
- Does Video Switching
- Preserves the video experience

TelePresence Multipoint
- Traditional Video Conferencing “conferencing” bridge
- Interoperability point for TelePresence endpoints
- H.320, H.323, SIP & SCCP Video
- Does Video Mixing

TelePresence Point to Point
- Cisco Unified Videoconferencing
- H.323, H.320, SCCP
- Tandberg
- Sony
- Polycom

CUVC and CUPC
- Sametime v7/8
- MOC 07
- CTS-3000/3200
- CTS-500
- CTS-1000

Company/Partner
- CTS-3000/3200
- CTS-500
- CTS-1000
- CTS-1300
- CTS-1000/1300
- CTS-500/1000/1300
- CTS-3000/3200

Presentation_ID
- Traditional/3rd Party VC Protocols
- Cisco Confidential
Cisco TelePresence Solution Components

CTS-3000/3200

CTS-500

CTS-1000

CTS-3000/3200

Interoperability Link

CUVC

CTMS

TelePresence Multipoint

H.323, H.320, SIP, SCCP, MOC, Sametime

CUVC and CUPC

Sametime v7/8

MOC 07

Cisco 7985 Video Phone

H.323, H.320, SCCP Tandberg Sony Polycom

Company/Partner X

Company/Partner Y

Company/Partner Z

CTS-500/1000/1300

CTS-500

CTS-1000/1300

TelePresence Point to Point

Traditional/3rd Party VC Protocols

TelePresence Multipoint

TelePresence Point to Point

Service Provider TelePresence B2B Network

CTS-Man

CTS-MAN

CTS-Man

Company/Partner X

Company/Partner Y

Company/Partner Z

H.323, H.320, SIP, SCCP, MOC, Sametime

CUVC and CUPC

Sametime v7/8

MOC 07

Cisco 7985 Video Phone

H.323, H.320, SCCP Tandberg Sony Polycom

TelePresence Point to Point

Traditional/3rd Party VC Protocols

TelePresence Multipoint
Cisco TelePresence Multipoint Switch
Interoperability Users Experience

This picture was taken with a cheap digital camera in a lab environment and is not meant to accurately reflect the quality of the TelePresence experience.

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 Traffic Characteristics

## Max Bandwidth per Second

<table>
<thead>
<tr>
<th></th>
<th>1080p</th>
<th>1080p</th>
<th>1080p</th>
<th>720p</th>
<th>720p</th>
<th>720p</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resolution</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Motion Handling</td>
<td>Best</td>
<td>Better</td>
<td>Good</td>
<td>Best</td>
<td>Better</td>
<td>Good</td>
</tr>
<tr>
<td>Video per Screen (kbps)</td>
<td>4000</td>
<td>3500</td>
<td>3000</td>
<td>2250</td>
<td>1500</td>
<td>1000</td>
</tr>
<tr>
<td>Audio per Microphone (kbps)</td>
<td>64</td>
<td>64</td>
<td>64</td>
<td>64</td>
<td>64</td>
<td>64</td>
</tr>
<tr>
<td>Auto Collaborate Video channel</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
<td>500</td>
</tr>
<tr>
<td>5 Frames Per Second (kbps)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Auto Collaborate Audio channel (kbps)</td>
<td>64</td>
<td>64</td>
<td>64</td>
<td>64</td>
<td>64</td>
<td>64</td>
</tr>
<tr>
<td><strong>CTS-1000 / CTS-500</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Audio and Video (kbps)</td>
<td>4,628</td>
<td>4,128</td>
<td>3,628</td>
<td>2,878</td>
<td>2,128</td>
<td>1,628</td>
</tr>
<tr>
<td><strong>CTS-3000 / CTS-3200</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<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>
<td>3,756</td>
</tr>
<tr>
<td>+ 20% for Layer 2-4 overhead</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>CTS-1000 / CTS-500 max bandwidth (kbps)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>includes Layer 2-4 overhead</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tx</td>
<td>5,554</td>
<td>4,954</td>
<td>4,354</td>
<td>3,454</td>
<td>2,554</td>
<td>1,954</td>
</tr>
<tr>
<td>Rx</td>
<td>5,707</td>
<td>5,107</td>
<td>4,507</td>
<td>3,607</td>
<td>2,707</td>
<td>2,107</td>
</tr>
<tr>
<td><strong>CTS-3000 / CTS-3200 max bandwidth (kbps)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>includes Layer 2-4 overhead</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tx</td>
<td>15,307</td>
<td>13,507</td>
<td>11,707</td>
<td>9,007</td>
<td>6,307</td>
<td>4,507</td>
</tr>
<tr>
<td>Rx</td>
<td>15,307</td>
<td>13,507</td>
<td>11,707</td>
<td>9,007</td>
<td>6,307</td>
<td>4,507</td>
</tr>
</tbody>
</table>

