

The Internet

Geoff Huston
Telstra Internet

▶ What can I say about the Internet.....

that hasn't been said already!



What is the Internet

Impacts of the Internet

Internet Futures

► Evolution of Silicon

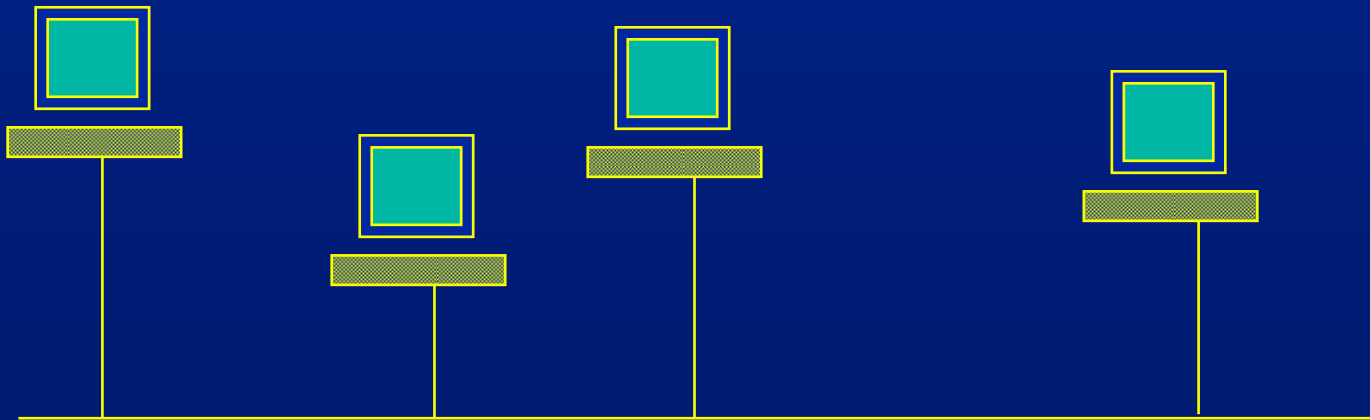
- The evolution of the computer in the 80's
 - single mainframe to many personal devices
- Data communications to link these personal devices are essential

▶ Data Communications

- The objective is to transfer digital data without error between two computers:
 - break the data into “chunks” for transmission (packets)
 - add packet “header” containing
 - source
 - destination
 - transmit the header plus packet data
 - await “ack” of successful transmission of packet

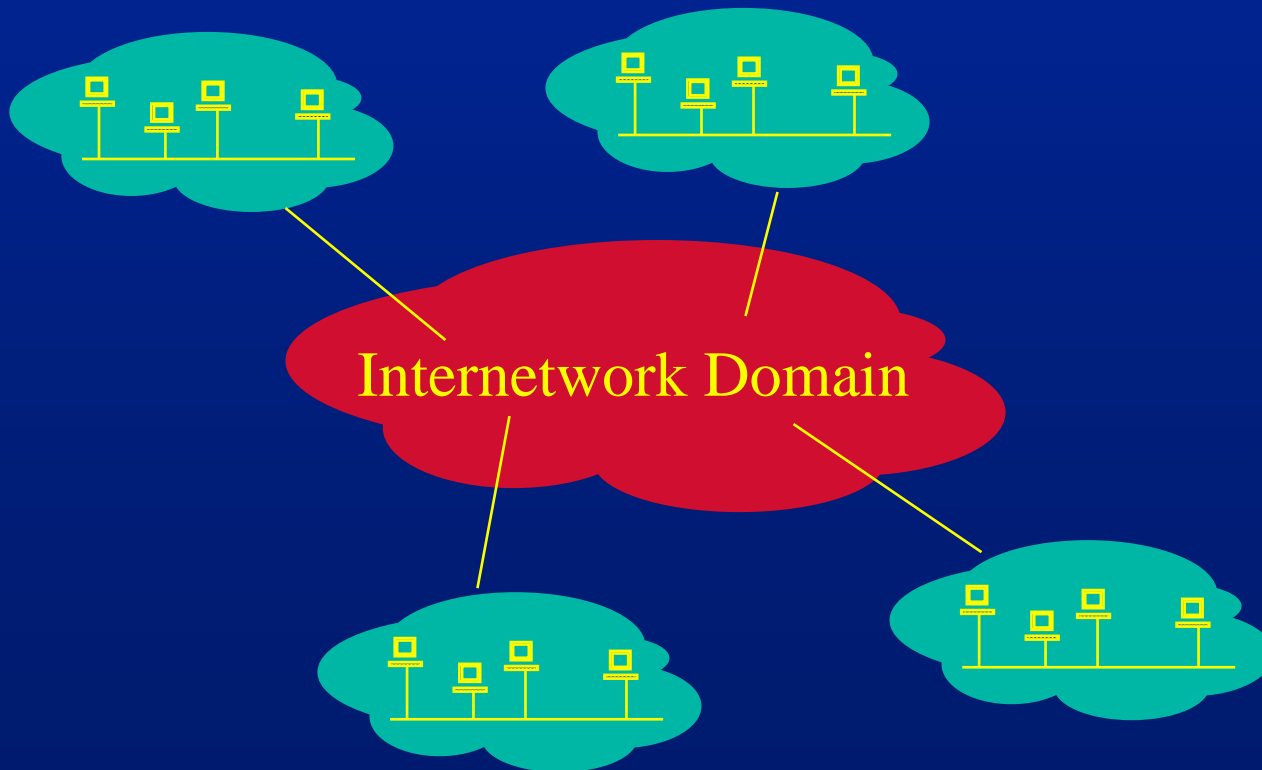
▶ Local Area Networks

- High Speed office networks
 - Ethernet - 10 / 100 Mbps broadcast
 - Token Ring 4 / 16 Mbps ring
 - FDDI 100Mbps ring



