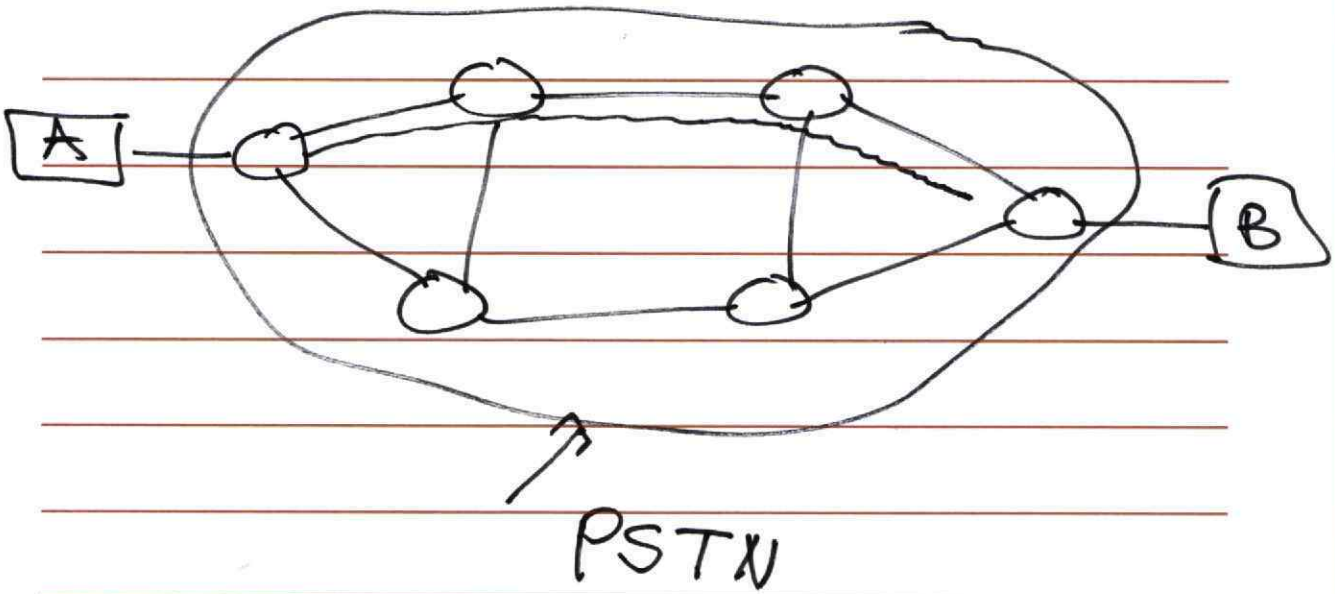
EE450, Fall 2015, Zahid
lecture # 1
Tuesday, August 25

PSTN : Public Switched Telephone Network

Intranet : private (corporate, enterprise) network that uses the same protocol suite (TCP/IP)



Overview

EE450: Introduction to Computer Networks

Professor A. Zahid

Course Overview

suite

~~sweet~~

Part 1: Data Communications & Networking

Part 2: Computer Networking Protocols (TCP/IP)

Part 3: Wide Area Networks (WANs)

Part 4: Local Area Networks (LANs)

Part 5: Internetworking

Part 6: Transport Layer Protocols

Part 7: Network Applications

Part 8: Network Security — CS530

Focus throughout the course is on the public Internet

PSTN

Growth of Computer Networks

- Computer Networking has grown explosively
- Since the 1970s, computer communication has changed from a research topic to an essential part of infrastructure
- Networking is used in every aspect of our lives:
  - Business
  - Education
  - Advertising
  - Social
  - Entertainment
  - Production
  - Planning
  - Billing
  - Accounting

Growth of CN (Continued)

- In short, computer networks are everywhere
- In 1980, the Internet was a research project that involved a few dozen sites. Today, the Internet has grown into a huge Network that reaches all of the world
- The advent and utility of networking has created dramatic economic shifts
  - Network has made telecommuting available to individuals
  - An entire industry emerged that develops networking technologies, products, and services
  - The importance of computer networks has produced a demand in all industries for people with more networking expertise
  - Companies need professionals to plan, acquire, install, operate, and manage the hardware and software systems for networks

Multimedia Convergence

Major Industries

Broadcast TV
Film

Video

- pre-recorded / on-demand
  (e.g., MPEG, Real Net)
- live (video phone,
  video teleconference)

