Real-Time Services in the Internet?

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Myths about Internet RT Services

- long delays make the Internet unsuitable for RT services
- real-time services are going to sink the Internet
- resource reservation will fix the problem
- ATM will fix the problem

Consumer Access

- acceptable RT bandwidth = acceptable web bandwidth
- 200 concurrent users / T1 ➠ 7.5 kb/s
- currently: 10 customers/modem ➠ will decrease
- ➠ only 75c/month for pipe ISP $\rightarrow$ backbone
- ➠ "Internet radio" costs $30/month for access

Backbone Network

- 10^6 users at 28.8 kb/s ➠ 288 Gb/s
- 12088 US AM/FM radio stations ➠ 340 Mb/s
- users will expect "radio service"
- $20/month long-distance as additional revenue stream ($61.5b/yr LD)

Resource Reservation to the Rescue?

- can't reject "normal" requests
- only factor 2 variation in bandwidth usage ➠ reservation useless for cutting peaks
- multi-provider charging (NJ TP coin toss) or pay on entry?
- charging for multicast - incremental network cost may be 0!
- authentication? ecash?
- scaling (OC-48: 90,000 streams!) ➠ aggregation
- aggregation $\leftrightarrow$ protection, fairness
- needed for fat pipe $\rightarrow$ narrow pipe: campus, cable modem, transatlantic, ...

The Future?

- alternatives to strict reservation? ➠ adaptation, traffic classes
- widespread multicast deployment ➠ save backbone
- need RSVP lite?
- peak/average ↑ ➠ cost based on average load? (MCI!)
- Internet = high-loss network?
- applications developing loss-tolerance (SR, FEC)?
- *affordable* backbone bandwidth will remain scarce ("too cheap to meter" II)