DEPLOYING CORPORATE COMMUNICATIONS AND E-LEARNING
SESSION NMS-2302

IP Communications
Types of Meetings

High

Interactivity

Low

Low

High

Discussion

Training

Briefing

Speech

Conferencing

Streaming

Reach
IP Communications

- Corporate Communications
  Deliver the same message to employees, partners, and stakeholders at the same time
  Emergency broadcasts
  Collaboration
- E-learning
  Automate the creation, data mining, recording, and safe distribution of corporate knowledge
  Expedite new product launches
  Compliance training
  Reduce travel spending

Video Agenda

- Video Protocols and CODECs
- Video Infrastructure
- Windows Media Details
- Deploying Video Solutions
- Media Network Operations
Video Terms

- Real-Time Streaming Protocol (RTSP RFC2326)
- Real-Time Transport Protocol (RTP RFC1889)
- Session Description Protocol (SDP RFC2327)
- Session Announcement Protocol (SAP RFC2974)
- Real-Time Control Protocol (RTCP RFC1890)
- Microsoft Media Server (MMS RFC-NOT)

Video CODEC (CODe/DECode) Standards

- Motion Pictures Engineering Group (MPEG)
  - MPEG1 VCR quality
  - MPEG2 Studio quality
  - MPEG4 Part 2
- International Telecommunications Union (ITU)
  - H.261 – MPEG 1
  - H.263
  - H.264 – MPEG 4 Part 10
- Audio Codecs
  - G.721 64 kbps
  - G.722 48 to 64 kbps
  - G.723 5 to 6 kbps
  - G.728 16 kbps
Video

Common Streaming Formats

- Microsoft™
- Real™
- QuickTime™
- IPTV™

Video

Session Description Protocol

- A session description protocol for multimedia connections
- Developed by IETF mmusic WG
- Simple/flexible
  - Text-based
  - Extensible
- Announcements (made by SAP)

V = Version
O = Originating device organization
S = Description of the SDP message
C = IP Address or Hostname that the originator expects the media to arrive at
T = Time field
M = Media description that the originator expects to receive
A = Media attributes...
Video
Sample Tandberg SDP

v=0
o=TANDBERG 800 96 1 IN IP4 10.1.83.203
s=TANDBERG Streaming
i=A streaming session from TANDBERG codec
c=IN IP4 239.1.1.1/1
m=video 22222 RTP/AVP 31
    a=recvonly
m=audio 22226 RTP/AVP 0
    a=recvonly

Video
SDP Announcement Methods

- Session Announcement Protocol (SAP)
- Session Initiation Protocol (SIP)
- Real-Time Streaming Protocol (RTSP)
- E-mail (mime format)
- Via Web (HTTP)
Video
Real-Time Streaming Protocol

- Establishes
- Controls single or several continuous streams
- Interleaves continuous media stream with the control stream
- Uses discrete session id (rtsp) or UDP (rtspu)

Video
RTSP Characteristics

- Server and client can issue requests
- Server maintains state (HTTP is stateless)
- Request-URI always contains absolute URI
- Data delivery takes place out-of-band
- RTSP is not tied to RTP
- Invitation of a media server to a conference
- Addition of media to an existing presentation
- Support for proxies, tunnels and caches as in HTTP/1.1
Video RTSP Methods

- SETUP—Start an RTSP session
- PLAY—Starts stream transmission
- RECORD—Saves stream transmission
- PAUSE—Temporarily halts a stream
- TEARDOWN—Session ceases to exist
- DESCRIBE—Retrieves the description
- OPTIONS—ANNOUNCE, GET_PARAMETER, REDIRECT, SET_PARAMETER

Video RTSP Flow Diagram
**Real-Time Protocol**

**RFC1889**

- Payload type identification—voice, video, compression type
- Sequence numbering
- Time stamping
- Delivery monitoring
- Carried on the odd port number with RTCP

<table>
<thead>
<tr>
<th></th>
<th>V</th>
<th>E</th>
<th>R</th>
<th>CC</th>
<th>M</th>
<th>Payload Type</th>
<th>Sequence Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 Bytes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4 Bytes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>RTP Timestamp</td>
<td></td>
</tr>
<tr>
<td>4 Bytes</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Synchronization Source (SSRC) ID</td>
<td></td>
</tr>
</tbody>
</table>

---

**Video**

**Real-Time Transport Control Protocol**

- Provides feedback on the quality of data distribution
- Conveys minimal session-control information (i.e. identifying a participant)
- Tracks participants in an RTP session
- Limits it’s own feedback send rate (< 5%)
- Carried on the even port number with RTP
### Video Streaming Compression Standards