Wireless

Data

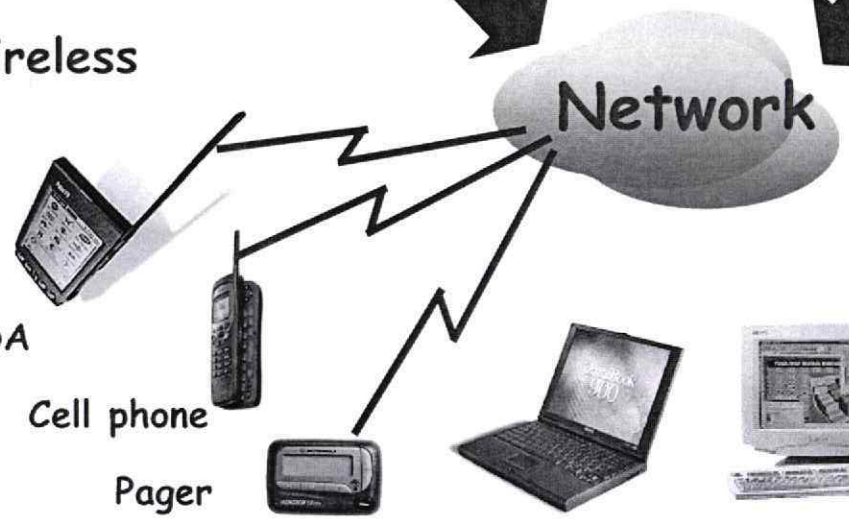
- e-mail
- files
  -- executables
  -- source code
  -- data
  -- html
  -- image

Computer Software
Financial, e-Commerce, etc.

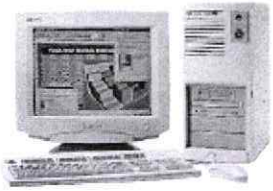
Recording
Broadcast
Radio

Voice / Audio

- pre-recorded /on-demand
  (streaming or file [mp3])
- live (Real Net, VoIP)



Telephone companies (Telco)
Internet Service Providers (ISP)



