

# QoS for Streaming Video

**Presented by:  
Dr. Peter J. Welcher**



Slide 1

## About the Speaker

- **Dr. Pete Welcher**
  - Cisco CCIE #1773, CCSI #94014, CCIP
  - Network design & management consulting
    - Stock quotation firm, 3000 routers, TCP/IP
    - Second stock quotation firm, 2000 routers, UDP broadcasts
    - Hotel chain, 1000 routers, SNA
    - Government agency, 1500 routers
  - Teach many of the Cisco courses
- **Enterprise Networking Magazine articles**
  - <http://www.netcraftsmen.net/welcher/papers>



## Objectives

**Upon completion of this seminar, you will be able to:**

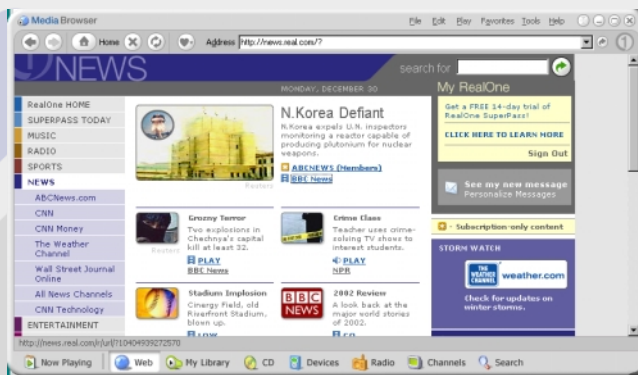
- Describe why QoS is needed with Streaming Video
- Explain the recommended QoS practices for Streaming Video



Slide 3

## Why QoS for Streaming Video?

- “I don’t have any”
- **But:** what about public video sites (news, etc.) or audio sites (Internet radio, etc.)



Slide 4

## Streaming Video QoS Concerns

- **Delivering adequate quality for business streaming video**
  - Streaming Video (SV) can tolerate delays of up to 4-5 seconds due to the jitter buffer
  - Interaction is not required so some constant delay isn't very noticeable
- **Protecting other applications**
  - Streaming Video or Audio can consume large amounts of bandwidth
  - Non-business use



Slide 5

## QoS for Streaming Video

- **Cisco recommends sending Streaming Video as AF13**
  - Medium application grade traffic
  - High drop probability: if queues are running moderately full, video will start being dropped
- **This gets SV some priority**
  - It may be enough



Slide 6

## Sample Configuration

- **CAUTION:** police and shape take bps not Kbps
- **CAUTION:** bandwidth takes Kbps

```
class-map match-any CLASS-VIDEOSTREAM
  description Streaming Video
  match access-group name VideoStream
!
policy-map WanPolicy512
  ...
  class CLASS-VIDEOSTREAM
    set ip dscp AF13
    police 200000
    bandwidth 200
```



Slide 7

## Sample Configuration

- **ACL to match all streaming video traffic**
- **For IP/TV, we cannot assume the source address is known since the RTCP traffic comes back via the PIM bi-directional tree.**
- **Site Policy: IP multicast groups are 239.192.0.0 /16. Adjust the following more tightly if separate blocks are assigned to IP/TV and WMS.**

```
ip access-list extended VideoStream
  remark IP/TV uses ports 16384-65534.
  permit udp any 239.192.0.0 0.0.255.255 range 16384 65534
```



Slide 8

## Sample Configuration

```
remark Windows Media Services part of ACL
permit udp host a.b.c.d 239.192.0.0 0.0.255.255
remark WMS uses TCP to 1755, UDP 1024-5000 unicastfrom web to server.
permit tcp any host a.b.c.d eq 1755
permit tcp host a.b.c.d eq 1755 any
permit udp host a.b.c.d range 1024 5000 0.0.0.0 127.255.255.255
permit udp 0.0.0.0 127.255.255.255 host a.b.c.d range 1024 5000
permit udp host a.b.c.d range 1024 5000 128.0.0.0 63.255.255.255
permit udp 128.0.0.0 63.255.255.255 host a.b.c.d range 1024 5000
permit udp host a.b.c.d range 1024 5000 192.0.0.0 31.255.255.255
permit udp 192.0.0.0 31.255.255.255 host a.b.c.d range 1024 5000
permit tcp any host a.b.c.d eq 80
permit tcp host a.b.c.d eq 80 any
remark WMS also uses TCP 7007, sometimes random port 1024-5000 unless
remark changed. DCOM is also used, TCP 135, UDP 135, UDP 1-65000.
remark Our current interpretation is that this is bulk file transfer
remark so should not be mildly prioritized like streaming video.
```

## QoS for SV – Choices

- **Can use CBWFQ bandwidth command to ensure adequate bandwidth**
- **Can use policing to limit amount of SV and protect other applications**
- **When configuring these, add 20% to the video rate to cover Layer 2 + IP header overhead**