▶ Internetworking

- Linking Local Area Networks



▶ TCP/IP - the Internet Protocol

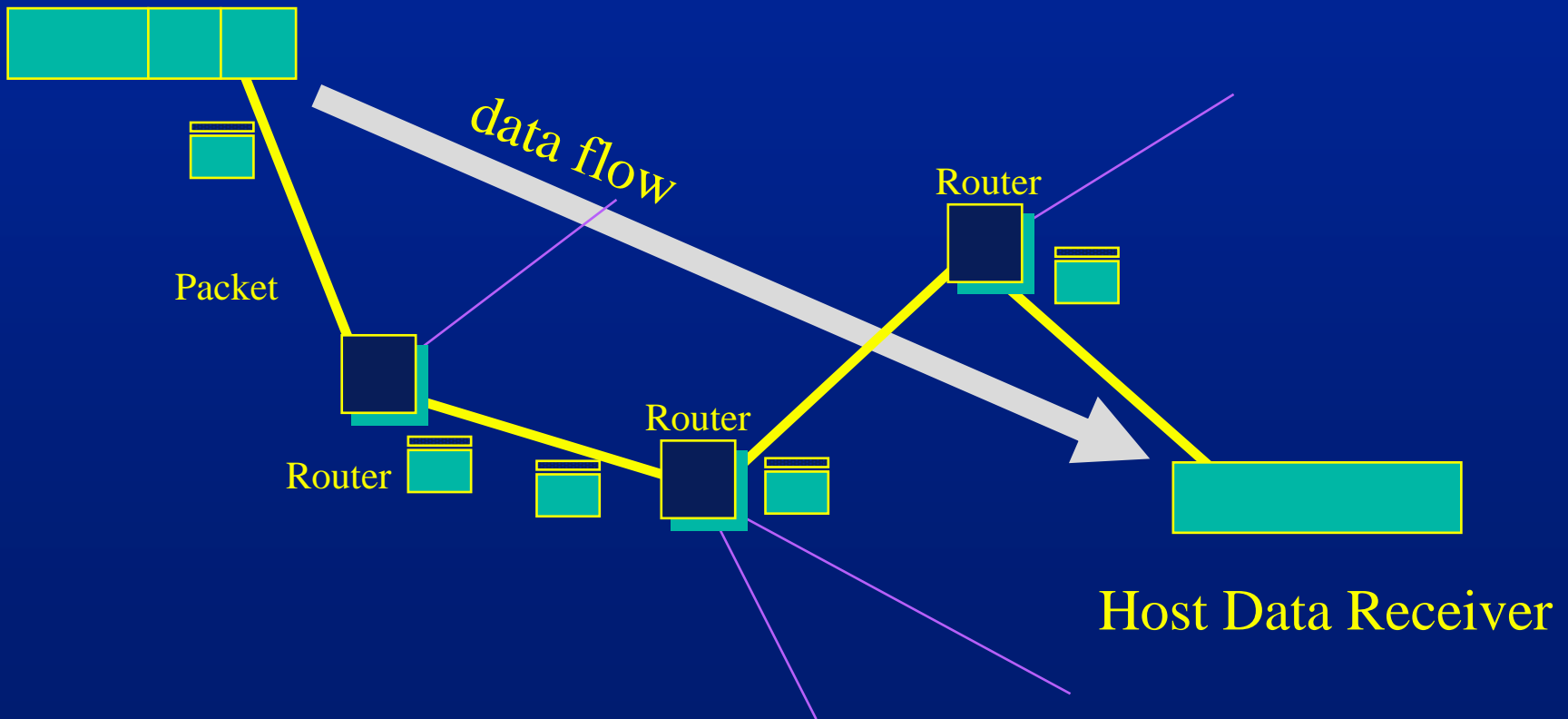
- unreliable datagram transmission with end to end coherency (stateless network)
- Functionally complete protocol architecture
- speeds from gigabit to bit
- can use any communications medium
- Openly (freely) available
- Simple and Sufficient