### Optional Add-On Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Value</th>
<th>+ 20% for Layer 2-4 overhead</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>30fps Auto Collaborate (kbps)</td>
<td>3,500</td>
<td>+ 20% for Layer 2-4 overhead</td>
<td>4,200</td>
</tr>
<tr>
<td>Interoperability Video Channel (kbps)</td>
<td>704</td>
<td>+ 20% for Layer 2-4 overhead</td>
<td>922</td>
</tr>
<tr>
<td>Interoperability Audio Channel</td>
<td>64</td>
<td>+ 20% for Layer 2-4 overhead</td>
<td>922</td>
</tr>
</tbody>
</table>
Cisco TelePresence Traffic Characteristics
Latency, Jitter and Loss Targets and Thresholds

<table>
<thead>
<tr>
<th>Metric</th>
<th>Target</th>
<th>Threshold 1</th>
<th>Threshold 2</th>
<th>Threshold 1 Action</th>
<th>Threshold 2 Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latency</td>
<td>150 ms</td>
<td>250 ms</td>
<td>400 ms</td>
<td>Warn</td>
<td>None</td>
</tr>
<tr>
<td>Jitter</td>
<td>50 ms</td>
<td>125 ms</td>
<td>165 ms</td>
<td>None</td>
<td>None</td>
</tr>
<tr>
<td>Loss</td>
<td>0.05%</td>
<td>1%</td>
<td>10%</td>
<td>Warn</td>
<td>Reduce Quality, Drop Call</td>
</tr>
</tbody>
</table>
# Don’t Let Good Technology be Hampered by Bad Implementation

## Room Components to Consider

### Sound Reflection
- Evaluate existing flat surfaces in room
  - Walls
  - Ceiling Tiles
  - Flooring
  - 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
Digital Media Suite

Create

- Media Encoder 1100
- Media Encoder 2200
- SA D9032 Encoder

Manage

- Media Experience Engine
- Media & Signage Mgr

Access

- Displays
- Desktop Video
- Enterprise TV
- Signage Media Player

Distribute

- Content Distribution Manager (CDM)
- Media Delivery Engines (WAE)
- WAE Appliance
- ISR-NM
DMS: Extensive Product Portfolio!

Digital Media Manager
For Show and Share, Digital Signs & Cast, Media Designer

Digital Media Encoder 1000
For Desktop Video

Digital Media Encoder 2000
For Desktop Video

SA Encoders
For Digital Signage & Enterprise TV

Show and Share Video For Desktop

Media Experience Engine
For Any Media to Any Device

Digital Media Players

Digital Media Players

DMP 4400G

Content Distribution Manager (CDM)

WAE Appliance

ISR-NM

Media Delivery Engines (WAE)

Media Delivery Networks (Cisco ACNS)
Cisco Digital Signs

1. Promote, upsell and cross-sell products and services directly to customers in the store
2. Enhance customer experience and deliver entertaining information to customers to reduce perceived wait time
3. Broadcast real-time executive and internal communications
4. Offer cost effective, flexible training options when computers are not available
5. Share up-to-date schedules, news and emergency messaging right where people need it most
Cisco Show and Share

