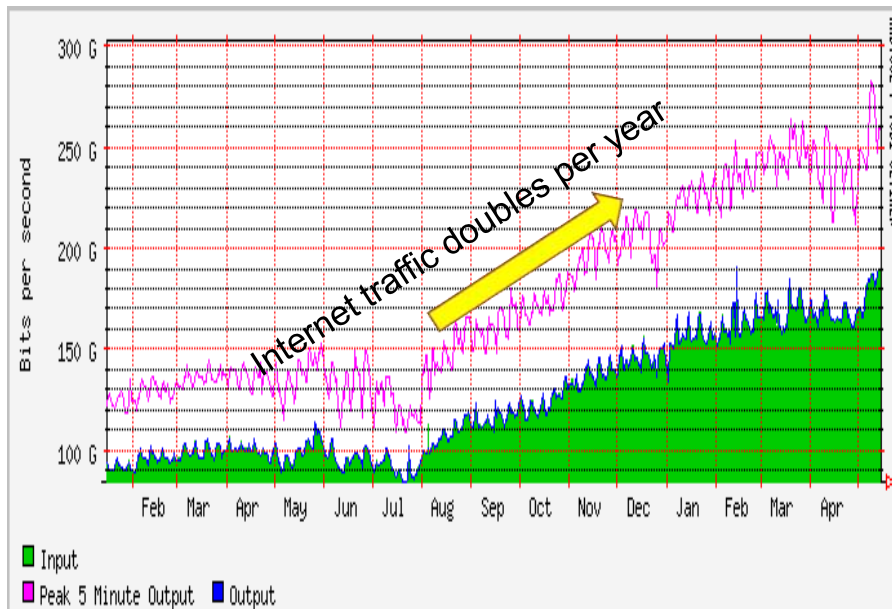


Peer-Assisted Delivery : The Way To Scale IPTV To The World

**Jin Li, Principal Researcher
Communication and Collaboration Systems
Microsoft Research**

Internet Traffic on the Rise

- Internet traffic trend: grow at a compound monthly average of 7.4% in 2006



2

Traffic at Amsterdam Internet Exchange (AMS-IX)

Video Fuels the Growth

- Video streams served increased 38.8% in 2006 to 24.92 billion (Source: AccuStream iMedia Research)
- 53 web-video startup in 2006, \$521M VC funding (Source: DowJones VentureOne)
- Major studio goes into Web Video



- \$410M video ads revenue in 2006 and grow by 89% in 2007 (0.6% of \$74B TV ad market, Internet ads \$16.4B in 2006, expect to grow 19% in 2007) [source: Emarketer]

Just Build More Powerful Data Center?

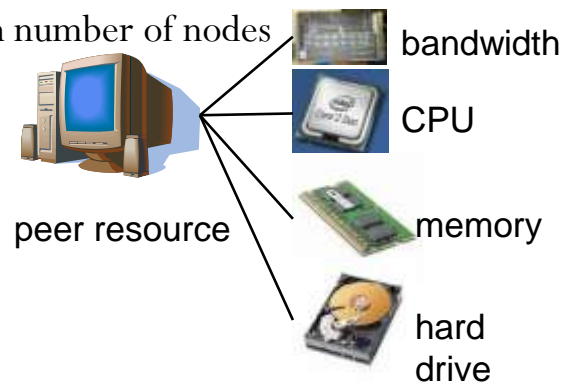
- VHS quality video streaming: 500 kbps (H.264/VC-1)
 - 200,000 viewers = 100 Gbps
 - DTV quality: 1Mbps
 - DVD quality: 1.5-2Mbps
 - HD quality: 6-10Mbps
- Data center capacity: Tera Grid
 - 30 petabyte of storage
 - 40 Gbps backbone: 80k video viewers
 - 70 days to retrieve all data through the backbone network

Can CDN Help?

- Akamai
 - 20,000 servers, 900 point of presence, 71 countries
 - 300Gbps bandwidth
- Limelight
 - 25 point of presence, hundreds servers per presence
 - 1,000Gbps bandwidth
- Combined: 2.6 million viewers.
- Current TV audience
 - Olympics: 2.5 billion viewers
 - Each viewer may have his/her own interest (different sport event, athlete nationality, etc.)

