

# Introduction to Networking

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April 2002

## A Bit of History

- ! ARPANET - late 1960's
- ! Ethernet - 1973
- ! BITNET - 1981
- ! NSFNET - 1986
- ! World Wide Web - 1991

## What is a Network? What does it do?

- ! A network is a combination of hardware and software that enables computers to communicate and share resources with each other.
- ! Networks bring us distant information quickly.  
i.e., Email, Web pages, etc.

## Basic Network

- ! Two or more computers connected together via a communications medium
  - " Twisted Pair cable
  - " Coaxial cable
  - " Fiber optics
  - " Wireless
  - " Network Equipment

## Network Types

- ! Public Networks
  - " Local Carrier or worldwide
- ! Private Networks
  - " Closed communication system
- ! Internet
  - " A worldwide connection of Networks
  - " Connected by fiber, copper & satellite
- ! Intranet
  - " Secure Enterprise
  - " Access to corporate servers
- ! Local Area Network (LAN)
  - " Building or Campus
  - " May connect other Lan's together
- ! Wide Area Network (WAN)
  - " Unlimited distances
  - " May connect a worldwide enterprise

## Local Area Network Topologies

- ! Bus
- ! Ring
- ! Star

## Why Ethernet?

- ! Most Popular
- ! Supported by most computer brands & operating systems
- ! Easily connected to star-wired hub or switch
- ! Cost per port declining

## Protocols

- ! TCP/IP
  - " Developed by Dept. of Defense
  - " Most popular protocol today
  - " Easily routable
  - " Recovers from network failures
  - " Actually a suite of protocols: FTP, Telnet, UDP, etc.

- ! Novell IPX
  - " LAN protocol for access to servers & printers
  - " Not used on the Internet
- ! NETBIOS/Netbeui
  - " Produced for IBM in 1983
  - " Used in Microsoft Networking
  - " Not routable

## Network Equipment

- ! Hubs
  - " Unmanaged
  - " Less expensive
- ! Switch
  - " Examine each packet before forwarding
  - " Sends data to proper port instead of all
  - " More expensive
- ! Bridge
  - " Connects networks together
  - " Forwards only packets destined for other segment
- ! Router
  - " Connects two or more networks
  - " Determines best path to send packet

## Wide Area Network Topologies

### High Speed WANs

- ! T1 - 1.544 megabits/sec
- ! T3 - 43.232 megabits/sec
- ! OC-3 - 155 megabits/sec
- ! OC-12 - 622 megabits/sec
- ! OC-48 - 2.5 gigabits/sec
- ! OC-192 - 9.6 gigabits/sec

### Lower speed WANs

- ! Modem - up to 56k
- ! ISDN - 64k or 128k
  - " Older technology but still available
- ! DSL - 256k to 1.5 meg
  - " Speeds may vary
  - " Typical speeds are 384k/128k
- ! Cable Modems
  - " Speeds up to 2 megabits/sec
  - " Speed may vary greatly
- ! Fixed wireless
  - " Speeds usually 256k to 2 meg.
  - " Not widely available, but increasing

## Satellite connectivity

- ! Starband or DirectPC type
- ! Speeds of 400-500k download and from 40-60k to 128k bit/sec upload
- ! Latency issues with satellite connection
- ! Weather can cause problems
- ! Remote areas can still connect

## Internet 1 & 2

- ! Internet 1 hosts exceed 176 billion, with over 230 countries connected
  - " Commodity Internet
- ! Internet 2
  - " Non profit research network
  - " High speed