

Interoperating with Video Endpoints of Yesterday, Today and Tomorrow

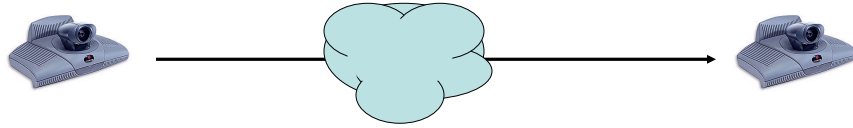
Will MacDonald



About Me

- Cambridge University England
 - Graduated in 1987
- Madge
 - A culture of reverse engineering
 - Token Ring Technology
- Calista
 - Voice Over IP, PBX Reverse Engineering
 - Acquired by Cisco in 1999
- Cisco
 - Video Conferencing End Users
 - Video Telephony Vision
- Codian
 - 2002 - Self funded startup
 - 2005 - Profitable

Point to Point Video



- Call Setup
 - Protocol, addressing
- Bandwidth
 - Minimum of each end
 - Symmetric or Asymmetric
- Video Codec
- Audio Codec
- In Call Signaling
 - FECC, FUR, Flow Control

Even in the Point to Point case we are still dealing With the lowest common denominator

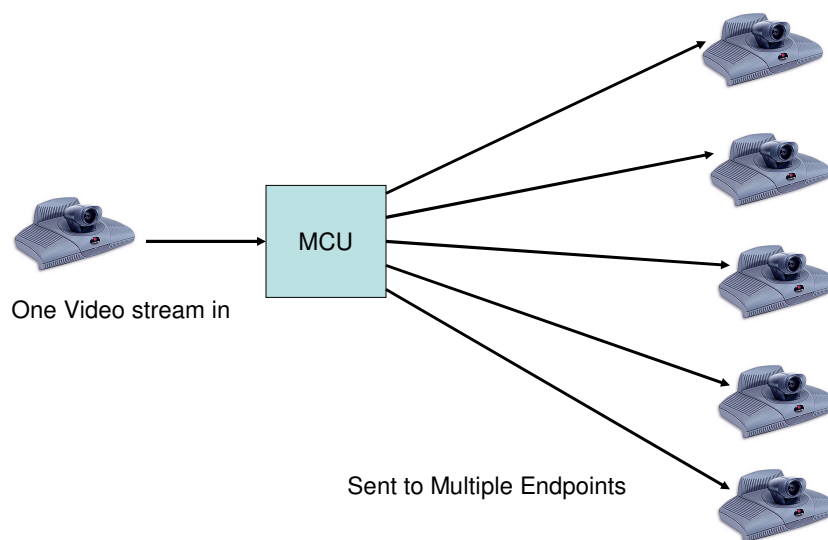
Endpoint Capabilities Vary

- The Capabilities per endpoint change based on
 - Manufacturer
 - Model
 - Software Version
 - Network
 - Bandwidth
 - Quality
 - Symmetry

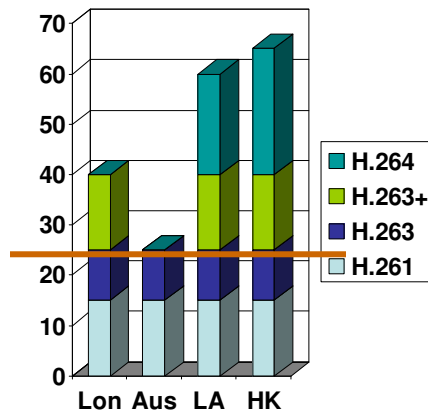
The role of the MCU

- The HUB of any multipoint conference
- Allowing connectivity between endpoints with different capability sets
- Two Approaches
 - The traditional “Voice Activated”
 - The newer “Choice of Capacities”
 - The latest “Encode Per Participant”