▶ The Internet - Hosts & Routers

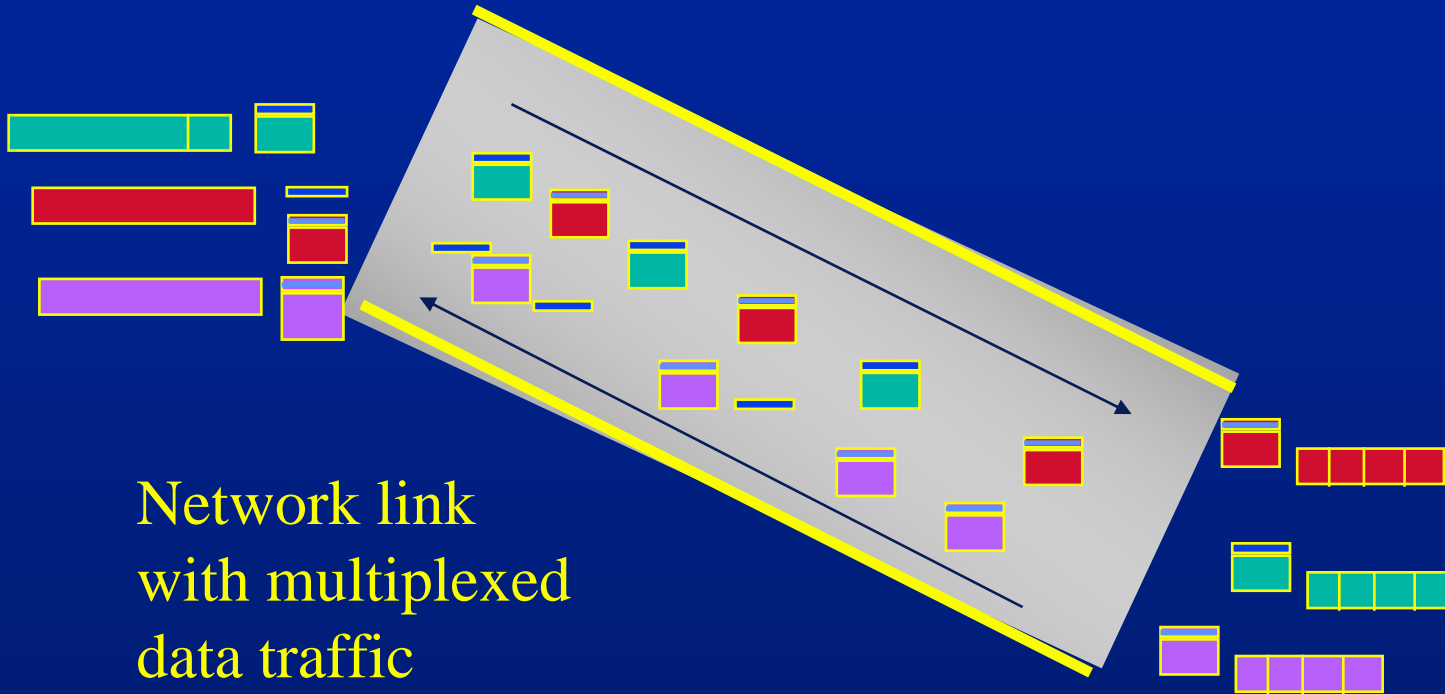
- Hosts
 - generate packets
 - retain packet until acknowledged by destination
 - retransmit packet is assumed lost
- Routers
 - switch packets
 - inspect packet header
 - decode destination address
 - lookup address table of destinations
 - transmit packet on next hop
 - or drop packets!