<table>
<thead>
<tr>
<th>Video Format</th>
<th>Video Quality</th>
<th>Bandwidth (bits/sec)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motion JPEG</td>
<td>Broadcast</td>
<td>10–26M</td>
</tr>
<tr>
<td>MPEG-2</td>
<td>Broadcast/HDTV</td>
<td>3–16M</td>
</tr>
<tr>
<td>MPEG-1</td>
<td>VCR/Business</td>
<td>.5–1.5M</td>
</tr>
<tr>
<td>H.261/H.263</td>
<td>Video</td>
<td>64K–2M</td>
</tr>
<tr>
<td>MPEG-4</td>
<td>Internet/Business</td>
<td>&lt;64K–4M</td>
</tr>
</tbody>
</table>

### Video Format Comparison Reference

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Real</th>
<th>Windows Media</th>
<th>IPTV</th>
<th>QuickTime</th>
</tr>
</thead>
<tbody>
<tr>
<td>Content File Type</td>
<td>rm, ra</td>
<td>wmv, wma</td>
<td>mpg, mov</td>
<td>mov</td>
</tr>
<tr>
<td>CODECs</td>
<td>Proprietary</td>
<td>Proprietary</td>
<td>Standard</td>
<td>Standard</td>
</tr>
<tr>
<td>Announce FileType</td>
<td>RAM</td>
<td>ASX</td>
<td>SDP</td>
<td>SDP</td>
</tr>
<tr>
<td>Descriptor Language</td>
<td>HTML</td>
<td>XML</td>
<td>SDP</td>
<td>HTML</td>
</tr>
<tr>
<td>Negotiation Protocol</td>
<td>RTSP</td>
<td>RTSP/MMS</td>
<td>RTSP</td>
<td>RTSP</td>
</tr>
<tr>
<td>Transport Protocol</td>
<td>RTP/UDP</td>
<td>MMS or RTP</td>
<td>RTP/UDP</td>
<td>RTP/UDP</td>
</tr>
<tr>
<td>Interoperability</td>
<td>QT</td>
<td>None</td>
<td>QT, VIC/VAT</td>
<td>IPTV</td>
</tr>
<tr>
<td>Marker Language</td>
<td>SMIL</td>
<td>ASF</td>
<td>ASF</td>
<td>SMIL</td>
</tr>
<tr>
<td></td>
<td>Standard</td>
<td>Semi-Standard</td>
<td>Proprietary</td>
<td></td>
</tr>
</tbody>
</table>
Video Format
Stream Media Options

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Real</th>
<th>Windows</th>
<th>IPTV</th>
<th>Quicktime</th>
</tr>
</thead>
<tbody>
<tr>
<td>Request Protocol</td>
<td>RTSP</td>
<td>MMS, RTSP*</td>
<td>RTSP</td>
<td>RTSP</td>
</tr>
<tr>
<td>CODEC</td>
<td>Proprietary</td>
<td>Proprietary</td>
<td>MPEG</td>
<td>MPEG</td>
</tr>
<tr>
<td>Cost</td>
<td>Player: Free</td>
<td>Player: OS</td>
<td>Player: Free</td>
<td>Player: Free</td>
</tr>
<tr>
<td></td>
<td>Server: Fee</td>
<td>Server: OS</td>
<td>Server: Fee</td>
<td>Server: Fee</td>
</tr>
<tr>
<td></td>
<td>Encoder: Fee</td>
<td>Encoder: OS</td>
<td>Encoder: Fee</td>
<td>Encoder: Fee</td>
</tr>
<tr>
<td>Player OS</td>
<td>Windows, Linux, Unix, Mac</td>
<td>Windows</td>
<td>Windows (VIC/VAT)</td>
<td>Windows, Mac</td>
</tr>
<tr>
<td>Digital Rights Mgmt (DRM)</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Recording</td>
<td>RM</td>
<td>ASF</td>
<td>MPEG, MOV</td>
<td>MOV</td>
</tr>
</tbody>
</table>

Video Agenda

- Video Protocols and CODECs
- Video Infrastructure
- Windows Media Details
- Deploying Video Solutions
- Media Network Operations
Content Engine ACNS
Streaming Media Server

