

# TPoD

## TelePresence over DOCSIS

John T. Chapman, Cisco Fellow, Cisco

Harsh Parandekar, SW Manager, Cisco

Jeff Finkelstein, Dir of Access Eng, Cox Communications



# What is Telepresence?

- Telepresence is a new technology category, sometimes referred to as “immersive video”, that delivers a unique in-person experience for virtual meetings.



# What is Telepresence?

- A telepresence solution integrates advanced visual, audio, and interactive technologies with broadband networking to bring people together from across the campus and around the world.



# Telepresence Example

- Local File
  - [Town Square Gathering](#)
- From YouTube:
  - <http://www.youtube.com/watch?v=wQpBPUBNJcM>
- Embedded File

# Telepresence Components

## Home Office Components:

- TP endpoint, single display, cameras, microphones
  - CODEC and all software runs on TP Endpoint
- IP phone
  - Separate device for TP call setup and tear down
- Room design, furniture, lighting, acoustics

## System Components:

- TP call agent
- TP multipoint bridge
- TP reservation manager
  - coordinates Call Agent and Outlook for reservations

# TelePresence Technology

- Data Plane
  - 1080p or 720p H.264 video at 30 fps
  - Spatial duplex audio MPEG4 AAC-LD
  - Auxiliary video path for slide sharing.
  - Low latency
  - Bidirectional
  - 2 to 6 Mbps per screen per direction
- Control Plane
  - SIP signaling.

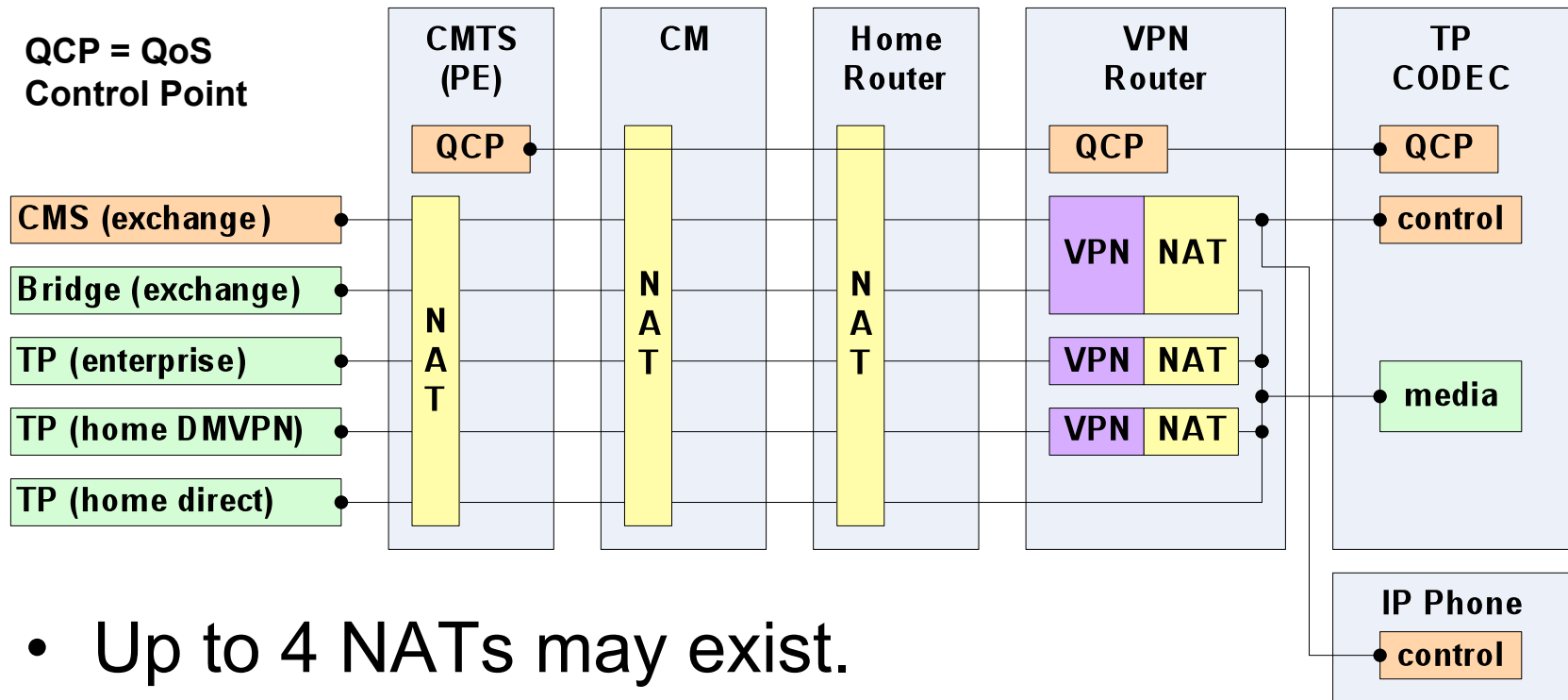
# TPoD Technology

- Security
  - User authentication
  - Path encryption
- DOCSIS Specific Concerns
  - Dynamic QoS per connection
  - Admission control