▶ Internetworking

Host Data Source

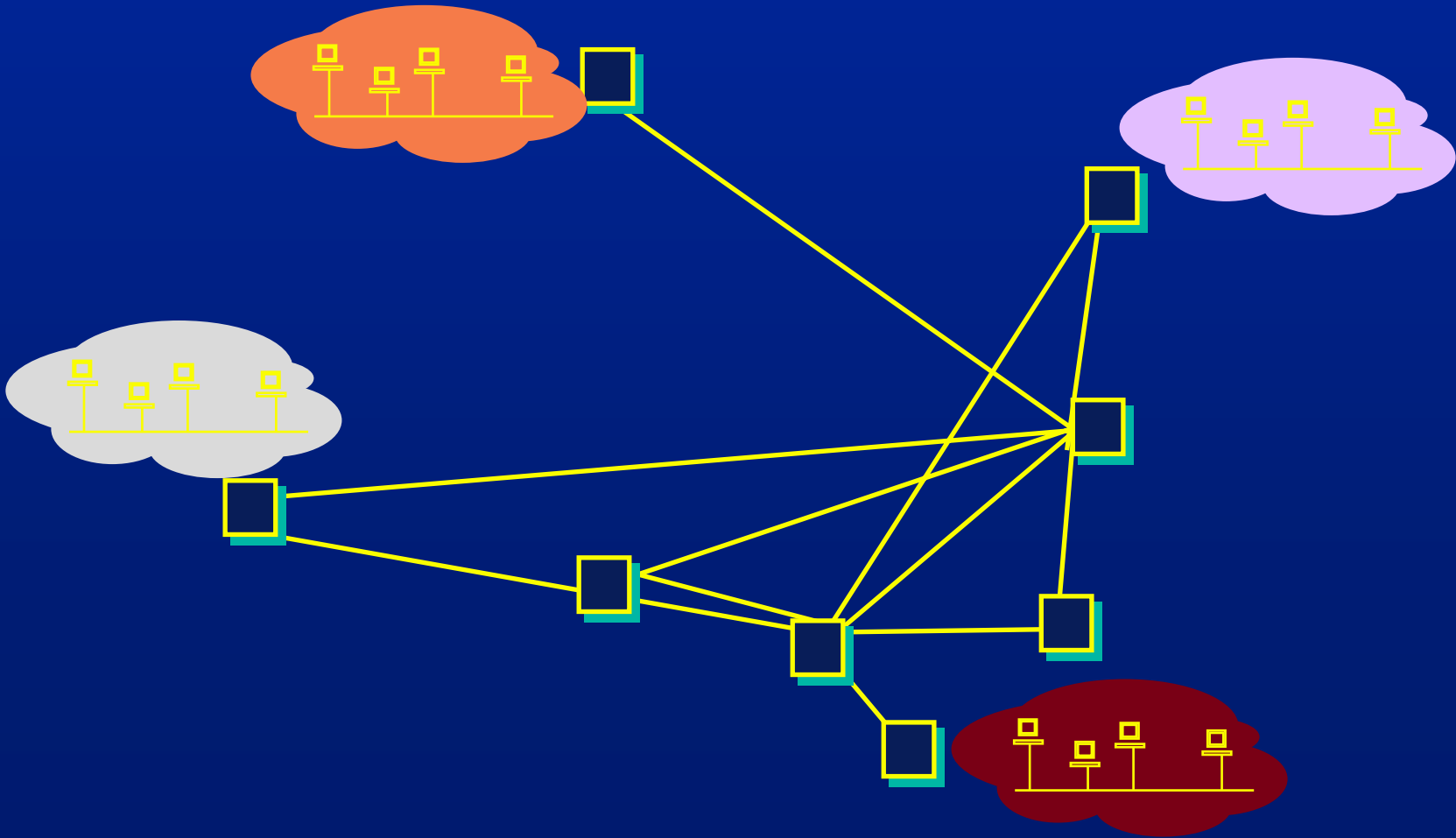


▶ Internetworking

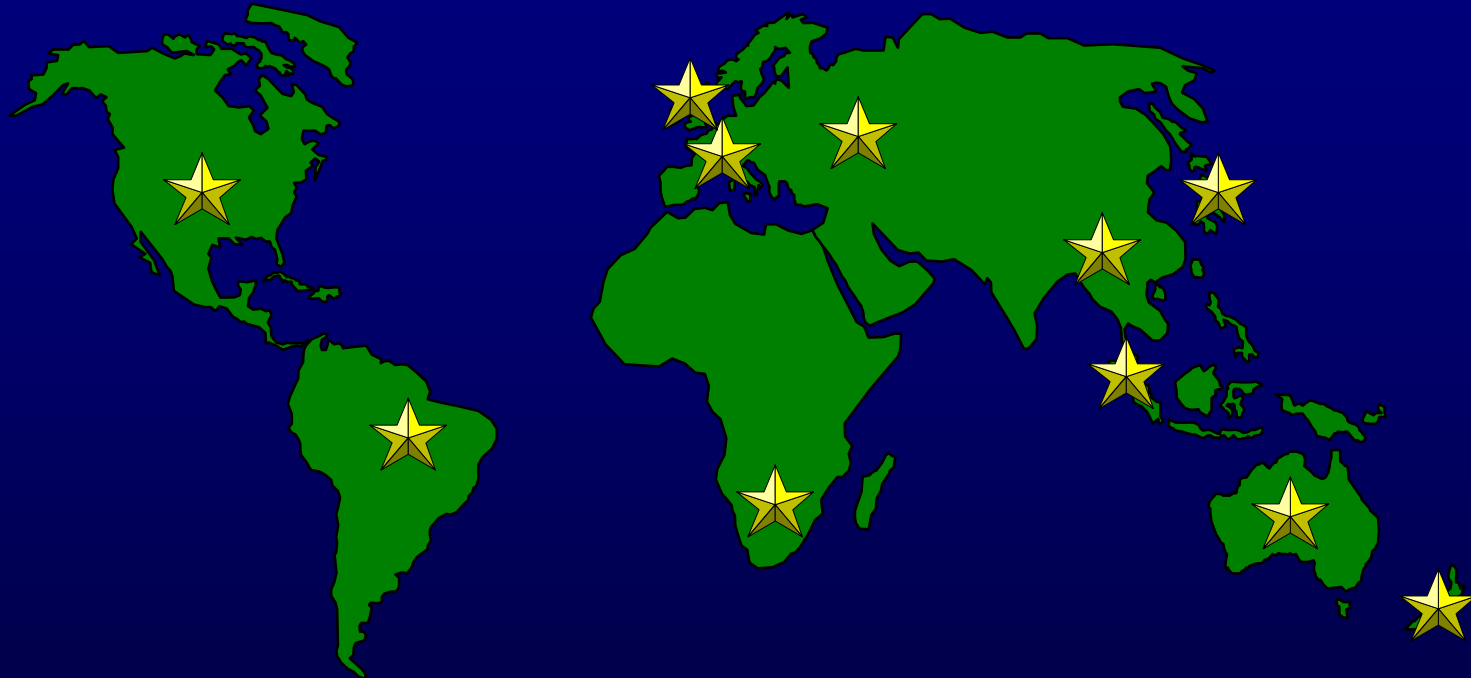


▶ Internets

- Composed of Routers and data links