1. Create, manage and access video over the Web
2. Capture and digitize digital media
3. Browse, search, and view training VoDs or live executive communication Webcasts over the network through the video portal—anywhere, anytime
4. Deliver executive and internal communications to employees and external marketing to customers
5. Provide cost effective training that’s accessible at any time
Cisco Cast

- Deliver on-demand video and broadcast TV channels over an IP network
- Customize lineups and create content libraries
- Search the interactive on-screen menus and program guides with the remote control, Cisco IP phone or mobile devices
- Enhance customer experience and provide product/service information on demand
- Offer cost effective, flexible training options when computers are not available
Cisco Show and Share

- Web 2.0 Collaborative features including:
  - Commenting
  - Ratings
  - Tagging
- User-generated content authoring (creation/recording)
- Optional Publishing Approvals
- Transcription capability
- Content editing
- Multi-level usage reporting
- Multi-language support
- Content subscription via RSS
- Advanced search
- Live Webcasting
- Cisco TelePresence recording playback
MXE Interoperability Network Diagram

CISCO TELEPRESENCE

SIP Signaling

TelePresence CTMS

Site 3

Site 2

Site 1

RTP Transport
H.264 CABAC Video
Up to 1080p resolution
AAC Wideband Audio

TelePresence
CTS-Manager

Schedule “Push” Resource Management

Cisco Media Experience Engine

Cisco Call Manager 7.0

H.323 Trunk

H.323 Gatekeeper

H.323 Signaling

POLYCOM TANDBERG

RTP Transport
H.264, H.263++ Video
Up to 720p resolution
G.7x/AAC Wideband & Narrowband Audio

One button to push Meeting join

Schedule a meeting

1. Ad hoc calls can be direct-dialed endpoint to endpoint
2. Static conferences can be configured on CTMS
3. Integration with CTS-Man will allow OBTP from a CTS endpoint

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Cisco Media Processing Strategy

Phase 1
MXE 3000
- Extensive Media Adaptation
  - Media adaptation and customization for stored media content
  - Automated workflow with Flip integration
  - DMS integration

Phase 2
MXE 3500 & 5600
- Interactive, Real Time
  - Ultra low latency, modular, highly scalable platform with open API
  - Speech to Text, Live transcoding
  - First application enabled is TelePresence interop

Phase 3
- Scalable, Optimized Media Intelligence
  - Advanced media processing
  - Distributed, large scale medianets
  - Extended Cisco and 3rd party application integration
<table>
<thead>
<tr>
<th>Media Capture/Creation</th>
<th>Media Management</th>
<th>Media Delivery and Distribution</th>
<th>Media Access</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cisco Digital Media Encoders for Desktop Video</td>
<td>Content Author</td>
<td>Multicast-Enabled WAN: Satellite</td>
<td>Cisco Video Portal</td>
</tr>
<tr>
<td>Third-Party Content Provider/Creative Agency</td>
<td>Cisco Digital Media Manager Located at headquarters or the data center</td>
<td>Cisco NM-VSAT for the ISR</td>
<td>Corporate Offices, At-Home Desktop Users</td>
</tr>
<tr>
<td>Scientific-Atlanta Encoders for Digital Signage and Enterprise TV</td>
<td>Network Administrator</td>
<td>Caching/Pre-Positioning, Live Streaming</td>
<td>Cisco Digital Media Players</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Unicast or Multicast WAN</td>
<td>On-Premise, Remote Location</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Cisco Enterprise TV</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>On-Premise, Remote Location</td>
</tr>
</tbody>
</table>

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Useful Links

1. Video Tool Kit

2. Video Conferencing

3. TelePresence

4. Digital Media Management
Cisco Networkers
Barselona
Registrujte se