Application and Content Networking Software

<table>
<thead>
<tr>
<th>HTTP Server Proxy</th>
<th>WMT Server Proxy</th>
<th>Real Server Proxy</th>
<th>Cisco Stream Server</th>
<th>IPTV Program Manager</th>
<th>DNS Proxy Cache</th>
<th>CIFS Server</th>
<th>FTP Server Proxy</th>
<th>TFTP Server Gateway</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filtering</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

System Storage
Pull Web Storage
Pre-positioned Web & All Video Storage

Internal (SCSI, IDE) and External (SCSI, FC, NFS, CIFS) Storage

Video Infrastructure
Streaming Media Functional Components

- Camera – converts light to analog video signal
- Microphone – converts sound to analog signal
- Encoder – converts analog signal to digital
- Recorder – stores digital
- Network – Transports digitized media
- Media Server – publishes recorded and re-publishes live streams
- Decoder – digital to analog converter
- Media Player – decodes & displays streams
- Media Processor - digital-to-digital media processing
Video Infrastructure
Streaming Media Terms

• Conference – interactive streaming media
• Announcement – File with video stream meta data and source information
• Live stream – one to many stream from encoder
• On-Demand stream – pull stream to one from file
• Broadcast – one to all from encoder
• Multicast – one to many from encoder
• Webcast – one to many from encoder to browser media player
• Web conference – interactive streaming via browser client
• Content – any file
• Video Conferencing Unit (VCU) – H.323 endpoint
• Media Conferencing Unit (MCU) – H.323 media processor

Live Stream
Without CEs

• Separate Stream for Each Client Cross the WAN
• Aggregate of All Clients Must Be Less than WAN Bandwidth
Live Stream
Unicast Stream Splitting

- Overcomes WAN Bandwidth Bottleneck
- Requires Larger CEs
- Only Solution for Adhoc Internet Streaming
- Easy to Administer since No Event Planning

Live Unicast Video
Multiple Unicast Streams
(One per User)

Live Stream
Hybrid Unicast to Multicast

- Multicast Enabled LAN Only
- CE Scales to Many Simultaneous Programs
- Requires Event Planning and Administration

Live Unicast Stream
Single Multicast Stream
Replicated by Network
Live Stream Network Multicast

- Multicast Enabled LAN and WAN
- No CE Necessary
- Requires Event Planning and Administration

- Single Multicast Stream Replicated by WAN Network
- Single Multicast Stream Replicated by LAN Network

Video on Demand Without CEs

- Separate Stream for Each Client across the WAN
- Aggregate of All Clients Must Be Less than WAN Bandwidth

- First Request
- Subsequent Requests
Video on Demand
Pull Caching

• Streamed Bandwidth Must Be Less than WAN Bandwidth
• Unmanaged Intranet or Internet Sourced

Video on Demand
Pre-Positioned

• Streamed Bandwidth Is Greater WAN Bandwidth
• Extreme Quality Capable
Video Agenda

- Video Protocols and CODECs
- Video Infrastructure
- Windows Media Details
- Deploying Video Solutions
- Media Network Operations

Windows Media Components

- Microsoft Media Services (MMS) Protocol
- Windows Media Player (WMP)
- Windows Media Encoder (WME)
- Windows Media Server (WMS)
  - Publishing Point (Unicast)
  - Stations (Multicast)
Windows Media Protocols

- MMS IP multicast
- MMS UDP (MMSU)
- MMS TCP (MMST)
- MMS over HTTP
- RTSP for Windows Media 9.0
- MSBD – old server to server

Windows Media Extensions and Announcements

- Windows Media Files Extensions
  -ASF
  -WMV
  -WMA
- Windows Media Announcements
  -ASX
  -WVX
  -WAX
Windows Media Architecture

1. Analog video
2. WME streams live video and records to storage
3. WMS publishes VoD off CIFS/SMB storage
4. WMS publishes live unicast
5. WMS publishes multicast station
6. WMPs stream many unicasts from WMS publishing point
7. WMPs join a multicast stream from the WMS multicast station

Windows Media Protocols

1. CIFS/SMB
2. HTTP port 8080 (unicast) or MSBD
3. MMSU, MMST, MMS-over-HTTP (unicast)
4. MMSU only (multicast)
Windows Media CE Capabilities

- Caching proxy
- Server
- Live Splitting
  - Unicast-unicast
  - Unicast-multicast
  - Multicast-unicast
  - Multicast-multicast
- WCCP Transparency
- Logging
- Statistics (SNMP, API, CLI)

Windows Media Players (WMP)