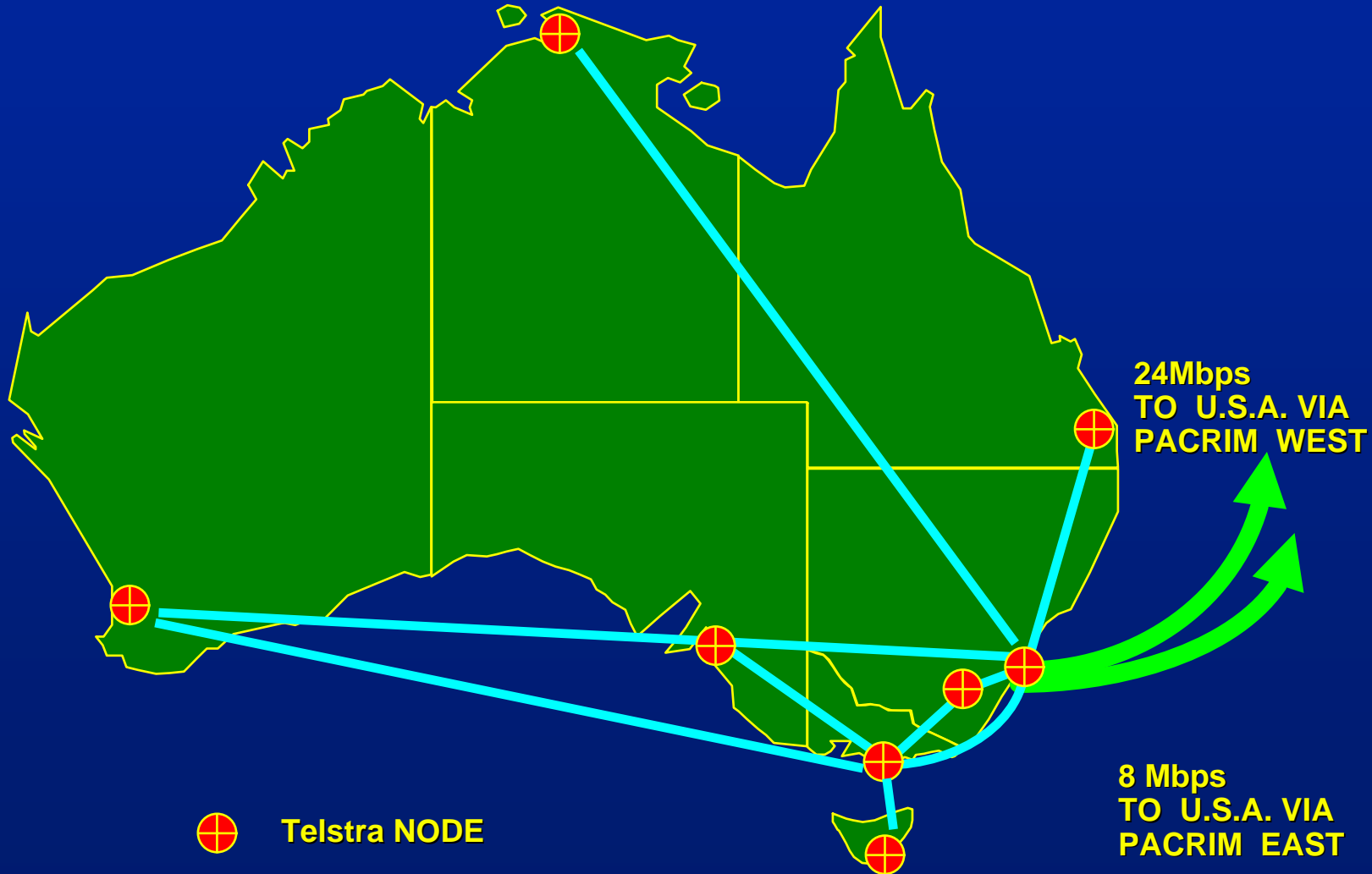
▶ The Internet



98 Countries
40+ Million Users

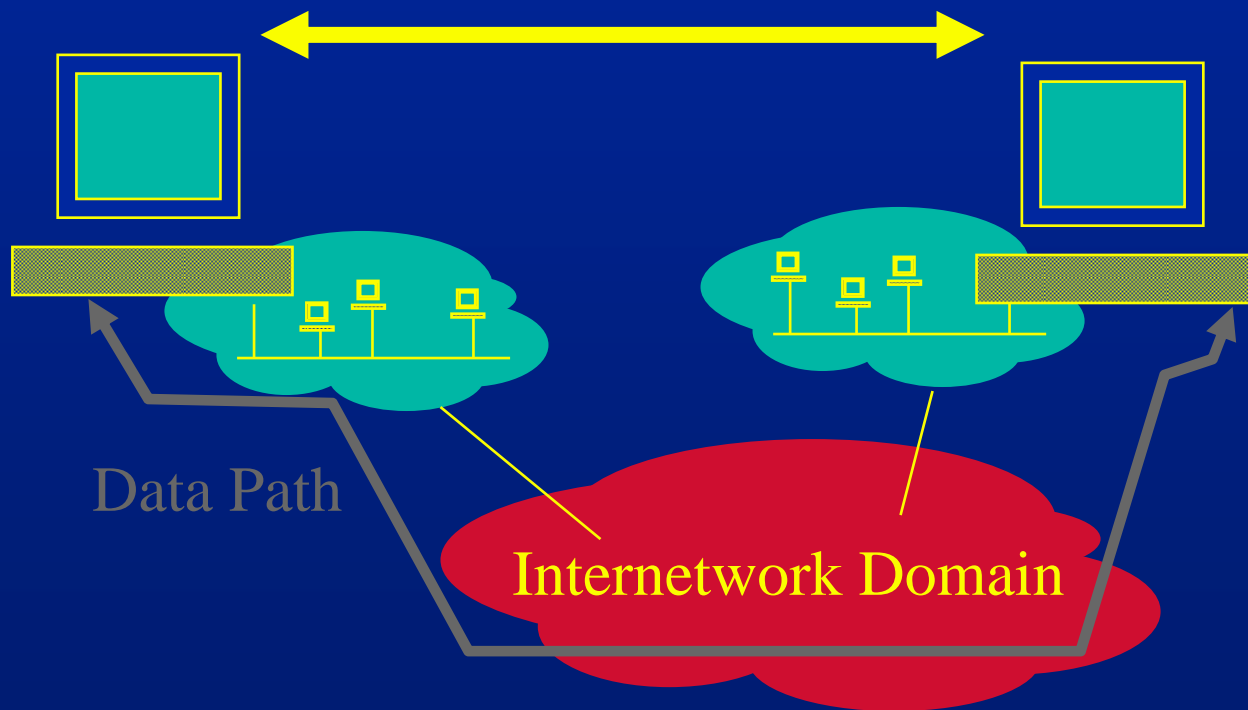
A network is added to “the net” every 20 minutes.

