Impact of Video on the LAN and MAN Architectures

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What is Video?

IPTV, VoD and Internet TV attract customers ... and create lots of traffic
Impact of Video Entertainment

Video is the change agent driving next gen IP network infrastructure design

- IPTV - Controlled delivery of premium broadcast TV and VoD services

Video and multimedia streaming causes dramatic shifts in traffic patterns

- Scalable bandwidth capacity, QoS/QoE, HA, Multicast, ...

- Evolving user expectations, evolving network needs

“ IPTV” service - A new level of QoE
Optimizing Broadcast Video Delivery
Key Requirements

**Triple Play Service Delivery Architecture**

![Diagram of Triple Play Service Delivery Architecture]

- **Traffic engineering, QoS, security, carrier OAM**
  - VPLS: combines strengths of Ethernet and MPLS
  - Service separation: unicast/mcast VPLS instances
  - HQOS: per-subscriber and per-service flow control
  - Security: residential split horizon, anti-spoofing, Mac-protection...

- **Multicast optimization and flexibility**
  - VPLS multicast registration (IGMP proxy)
  - H-VPLS: optimize rings and/or mesh topologies
  - Distributed multicast and content insertion

- **Assuring the user experience**
  - IGMP performance, HQOS, ICC
  - Service admission control
  - Performance monitoring
  - End-to-end management

- **High-availability, non stop services**
  - Rapid restoration (MPLS FRR)
  - Source redundancy (PIM-BFD)
  - Node/network resilience (NSR, ISSU)
Non-Stop Video Service Availability

System Resiliency

IGMP Stateful Switchover

Non-Stop Multicast Routing

Anycast RP

MC-LAG — Multi-chassis Link Aggregation

Any Access

802.3ad Capable Access

Internet

Voice

Video

MC-LAG — Multi-chassis Link Aggregation

Uninterrupted Viewing

BSA

BSR

PIM BFD

Non-Stop Operation

In-service Software Upgrades

Network Resiliency

Resilient VPLS

Resilient IP-VPN

Internet

Voice

Video

MC-LAG — Multi-chassis Link Aggregation

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Premeditated Video Entertainment
- download for future viewing
  - variable bandwidth determines “wait” to view
  - delay tolerant

On-demand Video Entertainment
- real-time video streaming
  - sustained bandwidth proportional to screen size
  - delay intolerant

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Average b/w per Subscriber | Over Subscription

“Best Effort” service is great for many applications - but video isn’t one of them
Just “Doing Nothing” Affects a Service Provider’s Competitive Position

IPTV services are by far the most demanding in terms of quality. User expectations are set very high.

Over time voice evolves to blended IP multimedia services. Quality of user experience is key to long-term success and profit.

OTT video demands better QoE than best effort HSI services can provide. Dissatisfied customers may churn all their services, not just one. Fairness is essential.

“Flawless Quality of Experience” across all services is a brand-defining attribute.
Differentiated Data content can be treated according to subscriber policy
- Each subscriber has independent policy configuration to allocate dedicated queues and Application QoS
- Can have separate rates for preferred vs. regular content
- Can shape overall HSI rate and individual OTT video
Thank-You

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Backup
The Video Inflection Point

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Aggregate bandwidth consumption

HSI | IPTV/Video
---|---
20 Mbps | 70 Over Subscription Ratio
18 Mbps | 60
16 Mbps | 50
14 Mbps | 40
12 Mbps | 30
10 Mbps | 20
8 Mbps | 10
6 Mbps | 0
4 Mbps | 0
2 Mbps | 0
0 Mbps | 0

Better QoS
Neutrality, Fairness and Service Improvement

Neutrality (FCC August 2005 Principles)
- Access the Internet content of choice
- Run applications and use services of choice
- Connect their choice of devices that do no harm
- Enjoy competition among service, application and content providers

Fairness
- Ensure best-effort network resources are allocated in a just and equitable fashion

Service Improvement
- Enables subscribers and content/application providers to improve their experiences over the public Internet

Service Expansion Delivers a Better Experience Ensures Fairness and Maintains the Principles of Neutrality
A Service Provider’s Response to evolving Internet applications

For Service Providers, ASPs are a:  
- a) Threat?  
- b) Opportunity?  
- c) Both a & b?

What Service Providers can do about it

**Status Quo**  
(Nothing Fails Like Success)  
Current “Best Effort” model self-regulates traffic, providing an increasingly inferior user experience and a decrease in video usage. Subscriber fairness is essential.

**Give Away**  
More Bandwidth  
Embrace the Internet’s separation of applications and transport, further propagating the Service Provider’s role as transport utility

**Create**  
New Services  
Leverage physical network assets to deliver an enhanced user-centric experience and increase shareholder value

IP innovation lets Service Providers become part of the application value chain