WMP 6.x
- Windows 98/NT/2000/XP
- MMS Streaming
- HTTP Download
- HTTP Proxy Only
- Embedded Player

WMP 7/8
- Windows 2000/XP
- MMS Streaming
- HTTP Download
- HTTP Proxy
- MMS Proxy
- Stand-Alone Player

WMP 9
- No part of any OS
- MMS Streaming
- RTSP Streaming
- HTTP Download
- HTTP Proxy
- MMS Proxy
- RTSP Proxy
- Embedded Player
- Stand-Alone Player
Windows Media Player Version 6

Windows Media Player Version 7
Windows Media Player Version 8

Windows Media Player Version 9
Media Player
Player Audio CODECs

Media Player
Player Video CODECs
Windows Media
WMS Administrator

- Control Windows Media Servers
- Device Management
- Publishing Points
- Multicast Stations

Windows Media Encoder (WME)

- Input
  - Device
  - File
  - Screen

- Output
  - Push to server (WME9 only)
  - Pull with HTTP
  - Pull with MSBD (WME4 only)
  - File

- Video CODECs
  - ISO MPEG4 Version 1
  - Windows Media 7
  - Windows Media 8
  - Windows Media 9
Windows Media Encoder 4

- Stream from file
- Stream from capture card or file
- Record
- API control
- Default stream on HTTP port 8080

Windows Media Encoder 7

- Stream from file
- Stream from capture card or file
- Record
- API control
- Default stream on HTTP port 8080
Windows Media Encoder 9

Windows Media Announcement Files

- Retrieved with HTTP
- Provide a program description
- May include meta data for searching on video program
- Allow windows media streams to be redirected to another source via HTTP
- Provide primary/secondary failover mechanism
Windows Media Requests

- To request a multicast
  [http://ce-ip/announce.nsc](http://ce-ip/announce.nsc)
- To request a unicast from an encoder
- To request a unicast or multicast through an announcement file

Windows Media Announcement (ASX)

```
<ASX Version="3.0">
  <ENTRY>
    <TITLE>NASA Television</TITLE>
    <REF HREF = "mms://ce-ip/nasatv" />
  </ENTRY>
</ASX>
```

Request from a web server with
[http://wms/nasatv.asx](http://wms/nasatv.asx)
Windows Media
ASX Failover

<ASX Version="3.0">
  <ENTRY>
    <TITLE>NASA Television</TITLE>
    <REF HREF = "http://ce-ip/nasatv.nsc" />
    <REF HREF = "mms://ce-ip/nasatv" />
  </ENTRY>
</ASX>

First Request Is for Multicast
Second Request Is for Unicast

Windows Media
Publishing Point Video Request

<ASX Version="3.0">
  <ENTRY>
    <TITLE>NASA Television</TITLE>
    <REF HREF = "mms://wms/video.asf" />
  </ENTRY>
</ASX>

DNS Resolve www.company.com

mms://wms.company.com/video.asf

Stream negotiated and delivered
Windows Media Announcement
Multicast (NSC)

[Address]
IP Address=02Cm0000000000KCW0p03a0BW0n02u0uCG0k0340000
IP Port=0x00004E20
Delivery Mode=0x00000002
NSC Format Version=029G0000000008Cm0k0300000

[Description]
Description=020W0000000002000

[Formats]
Format1=02U0001c0000BdC2G0TOvcpn6csG2g06BERBK2000000001W0000042sz4Ufpn6Ev030
321JPMW00000000008z6hScnsX6K0T030JrZxMnB5200000000m5QTDaAmW7))]])0000000000
00000000002300003300000000a0502c3W000Nw100E2J12020zxBg9dF40xZ0C0C5D5bBW000000
0HqEhkgdF40xCOCC55D01W00000000GvSpUfpn6EvW30321JPN8000000000GVsf4Rspn6eG2
0Nm4Ar3DmFxFSyHyz8gWZquY00000000001m00008000000000GQ0000OG41080003G1m00008
G0ce04040000U000040W022G50aGV5jxfnn6EvE130321JPO40000000000nEyPl4Rspn6eJ320
Nrr4Am1N(c01LYhGnf40xsZs3Z2h00000000003C000000000W000000GQ0400F000000002Ab6e000
G0400F00000101W0JL0qCm240m0000000000000000000000000G5BHXXqnt1Z6Zo2W0G0D8j2u0000
000001B0HXKxqnt1Z6Zo2W0G0D8j2u0000000000000000000000000G5BHXXqnt1Z6Zo2W0G0D8j2u0000
000001G4040a4m0W05000030O0B104BW0W002
0J1G1F0d4uJm0000000000OG41080003G1m00008
IG1404K0Jm0W04C0Jm
0000000000KyTL4Rpn66
ScnsX6K0T030JrZxMn00000000000C4
Description1=0210000000000yRG1j07C0EW0l02y0DW0p02u0DW0p02u0sCW0b0300BW0o03400Cm0k0330000CW0t0
2G0R01X70C0OG0p0300C01n0000