Telstra's Internet



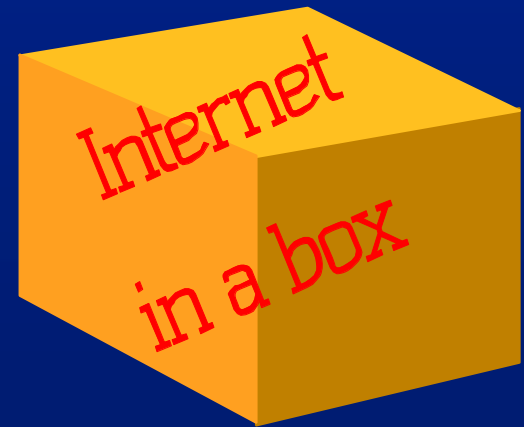
► The Internet Service Model

Internet Applications operate host to host



► Some Internet Applications

- 4 Electronic Mail
- 4 On-line Information Services (WWW, Gopher)
- 4 Bulletin Boards, Social Networks
- 4 Interactive Games
- 4 Distance Learning
- 4 File Transfer
- 4 Home Shopping
- 4 Internet Telephone
- 4 Video Mail
- 4 Video-conferencing



▶ TCP/IP vs Telephony

- switching data packets, not dedicated analogue circuits
- adaptive flow control, not real time flow
- end to end absolute data integrity, not data distortion
- No defined level of service
- No coherent service provider structure
- No coherent administrative structure

▶ The Internet World

- Communications capabilities as software loaded into the end device
- The end devices control the information flow across the network
- The network is just a “dumb” switch
- The services are loaded into the end devices
- Every receiver is a transmitter!