Computer Hardware/Software
Telco/wireless Hardware

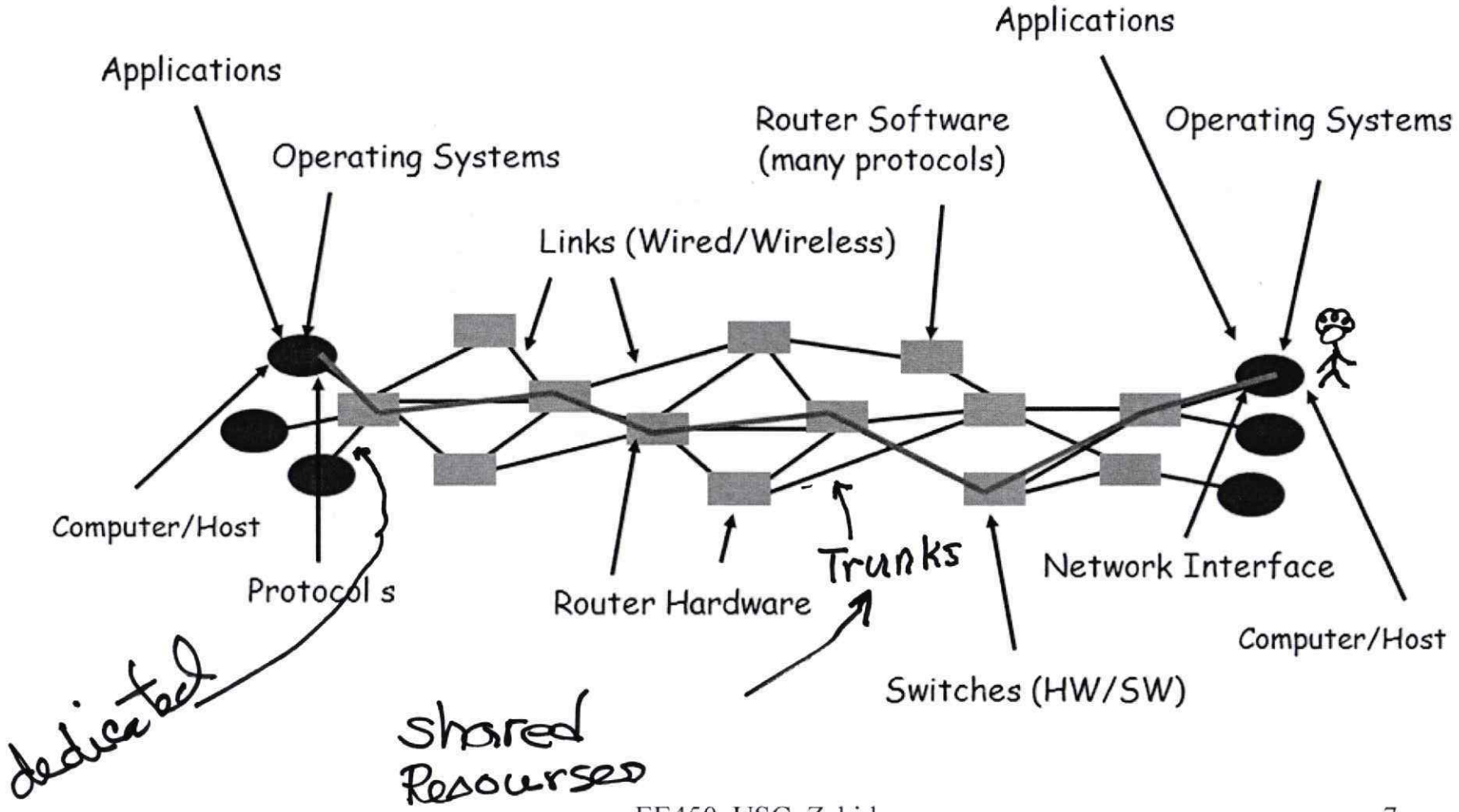
Computer (?) Networks

- A Computer Network is a set of nodes such as routers, switches, hosts, etc.. interconnected via transmission facilities such as copper, cable, fiber, satellite, radio, microwave, etc.. for the purpose of providing services to end systems/users

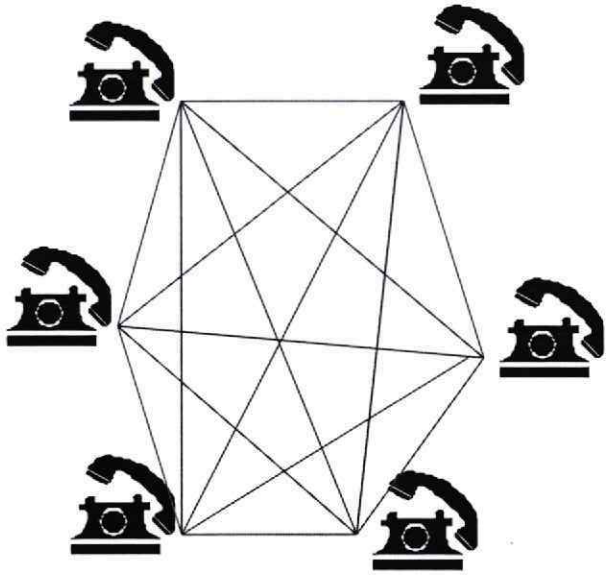
- So why the question mark?? Non traditional end systems (Laptops, Cell Phones, Tablets, gaming Consoles, Sensor devices, Toasters, Refrigerators, etc...) are being connected to the internet

- Point-to-point communication is not practical!
  - Devices are too far apart
  - Large set of devices would need impractical number of connections. See illustration next chart

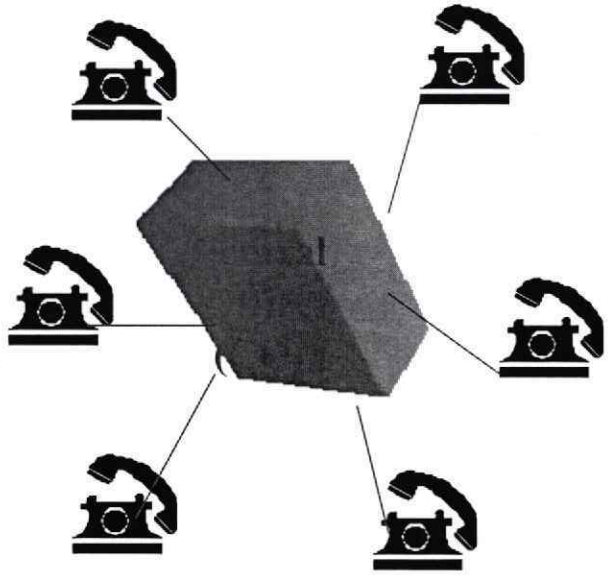
Generic Computer Network



Example: Telephone Network



Fully-Connected Mesh
# of FDX links = N(N-1)/2
e.g., N=6; 6(5)/2=15 links
Total # ports = N(N-1)
e.g., N=6; 6(5)=30 ports



With Central Office
# of FDX links = N
e.g., N=6; 6 links
Total # of ports = N
e.g. N=6, 6 ports