---

Windows Media
Multicast Station Video Request

[Address]
[Description]
[Formats]

Stream Delivered

IGMP Report Join to [Address]
Multicast Tree Building

Configure Multicast Station in WMS
WMS Creates video.nsc

http://www.company.com/video.nsc

---

Dynamically Generated by CE with Multicast Station
Windows Media Configuration

ce(config)#wmt ?
    accept-license-agreement     Accept license license-agreement'
    bandwidth                   WMT bandwidth configurations
    broadcast                   Broadcast live configuration.
    cache                       WMT cache config
    disallowed-client-protocols Specify disallowed wmt client protocols
    enable                      Enable WMT
    evaluate                    Start/continue 60-day evaluation of WMT.
    extended                    WMT extended configurations
    fast-live-split             Proxy live split performance improvement
    fast-proxy-cache            Proxy cache performance improvement
    incoming                    Configuration for incoming WMT requests
    14-switch                   Configure L4 switch for WMT.
    license-key                 Required license key for WMT
    live-url-stripping          Strip live URL's ? and beyond
    max-concurrent-sessions     Maximum # of unicast concurrent
    mms                        MMS configurations
    multicast                   Multicast configuration and scheduling.
    proxy                      Out-going proxy configuration
    transaction-logs            WMT transaction log configuration

Windows Media Show WMT Configuration

ce01#show wmt
WMT version: ce507-001.000
WMT enabled
WMT disallowed client protocols: none
WMT end user license agreement accepted
WMT permanent license key installed
WMT max outgoing bandwidth limit enforced for configured license key: 28000 Kbit/s/sec
WMT evaluation not enabled
WMT outgoing bandwidth configured is 28000 Kbit/sec
WMT incoming bandwidth configured is 1500 Kbit/sec
WMT incoming port: 1755
WMT max sessions configured: 271
WMT max sessions platform limit: 271
WMT max sessions enforced: 271 sessions
WMT max outgoing bit rate allowed per stream has no limit
WMT max incoming bit rate allowed per stream has no limit
WMT cache enabled
WMT cache max-obj-size: 1024
WMT cache unique-stream-key enabled
WMT debug level: 0
WMT 14 switch not enabled
WMT debug client ip not set
WMT debug server ip not set
WMT/REAL cache space partition: wmt 70%, real 30%
WMT Stripping ? from Live URL is not enabled
WMT Live-split using streaming engine is enabled
WMT Proxy cache using streaming engine is enabled
WMT Extended Transaction Log is not enabled
WMT Transaction Log format is Windows Media Services 4.1 logging
Windows Media Logging and Statistics

- Transaction logging is in Windows Media Server a W3C compliant format and can be exported
- Error logging for application errors are in syslog format
- Statistics are available both through the CE GUI, CLI, and CDM

Video Agenda

- Video Protocols and CODECs
- Video Infrastructure
- Windows Media Details
- Deploying Video Solutions
- Media Network Operations
Video Deployments

- Live
  - Windows Media
  - Standard Stream from Tandberg

- On Demand
  - Windows Media
  - Standards
  - Digital Signage

Windows Media First Request for VoD

1. First client browser requests video.asx
2. Web server delivers video.asx
3. WMP makes mms://wms/video.asf
4. CE requests mms://wms/video.asf
5. WMS streams to CE
6. CE streams to WMP
Windows Media
Second Request for VoD

1. First client browser requests video.asx
2. Web server delivers video.asx
3. WMP makes mms://wms/video.asf
4. CE streams to WMP

Windows Media
Live Unicast Stream Splitting

1. First client browser requests video.asx
2. Web server delivers video.asx
3. WMP makes mms://wms/video.asf
4. CE intercepts and requests mms://wms/video.asf
5. WMS streams to CE
6. CE streams to WMP
**Windows Media Live Edge Unicast to Multicast**