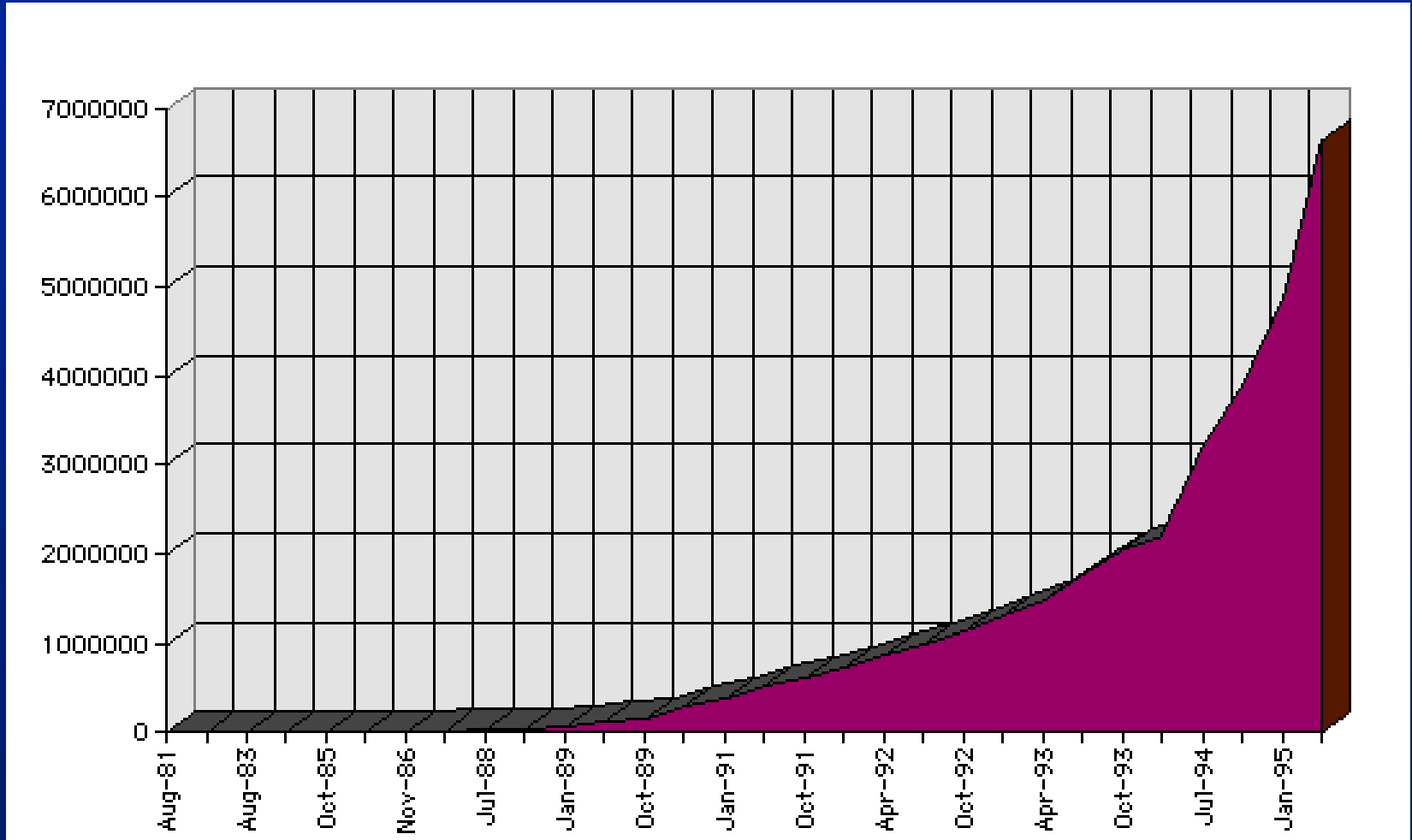
▶ The Internet Environment

- Distributed information environment
- Diversity of consumer access devices
- Ubiquitous network service
- end-to-end service model

▶ The Active Communications Model

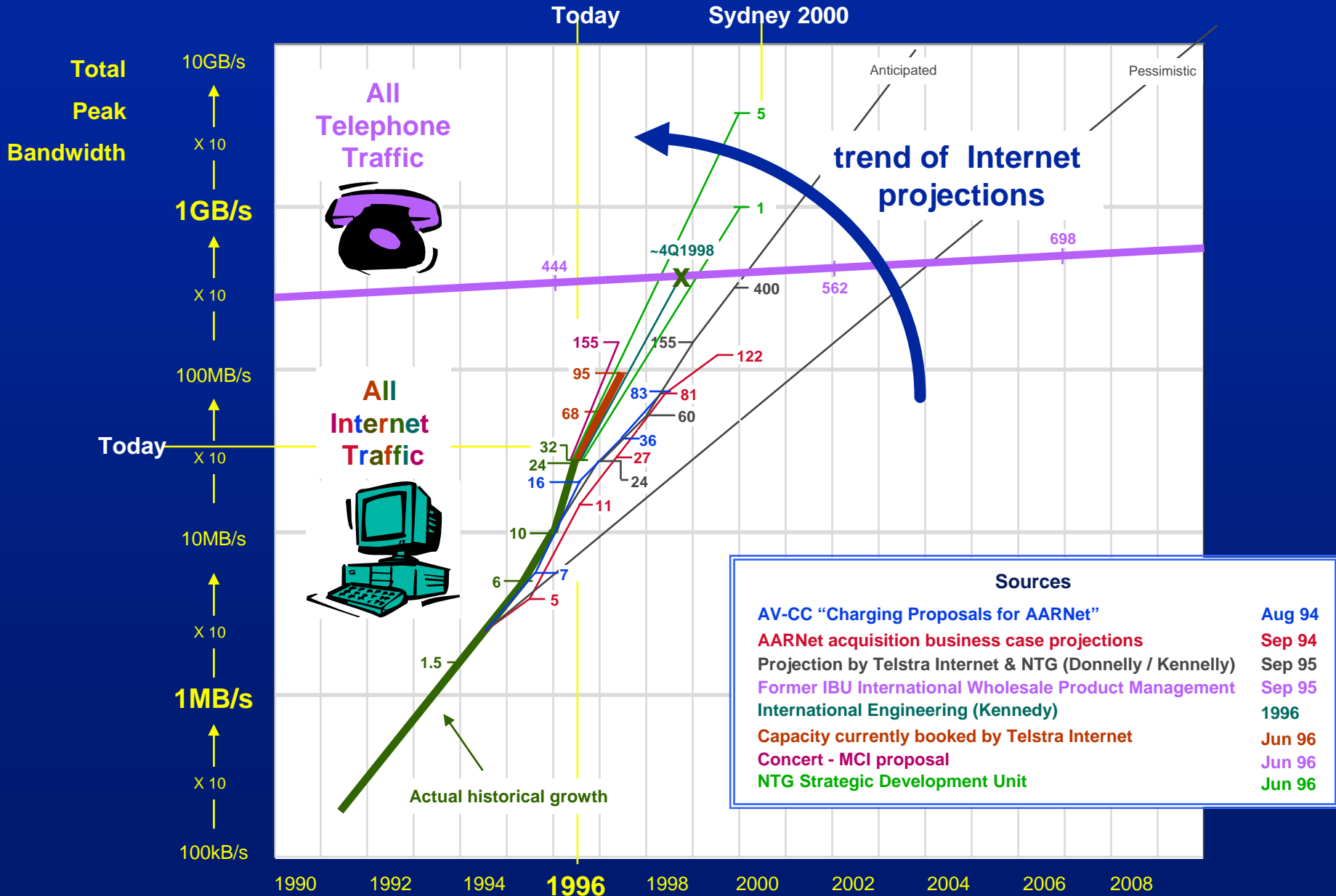
- Capable user devices which can generate and receive services
- Passive Data Transmission Network

