



High-Speed Networks: Introduction (1)

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Some ideas and thoughts were the thoughts of Prof. M. Shyman of U. of Maryland

Objective

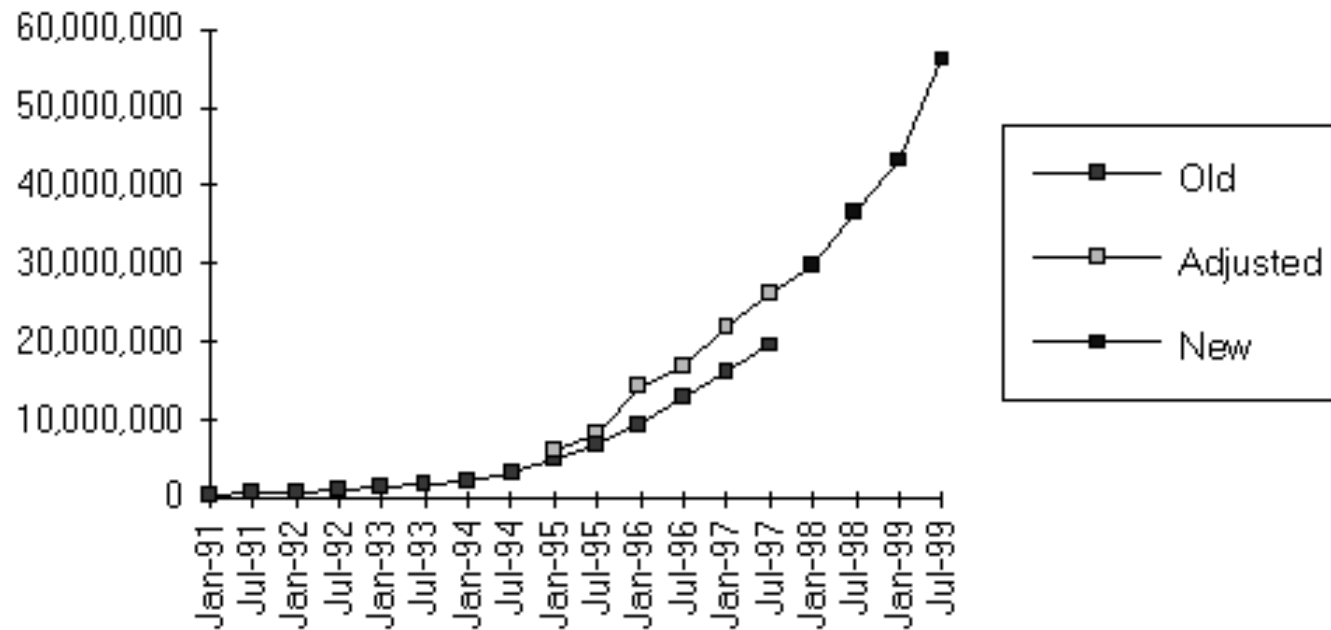
- The need to carry large volumes of traffic with different quality of service (QoS) requirements over networks operating at very high data rates.
- Get the *MOST* for the *LEAST*!

History

- The growth in the Internet been dominated by the growth of WWW
- 1,326,920,000 web pages on the net

Growth of IP Domains

Internet Domain Survey Host Count



Source: Internet Software Consortium (<http://www.isc.org/>)

History

- In 1969, ARPAnet invented
 - » two variations of ARPAnet are
 - Packet radio
 - Satellite com (SATnet)
 - » each has different packet size & header
- Internetworking emerged.

More history

Telephone Networks

- Public telephone network uses analog switching and transmission technologies based on circuit switching.
 - » Switching originally by operators, then automated mechanical, now electronic

Telephone Networks (Cont.)

- Digital evolution came up.
- There is a need to digitize public networks
 - Analog switches ==> digital computerized sw
 - Analog transmission ==> digital transmission
- The concept of circuits remains.

Telephone Networks (Cont.)

- **Common channel signaling (CCS)**
 - data network used by switches to exchange control information
 - Separates call control from transfer of voice
 - Together with programmable switches, permits value-added services (e.g., call waiting, call forwarding)

Telephone Networks (Cont.)

- Although those digital evolution of telephone networks is meant to provide economic voice communication, different digital data services need to be supported.
- Integrated Services digital Network (ISDN) came about to carry different traffic formats.

ISDN

- The same digital switches and digital paths are used to establish connections for different services, e.g. telephony, data.
 - » Basic access is $2B + D$
 - B channel is full-duplex 64 kbps. Suitable for circuit-switched connection, connection to packet-switched network, or permanent digital connection
 - D channel is 16 kbps packet-switched

ISDN (Cont.)

- Since 1980's, transmission changing to SONET (Synchronous Optical Network)
 - » Basic STS-1 signal has rate of 51.840 Mbps
 - » Then OC-3 or 155 Mbps

Broadband ISDN

- Integration of voice, video, data in high speed network
 - » ATM running over SONET
- B-ISDN channels support rates higher than 64 Kbps

ATM

- Asynchronous Transfer Mode
- Technology developed independently from B-ISDN and was considered for a long time as part of B-ISDN.
- ATM is no more B-ISDN:
 - Public networks
 - ATM LANs
 - ATM WANs

HS LANs

- Two trends mainly contributed to the emergence of HS LANs:
 - Powerful computers
 - Client server computing (this is not possible to exist with the telephone network ONLY)
- This results in huge amount of data to be handled by the network.