1. CE WMS acquires from WME
2. Publishing CE (P-CE) re-publishes WME as multicast wmt broadcast alias-name live1 source http://wme-ip:8080/
3. Edge CE acquires unicast from P-CE wmt multicast-station alias-name live1 239.1.1.1 20000 source mms://p-ce-ip/live1
4. Edge CE streams LAN multicast wmt multicast-station start live1 loop-forever
5. WMP visits video portal and selects href for http://e-ce-ip/live1.nsc
6. WMP makes IGMP join for 239.1.1.1 and listens on UDP port 20000

**Windows Media Live Multicast**

1. First client browser requests video.aspx
2. Web server delivers video.aspx
3. WMP makes mms://wms/video.asf
4. CE intercepts and requests mms://wms/video.asf
5. WMS streams to CE
6. CE streams to WMP
Live Windows Media
Unicast From PC Encoder

- Media Player
  mms://pub-ip/live
- Publishing CE
  wmt broadcast alias-name live source
  http://encoder-ip:8080/
- Encoder
- Camera

Live Windows Media
Multicast From PC Encoder

- Media Player
  http://pub-ip/live.nsc
- Publishing CE (in data center)
  wmt multicast station-configuration live
  239.255.1.1 20000
  http://encoder-ip:8080/
  play-forever
  wmt multicast-station live start
- Encoder (near camera)
- Camera
Live Windows Media Redundancy

- Primary Publisher CE
- Secondary Publisher CE

Live Windows Media
Combined Unicast and Multicast
Live Windows Media Program File

<?xml version="1.0"?>
<!DOCTYPE program SYSTEM "live.dtd">
<program version="1.0" name="live" serviceType="wmt"
    description="test" autoDelete="true" live="true">
  <media index="1"
  <ucastInfo
  <schedule timeSpec="gmt" startTime="0" activeDuration="0"/>
</program>

Windows Media Program Live Event

• Create Program API

• Assign live channel to live program
Windows Media WCCP Deployment
Protecting the Network from WM9

- WCCP deployed for MMS on TCP/UDP 1755
- WMP9 tries RTSP 554, MMS 1755, then MMS-over-HTTP 80
- Cannot disable RTSP on the player
- CE supports WM9 MMS with RTSP 554 planned
- If WMP9 RTSP 554 to a WMS9 bypasses WCCP 81/82 on 1755
- Solution – ACL TCP 554 from getting to WMS9

Windows Media WCCP Deployment
Protecting the Network from Failed CE

- WCCP deployed for MMS on TCP/UDP 1755
- Many WMPs in a branch site with CE
- CE Fails
- All WMPs connect direct to Publishing CE or WMS
- Solution – ACL to allow only local and 2nd Tier CEs to access Publishing CE or WMS
Windows Media Deployments
Protecting the Network from Streaming

Content Engine Sizing Considerations

- Encoding Rate
- Expected simultaneous viewers
- # viewers * encoding rate = total streaming bps
- CE license limited by total streaming bps
  - NM-Ce – 28 or 56 Mbps
  - CE510 – 56 or 84 Mbps
  - CE565 – 224 Mbps
  - CE7305 – 560 Mbps
  - CE7325 – 1008 Mbps
- CE’s achieve license limit for large streams
- Work with account team on smaller streams
Windows Media Deployments
Troubleshooting

- Show statistics wmt streamstat
- Show stat wmt...
- Debug wmt trace...
- Type-tail /local1/errorlog/wmt_errorlog.0 follow
- Tcpdump –s 1600 –w /local1/capture.dat
Live Stream From Tandberg Topology

- Tandberg publishes SDP file
- CE Acquires Stream via Unicast or Multicast
- CE Publishes ipvc.sdp
- QT Player Requests Multicast and/or Unicast
- No recording
Live Stream From Tandberg SDP File

v=0
o=BLO TANDBERG 96 1 IN IP4 64.101.213.212
s=TANDBERG Streaming
i=A streaming session from TANDBERG codec
c=IN IP4 64.101.213.248/1
m=video 22232 RTP/AVP 31
a=recvonly
m=audio 22236 RTP/AVP 0
a=recvonly

Live Stream From Tandberg Unicast

- QuickTime Player
  rtsp://pub-ip/tandberg.sdp
- Publishing CE
  rtsp server cisco-streaming-engine broadcast port-list 1 22232 22236
  rtsp server cisco-streaming-engine broadcast id tandberg
  source source-udp
  http://64.101.213.212/stream.sdp
  64.101.213.212 0.0.0.0 1 track-count 2 destination destination-pull
- Tandberg (Encoder & Camera)
Live Stream From Tandberg Multicast