Clients, Servers and Peers

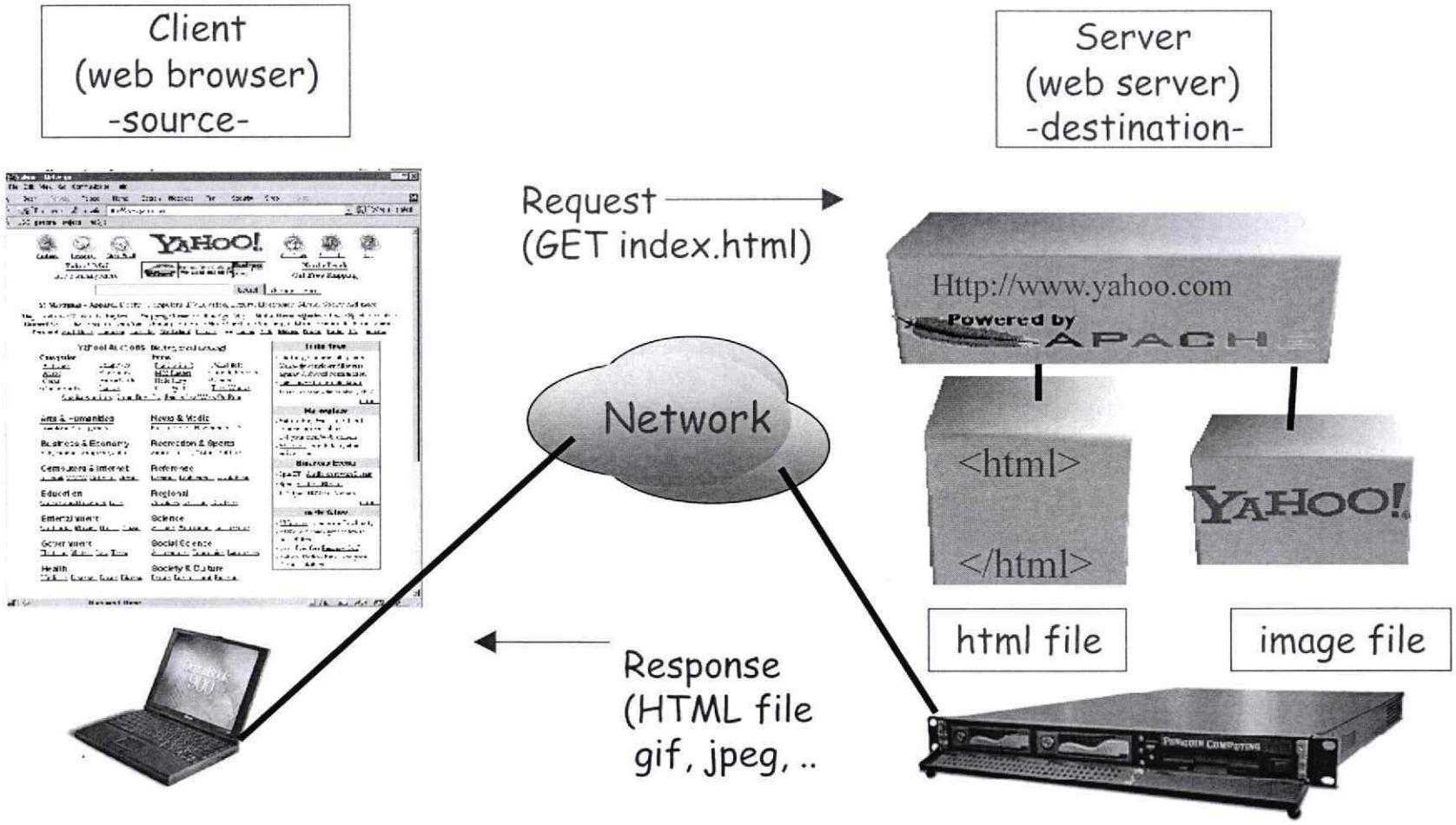
- A network computer can either provide service or request service
- A *server* is a service provider, providing access to network resources
- A *Client* is a service requester
- A *Peer-to-Peer* network does not have a dedicated server. All computers are equal and they both provide and request services.

Server Roles

- Servers can assume several roles and a single server could also have several roles
- Examples of Servers include:
  - File Servers: Manages user access to shared files
  - Print Servers: Manages user access to print resources
  - Application Servers: Similar to FS with some processing
  - Mail Servers: Manages electronic messages between users
  - Communications (Remote Access) Servers: Manages data flow and e-messages from one network to another RAS
  - Web Servers: Runs WWW and FTP servers for access via the Internet/Intranet
  - Directory (DNS) Servers: Locates information about networks such as domains.

Client/Server Model

Example: World Wide Web



Peer-to-Peer Model

- Peer-to-Peer
  - Each host has both client and server functionalities
  - CPU cycle sharing
  - Example: Gnutella, KaZaA, Skype, BitTorrent, etc...