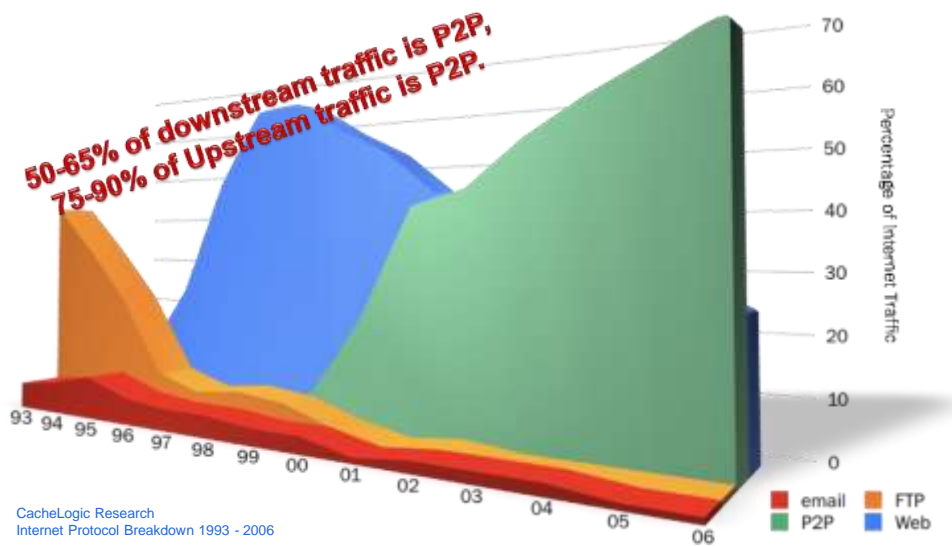
P2P is the Way To Scale

- Economical to run
 - Saves server/CDN bandwidth, disk I/O, CPU, memory
- Robust
 - no single point of failure in network
- Super-scalable
 - system capacity increases with number of nodes