▶ Internet Growth

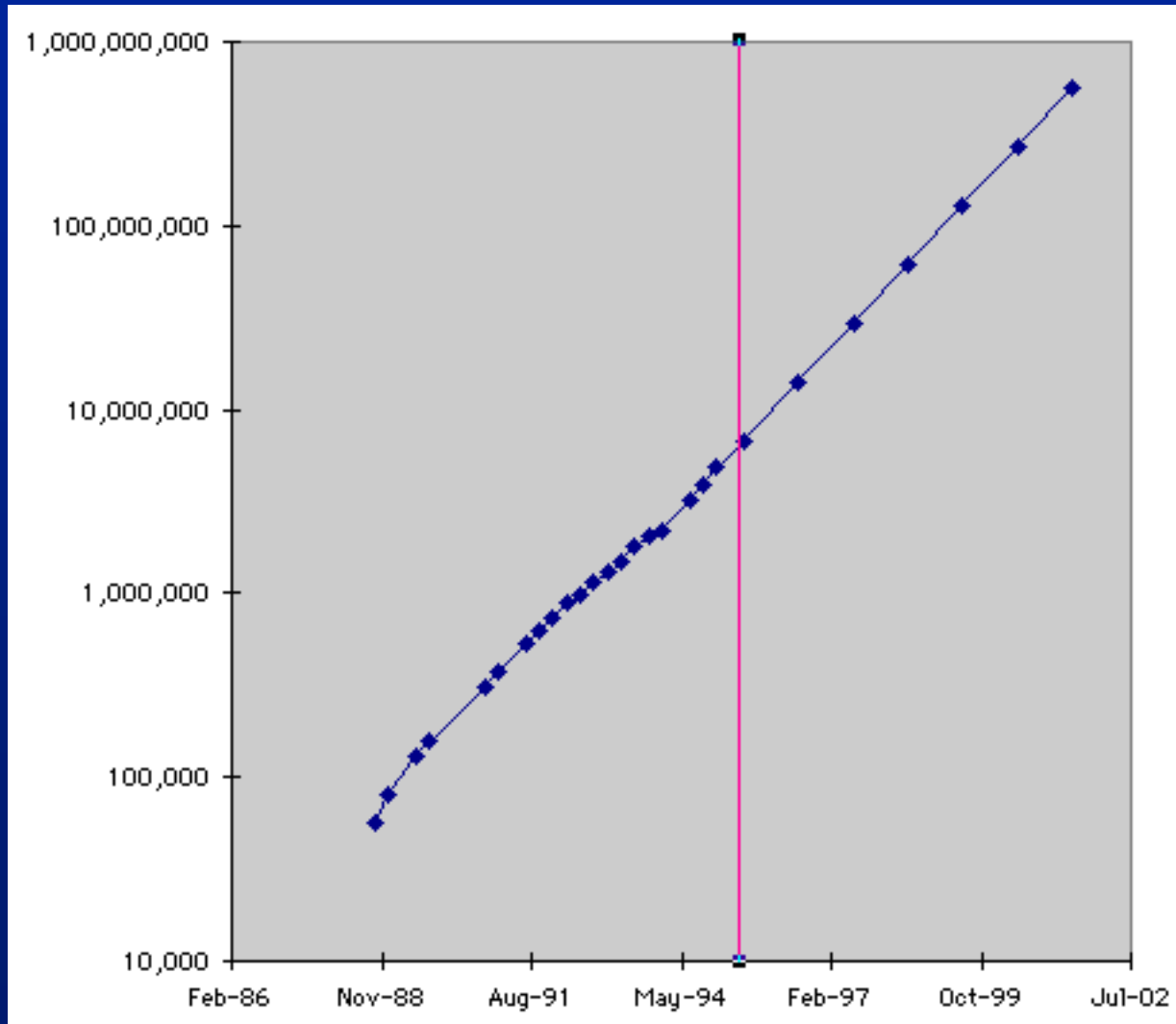


International Internet Capacity - A Selection of Projections

Linear Thinking in a Non-linear Era



Futures



► Communications Model - 1995

- Voice, Television, Radio and Print networks:
 - “Smart” content provider
 - “Smart” network
 - “Dumb” access device
- Data over Voice

► Communications Model - 2000

- A Ubiquitous Internet
 - “dumb” network
 - “smart” access devices
 - service flexibility
 - no distinction between content provider and consumer
- Voice as one of many data applications

▶ Impacts

- **Users are Clients and Providers**
 - no massive investment is required to generate content
 - each network user can generate content on their networked device.

▶ Impacts

- No Strict Service model
 - services are defined within software
 - one device can map to multiple communications services
 - the network supports unicast, multicast and broadcast models simultaneously
 - the network supports synchronous and asynchronous communications models

▶ Populating the Internet World

- Content provision is easy
- Abundance of
 - content
 - trading environments
- Content navigation is difficult!
- Directory and Navigation technologies critical

▶ Impacts

- Communications Service Enterprises ?
- Publication Industry ?
- Media ?
- Business and Information Flow ?
- Transaction Industry ?
- Finance ?

► By 2001

- 1 billion connected devices
- 1 million component networks
- voice as a data application
- thousands of applications
- underpin the global communications environment
- Alter institutional, financial and political boundaries

▶ And Beyond

Silicon thrives on volume !

▶ Questions