- Media Player
  rtsp://pub-ip/tandberg.sdp
- Publishing CE
  rtsp server cisco-streaming-engine broadcast port-list 1 22232 22236 22235
  rtsp server cisco-streaming-engine broadcast id tandberg
  source source-udp
  http://64.101.213.212/stream.sdp
  64.101.213.212 0.0.0.0 1 track-count 2 destination destination-udp 15 1
- Encoder
- Camera

QuickTime Player Launch

Enter an internal URL to open
[URL] OK Cancel

Click here for more context
Digital Signage
Delivery Architecture

1. Videos distributed via Bandwidth policies
2. STB requests video file from web server
3. CE locally delivers video file

Digital Signage
CE Embedded Decoder

- Recorded video replay only
- MPEG-1 system stream
- MPEG-2 program and transport stream
- Dolby Digital (AC-3) 5.1 Channel Audio support
- NTSC to PAL Converter
- 256 color On Screen Display
- 1 Video stream output
**Acquisition and Distribution Content Movement**

- **Manifest File**
  - Cat.mpg
  - Dog.mpg

- **Web Servers**

- **WAN**

- **Location**
  - Sydney
  - UK
  - Boston

**CE Modes of Operation**
- Root CE has no parent CE
- Parent CE has children
- Forwarder CE has parent and child
- Child CE has no child

**Bandwidth Controls**
- Acquisition
  - Bandwidth In
  - Bandwidth Out
Digital Signage
Cisco Playlists

• Playlist - list of media files with attributes that defines when/how files are played
• Playtime - a schedule set up for a playlist (up to 10)
• Playback is the playing of the playlist as specified by a playtime
• Playlists are created and managed by the CDM and then played across one or more TV-out devices or STBs

Digital Signage
Creating a Playlist
Digital Signage
Editing a Playlist

Assigning Devices or Groups to Playlist
Digital Signage
Scheduling the Playlist

Digital Signage
Adding a Playlist Export Channel
Digital Signage
Exporting the Playlist

Example Exported Playlist

```xml
<?xml version="1.0" ?>
<PlaylistIndex channel="export_company-playlist">
  <playlist file="/playlists/company-playlist.xml" />
</PlaylistIndex>

<?xml version="1.0" ?>
<program version="1.0" name="company-playlist" serviceType="export" playTime="147"
  lastModificationTime="1069678956" gracefulExit="false" shuffle="false" autoDelete="false">
  <media index="1" src="www.company.com/demo/cisco/cajun.mpg" playTime="32" />
  <media index="2" src="www.company.com/demo/cisco/MtnBike.mpg" playTime="17" />
  <media index="3" src="www.company.com/demo/cisco/TOY.mpg" playTime="61" />
  <media index="4" src="www.company.com/demo/cisco/Monsters.mpg" playTime="37" />
</program>
```
Digital Signage
Set-Top-Box Considerations

- Audio/Video Formats
- Recorded Replay
- Still Images
- Picture-In-Picture
- Overlays
- Output formats
- Live video decoding
- Separate Integrated TV tuner
- Wireless integration

Windows Media On-Demand
Configuration Steps

- Create Content Provider
- Create Website
- Create Channel
  - Assign CE’s
  - Allocate storage
  - Define acquisition instructions in manifest
- Validate Replication
- Publish content
Windows Media On-Demand

Create Channel

Windows Media On-Demand

Assign Content Engines
Windows Media On-Demand
Validate Replication Status

Video Agenda

• Video Protocols and CODECs
• Video Infrastructure
• Windows Media Details
• Deploying Video Solutions
• Media Network Operations
IPTV Features

- Live Encoding & Broadcast
- Scheduled Re-broadcast
- Video On Demand
- Synchronized Presentations
- Question Feedback
- Quality Monitoring & Usage Feedback
- High quality stream support
- Multicast and Unicast Support
- Standards based
- IPTV or QT player required
- Low latency
- Low cost
- Limited DRM

IPTV Components

- Program Manager (PM)
- Broadcast Server (BS) - encoder
- Archive Server - Content Engine
Clicking on “raised hand” icon pops up a dialog box where user question can be typed.
IPTV
Synchronized Presentations

- WebPresenter delivers native HTML or PowerPoint files
- ScreenCaster captures screen and delivers as JPG files
- SlideCast captures screen and delivers as H.261 stream