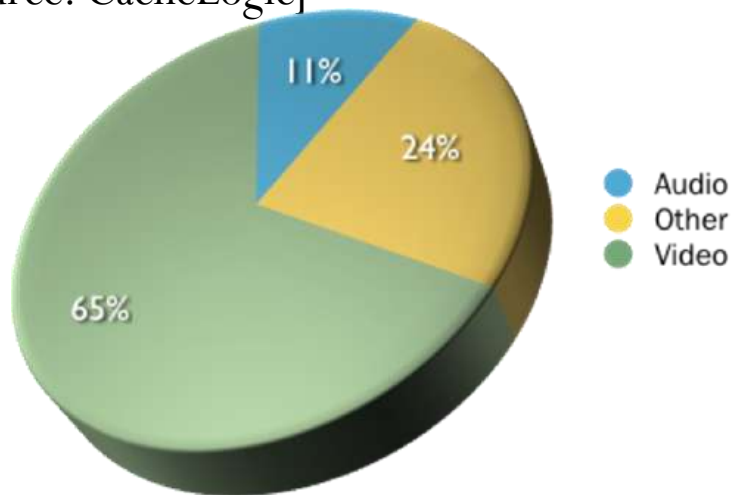
P2P Traffic Dominates

- 1999 to present: fueled by Napster, KaZaA, eDonkey and BitTorrent



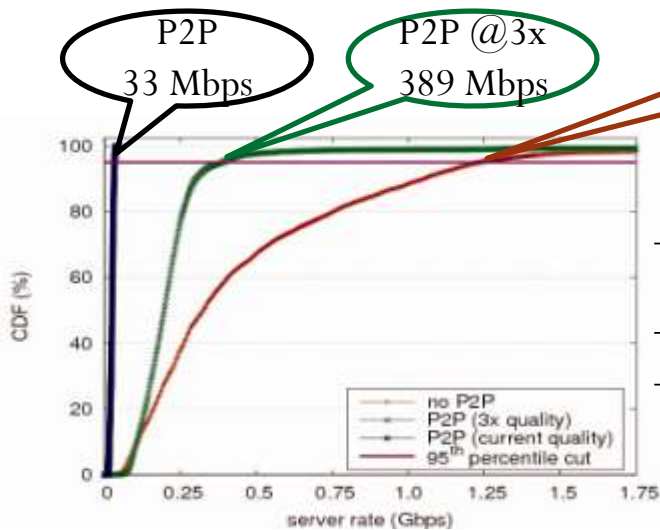
Internet Traffic Statistics

- 60+% of Internet backbone traffic is P2P
- Among P2P traffic, 65% is video, 24% is audio [source: CacheLogic]



P2P Benefit Content Owner

- Based on actual MSN video trace
 - Assume same user behavior, client-server vs. peer-assisted VoD



	client-server VoD	peer-assisted VoD	Peer-assisted VoD (3x)
Server BW	1230 Mbps	33 Mbps	389Mbps
Saving		40x	3x

Savings breakdown (Apr. 2006)

P2P Benefit Consumers: Better Video Quality, More Selection

RedSwoosh
free your links



LIVESTATION



skyrider

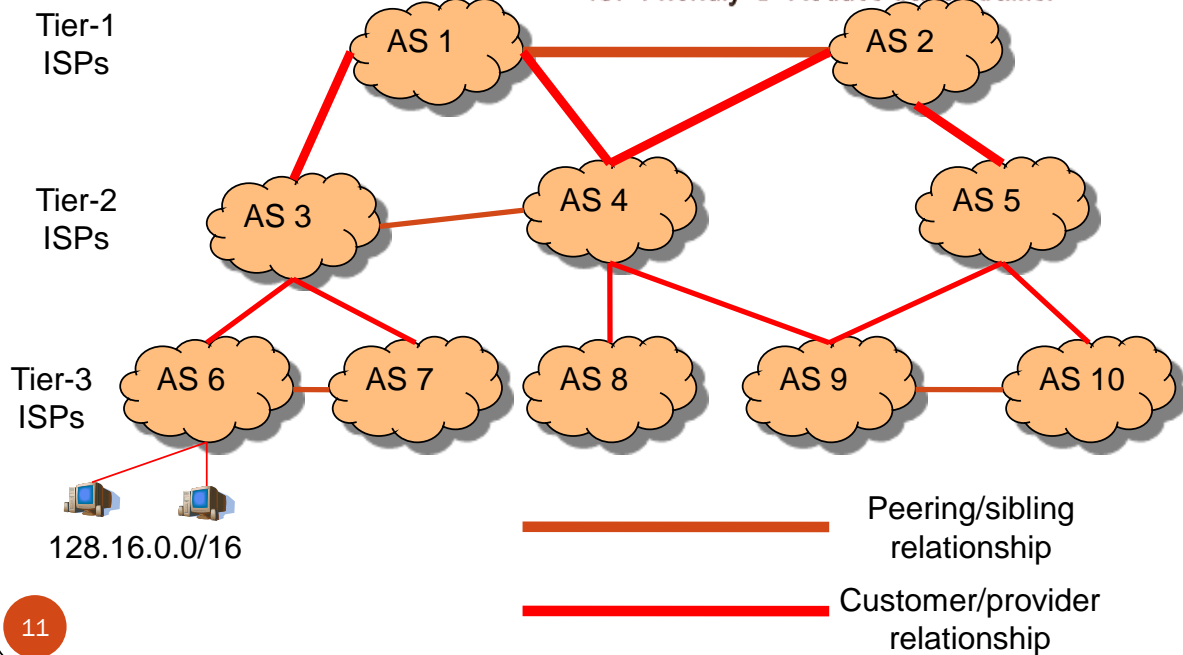
播播3



PeerApp
Where ISPs embrace P2P

P2P Should Be ISP Friendly

P2P: 60+% of Internet backbone traffic.
ISP Friendly → Reduce transit traffic.



P2P Locality: Intra ISP