Voice Activated

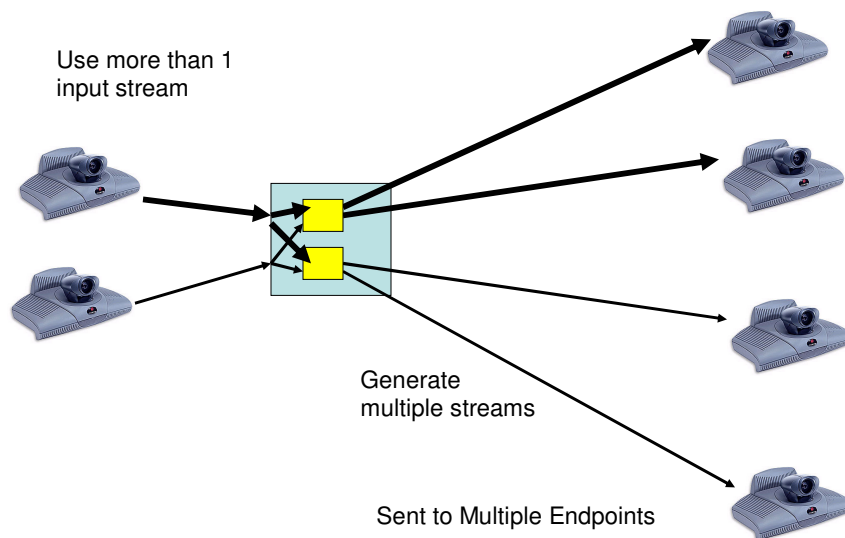


Voice Activated



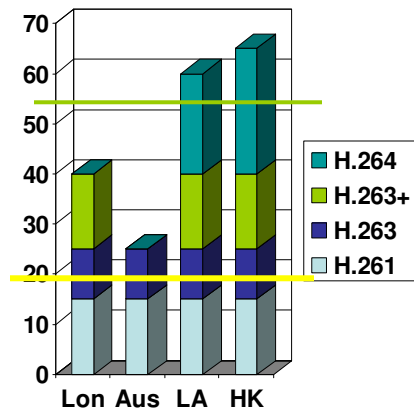
- Lowest Common Denominator
- Usually H.263 at 384k
- E.g. Megaconference
- Limited CP
- No video processing required
 - Dropped packets
 - I-frames
 - Scalability

Choice of Capabilities

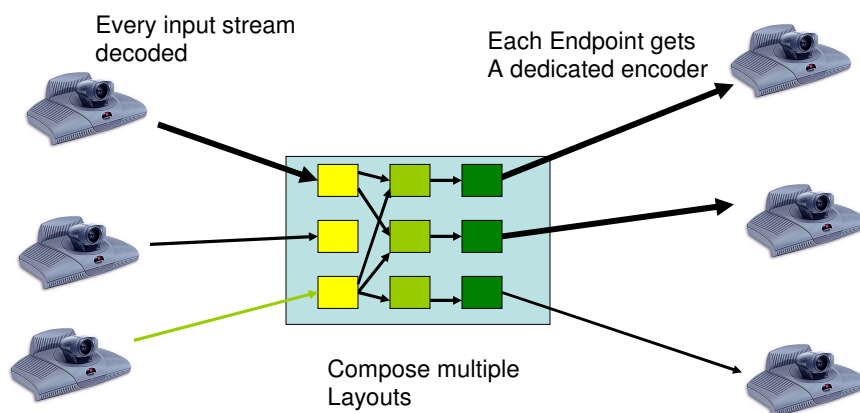


Choice of Capabilities

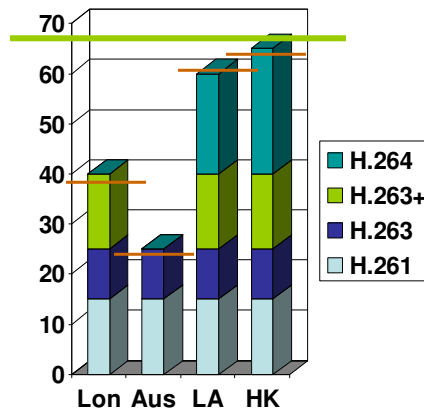
- MCU produces 2 video outputs (encodes) per conference.
- Endpoints join one or the other
- Better than voice activated, but still a compromise



Encode per Participant



Encode per Participant



- Perform audio and video mixing at highest quality available
- State of the Art
 - AAC (22khz)
 - 4 CIF 30fps
 - iCIF 60 fps
 - H.264 2mb/s
 - H.263 4mb/s

Difficult Choices

- H.264 - CIF vs H.263+ 4CIF/XGA
- 4CIF at 15fps (ex G70), XGA at 7fps
 - Dynamic resolution switching
 - Dynamic codec switching ?
- CIF, SIF and 16:9
- Interlaced H.263
 - Sony vs Tandberg vs Polycom

H.264 vs H.263

- World Standardization
 - Except Microsoft
- Original VSX 7000 issue
- Under powered endpoints
 - Advertise 30/30
 - Best case 15/30
 - Actual was 7/30
- Current status good (except 4CIF)

16:9 Aspect Ratio

- Original 4:3
- Stretched to 16:9
- Most cameras are 4:3
- Most screens are 16:9



16:9 Aspect Ratio

- Endpoint Solution 1
- Crop
- Waste Bandwidth
- Endpoint Solution 2
- Black Bars
- Waste Screen



Fix it in the MCU

- Send a custom layout for the screen
- Or crop it at the source



Pros and Cons

- Voice Switched
 - Good video quality (if no packet loss)
 - Requires endpoint configuration to connect to conference
 - Lose latest features
- Encode Per Participant
 - Good video quality (with real networks and packet loss)
 - No endpoint configuration is required
 - Risk of compatibility with latest features
 - Take advantage of latest technology

How to Prevent Quality Loss

- Cause by Decode and Re-Encode
- Preserve Macro Blocks
- Preserve Motion Vectors
- Same BW and Codec -> Almost No Loss
- Lower Quality Dominates in
 - Lower to Higher
 - Higher to Lower

H.239

- New Standard
 - Teething Problems
 - Standard too broad
 - Need to shake out the options used
- e.g. Polycom and Tandberg
 - If Polycom has VC then it opens the 239 channel
 - If Tandberg sees channel open it displays content
- Sony
 - Wont accept H.239 in first 2 seconds

Questions ?