IPTV
StreamWatch Quality Monitoring

- Live Monitoring and usage reports from every desktop
- Store RTCP reports as flat file or ODBC data
- Based on multicast or unicast RTCP
- Unicast RTCP allows scaling to 10K+ clients without impact on network IP multicast service
IPTV ACNS Integration

Enterprise Edge

Studio

IPTV Broadcast Server

Program Manager

CDM

Root CE

Data Center

WAN

Enterprise Video on Demand Solution

Media Network Operations

Content Authoring/Management

Studio

Web Portal Publishing

Network Delivery

Planning, Implementation and Operational Guides
Media Network Operations Organizations

- Desktop
- Network
- Server and Application
- Video

ALL Groups Must Work In Concert For A Successful Streaming

Media Network Operations Desktop Team

- Multimedia enablement
- Processor performance
- Operating Systems
- Players
- Installed CODECs
- Local rights to download & install new CODECs
- Ability to push out CODECs
- Client protocol configurations
### Media Network Operations

#### Network Team

- Multicast
- WCCP
- WAN Bandwidth Capacity
- LAN Uplink Bandwidth Capacity
- Video splitters and servers
- Duplex mismatches
- Quality of Service
- CDN video server acquisition
- Content Engine operations & maintenance

---

### Media Network Operations

#### Server and Application Team

- Video On Demand server maintenance
- Encoder server maintenance
- OS maintenance
- Portal maintenance
- Security patches
- CDN directory mirroring (i.e. c:\asfroot)
Media Network Operations

Video Team

- Event planning
- Announcements
- Studio operations and maintenance
- Read/write access to video server home video directory (i.e. c:\asfroot)
- Encoder operation
- Video server operation

---

Media Network Operations

Streaming Video Event Planning

- Pre-Event
  - Content Authoring
  - Announce
  - Registration
  - Lobby
- Event
  - Slides
  - Content Download
  - Polling
  - Questions
  - Chat
  - Recording
- Post-Event
  - Processing
  - Editing
  - Publishing
  - Data Mining
  - Distribution
### Media Network Operations
#### Integrating with Other Systems

- Content Management Systems
- Content Authoring
- Learning Management Systems
- Program Management
- Web Conferencing
- Video Conferencing
- Video Telephony

---

### Media Network Operations
#### WMT, Real, ISMA Streaming Matrix

<table>
<thead>
<tr>
<th></th>
<th>WMT</th>
<th>ISMA Streaming</th>
<th>Real</th>
</tr>
</thead>
<tbody>
<tr>
<td>Player</td>
<td>WMP already on Win desktops</td>
<td>QT player for Windows and Mac</td>
<td>Real Player for Windows &amp; Unix users</td>
</tr>
<tr>
<td>BW/Bit Rate</td>
<td>128kbps-1Mbps</td>
<td>MPEG4: 128-1500 Kbps</td>
<td>128kbps-1Mbps</td>
</tr>
<tr>
<td></td>
<td></td>
<td>MPEG2: 2Mbps-6Mbps+</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>MPEG1: 500kbps-1.5Mbps+</td>
<td></td>
</tr>
<tr>
<td>License Fees</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Publishing</td>
<td>IVT, MPI</td>
<td>IPTV, MPI, IVT</td>
<td>IVT, MPI</td>
</tr>
<tr>
<td>Encoders</td>
<td>PC with Capture card</td>
<td>IPTV BS</td>
<td>PC with Capture card</td>
</tr>
<tr>
<td>Access Controls, DRM</td>
<td>NTLM Authen, Microsoft License Server</td>
<td>None</td>
<td>Real Commerce Server</td>
</tr>
<tr>
<td>API Support</td>
<td>Manifest, Program API</td>
<td>Manifest, Program API</td>
<td>Manifest API</td>
</tr>
<tr>
<td>Scheduled ReBroadcast</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Slide Synch</td>
<td>IVT, MPI</td>
<td>IPTV partial, MPEG4 Adv 2D.</td>
<td>IVT, MPI</td>
</tr>
<tr>
<td>Live Failover</td>
<td>Yes, next click</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

**MPI** – Media Publisher Incorporated  
**IVT** – Interactive Video Technologies
“It’s no longer about integrating voice, video, and data on the same network but rather providing integrated voice, video, and data solutions.”

Complete Your Online Session Evaluation!

WHAT: Complete an online session evaluation and your name will be entered into a daily drawing

WHY: Win fabulous prizes! Give us your feedback!

WHERE: Go to the Internet stations located throughout the Convention Center

HOW: Winners will be posted on the onsite Networkers Website; four winners per day