## Settings for SV

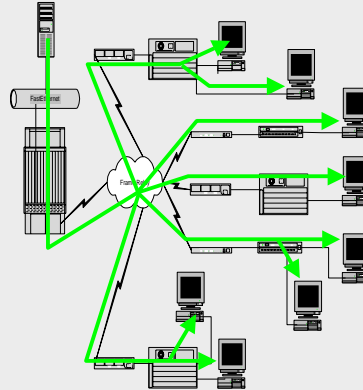
- **LAN**
  - High bandwidth available
  - Less concern about SV impact on other applications
- **WAN**
  - Much less bandwidth available
  - Need to consider impact of SV on other applications

## SV Delivery Choices

- **There are some choices you can make as to the form of SV:**
  - Multicast vs unicast
  - Scheduled vs VoD
- **Considerations:**
  - Business requirements
  - Costs
  - Bandwidth available

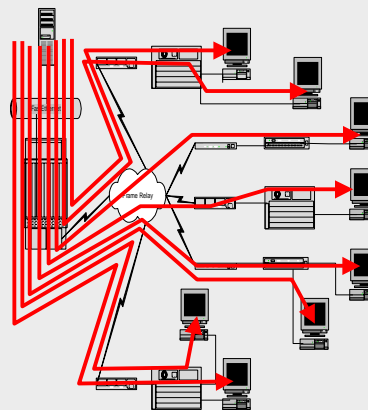
## Forms of SV: Scheduled Multicasts

- **Scheduled video “programs”**
  - Like commercial TV
  - A little less convenient for users
  - Uses multicast
  - Conserves bandwidth



## Forms of SV: Video on Demand

- **Video on Demand (VoD)**
  - Like watching a DVD, when you want
  - Must be unicast
  - May use much more bandwidth
  - Costs more to scale up



## Video Server and Multicast

- **With multicast and scheduled video, it is relatively easy to control the impact**
- **The scheduled video will be at known bit rates**
- **Add up the bit rates across all “channels” to determine total bandwidth needed**
- **Easy to control this**
  - Don't add more channels
  - Don't use high resolution video
- **Multicast is WAN-friendly!**



Slide 15

## Video Server and Unicast VoD

- **Video on Demand is harder to predict and control**
- **Bandwidth needed is the video bit rate for each stream, times the number of users**
  - Less WAN friendly
  - How can you predict this?
    - Server may let you set the maximum number of users
    - With some discipline, the administrator can remember to limit the bit rate



Slide 16

## VoD: Know Your Software

- **Does your Video Server application:**
  - Provide a global bandwidth/user control?
  - Per-site controls?
  - Quietly degrade video quality as more users join in? Or refuse to add users beyond some point? How gracefully does it deny users?
  - Use RTCP or other feedback to adjust video quality to bandwidth available?
  - Allow use of RSVP to do Admission Control?

## Interaction Between QoS and VoD

- **VoD managers want to deliver good video quality**
- **If you police SV, then as more users come on, more packets get dropped**
- **Need to coordinate policed bandwidth with server configuration**
- **Need to test and understand server response to policing or RSVP**
  - Want to avoid user quality degradation?
  - “The network is no good” – political factor

## QoS for Rebroadcast

- **Live broadcast or rebroadcast require digitization of an analog video signal**
- **The quality of the retransmission depends on the codec and PC hardware you use**
  - “You (may) get what you pay for”

## Forward Reference

- **Staging video via multiple servers or caching engines scales up VoD**
  - See also the chapter on Content Delivery Networks
- **Call Admission Control (CAC)**
  - RSVP is usually used for Streaming Video CAC
  - See the chapter on Call Admission Control

## Summary: QoS for Streaming Video

- **Classify and mark business SV as AF31**
- **Police official SV to protect network**
- **Police or mark as Best Effort all non-business SV**
- **Strongly consider using multicast**
- **For VoD, consider CAC & RSVP and/or Content Delivery Network solutions**

## Summary

**Having completed this chapter, you will be able to:**

- Describe why QoS is needed with Streaming Video
- Explain the recommended QoS practices for Streaming Video

## Questions

# Any Questions?



Slide 23

## A Word From Us ...



- **We can provide**
  - Network design review: how to make what you have work better
  - Periodic strategic advice: what's the next step for your network or staff
  - Network management tools & procedures advice: what's right for you
  - Implementation guidance (your staff does the details) or full implementation
- **We do**
  - Small- and Large-Scale Routing and Switching (design, health check, etc.)
  - IPsec VPN and V3PN (design and implementation)
  - QoS (strategy, design and implementation)
  - IP Telephony (preparedness survey, design, and implementation)
  - Call Manager deployment
  - Security
  - Network Management (design, installation, tuning, tech transfer, etc.)



Slide 24

## Cisco Certifications

**Chesapeake Netcraftsmen**  
**is certified by Cisco in:**



- IP Telephony
- Network Management
- Wireless
- Security
- (Routing and Switching)



Slide 25