# TPoD QoS

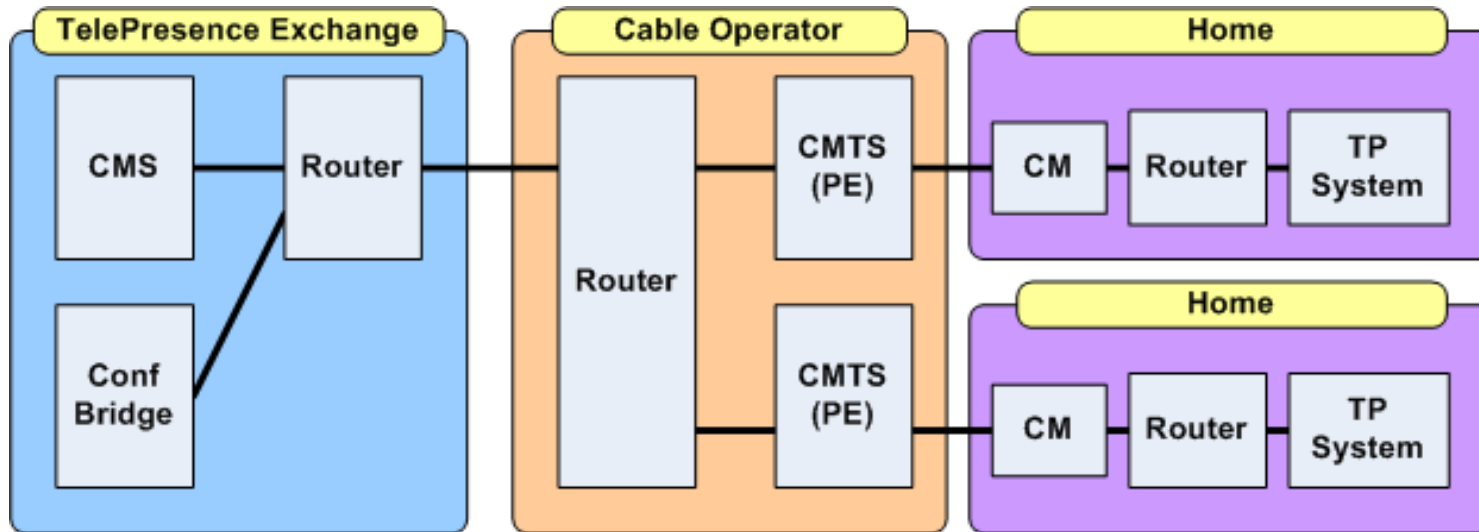
- Comparison to VoIP
  - Both are connection based.
  - Both are managed services.
  - Much larger bandwidth requirement for TPoD.
- Comparison to Video over DOCSIS (VDOC)
  - VDOC is one-way, latency insensitive, and its primary focus is network generated content.
  - TPoD is two-way, latency sensitive, and is user generated content.

# TPoD Access Network



- Up to 4 NATs may exist.
- VPN with encryption hides the packet contents from the CMTS.
- How does the TP Endpoint or Call Agent tell the CMTS what IP address to classify on?

# TPoD QoS Options



Options for QoS of TP flows on DOCSIS networks:

1. Best Effort DOCSIS
2. Provisioned DOCSIS
3. On-Path (with RSVP over UDP)
4. Off-Path (with PCMM)

# TPoD QoS – Best Effort DOCSIS

- Definition
  - TPoD delivered as best-effort traffic – transparent to cable operator.
- Pros
  - Subscribers can setup TPoD on their own.
  - No change to CMTS or CM.
- Cons
  - Quality of experience is not guaranteed and will depend on DOCSIS service level, traffic load, TPoD system configuration and other factors.

# TPoD QoS – Provisioned DOCSIS

- Definition
  - Dedicated CM with a TP compatible configuration file.
  - Configured resources on CMTS.
- Pro
  - Fast time to market for TPoD trials.
  - User Authentication is partially achieved.
- Con
  - May be inefficient use of DOCSIS resources.
  - Does not scale well for large deployments.

# TPoD QoS – On-Path

- Definition
  - Local two-way RSVP over UDP (so NATs can be traversed) between TP endpoint and CMTS.
- Pro
  - Solution is agnostic to the call agent which permits more flexibility in the choice, location, and ownership of call agent.
- Con
  - Authentication protocol needed to prevent non-TP endpoints from generating RSVP requests.
  - May require development on TP Endpoint and CMTS.

# TPoD QoS – Off-Path

- Definition
  - PCMM based
    - TP Call Agent is a PCMM Application server which talks to PCMM policy server which talks to CMTS.
    - CMTS performs admission control.
  - True system-level approach
- Pro
  - PCMM is well-defined and supported on the CMTS.
  - Authentication is done within a trusted network.
- Con
  - May require development on Call Agent.

# Closing Thoughts

- To ensure the reliable delivery of TPoD sessions, the DOCSIS network has:
  - the bandwidth needed in the forwarding plane, and
  - the call control and management needed in the control plane.
- As DOCSIS 3.0 is deployed, more network bandwidth will be available which will permit more users to be simultaneously connected.
  - Network signaling and QoS reservation techniques are still recommended with DOCSIS 3.0.
  - More bandwidth should equate to more users connected, not less management of users.