Computer Networks and Internet

Objectives

- Computer Networks
- Internet

Computer Networks

Introducing Computer Networks

- A computer network consists of two or more computers linked together to exchange data and share resources.

Types of Computer Networks

Local area network (LAN)

- Links computers within a building (close proximity).
- Uses direct cables, radio, or infrared signals.

Wide area network (WAN)

- Links computers separated by a few miles or thousands of miles.
- Uses long-distance transmission media.

Metropolitan area network (MAN)

- Links computers within a group of buildings.
- Uses fiber-optic cables.

NEXT SLIDE

Networking Synergies in a Nutshell

Reduced hardware costs

- Users share equipment

Connected people

- People can work together without being at the same location
- Groupware enables sharing of schedules and communications

Shared applications

- Users share software
- File server enables all users to work with the same application program

Building information resources

- Users create common pools of data that can be accessed by employees

Network Fundamentals

- Physical media used in networks:
  - **Cables**– Telephone lines, coaxial cable, microwave, satellites, wireless, and fiber optic cables connect computers.
  - **Routers**– Devices that examine the data transmitted and send it to its destination.
  - **Switches**– High speed electronic switches maintain connections between computers.
- **Protocols**– Standards that specify how network components communicate with each other.

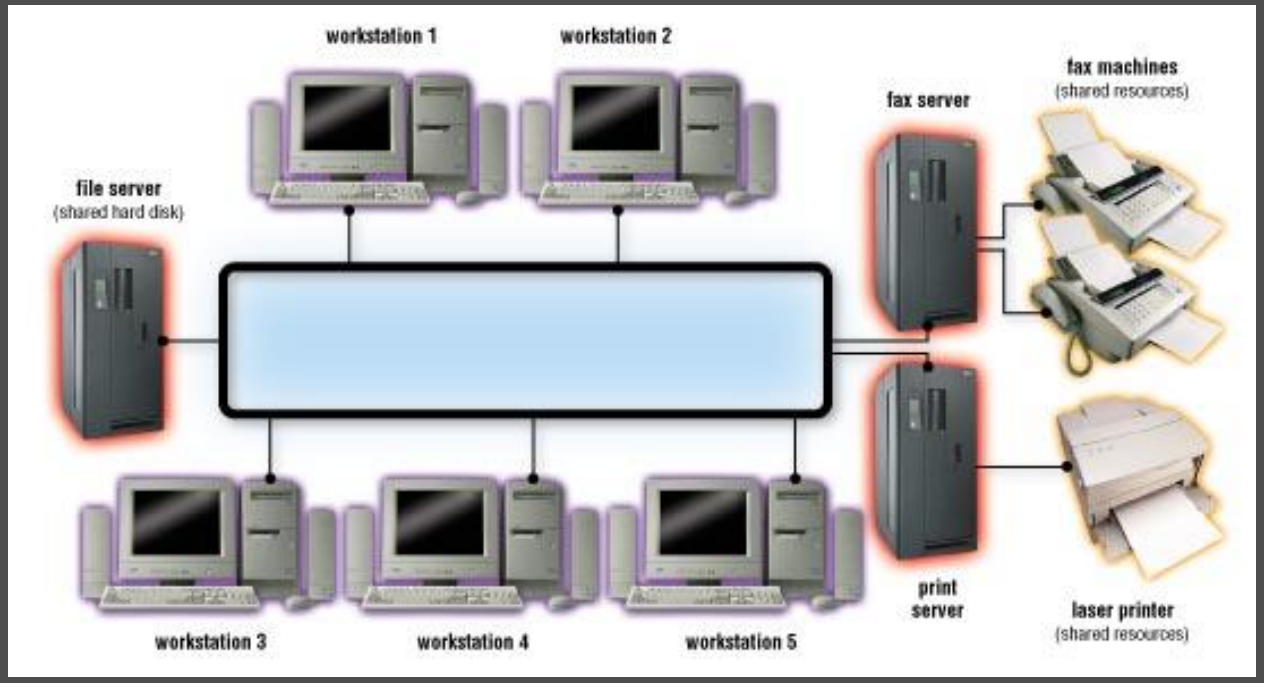
Local Area Networks (LANs)

- LANs connect computers and peripherals within a building.
- Users can access software, data, and peripherals.
- LANs require special hardware and software.
- Computers connected to a LAN are called workstations or nodes.
- Different types of LANs:
  - Peer-to-peer
  - Client-server

Peer-to-Peer Networks

- All computers on the network are treated as equal.
- There are no file servers.
- Users decide which files and peripherals to share.
- They aren’t suited for networks with many computers.
- They are easy to set up. Example: Home networks

Client-Server Networks



- Typical corporate networks are client-server.
- They use various topologies or physical layouts.
- The network requires file servers, networked computers (clients), and a network operating system (NOS).
- Clients send requests to servers for programs and data, and to access peripherals.

Network Media

LANs use a variety of media to carry network signals.

- Twisted pair–Two insulated wires twisted around each other. The same type of wire as that used for telephones.
- Coaxial cable– Consists of an insulated center wire surrounded by a layer of braided wire. The same type of wire as that used for cable TV.
- Fiber-optic cable– A type of fiber glass cable that transmits data in the form of light impulses. It can carry more data for longer distances than other wire.
- Infrared– A wireless system that includes a transmitter and receiver for sending and receiving signals.
- Radio– A wireless system that uses radio signals to send and receive data.

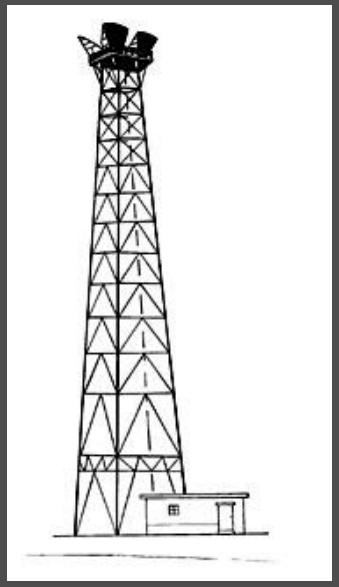
Types of Telephone Transmission Media

Twisted Pair Copper Wire

Fiber Optics

Satellites

Microwave



Wide Area Networks (WANs)

- **WANs are similar to long-distance telephone systems.**
- **They have a local access number called a point of presence (POP).**

Point of Presence (POP)

- A point of presence is a WAN network connection point that enables customers to access the WAN by making a local telephone call.
- Media used to create a connection from an organization to a POP include:
  - 56 Kbps leased line
  - ISDN
  - ADSL
  - T1 line
  - Permanent virtual circuit (PVC)

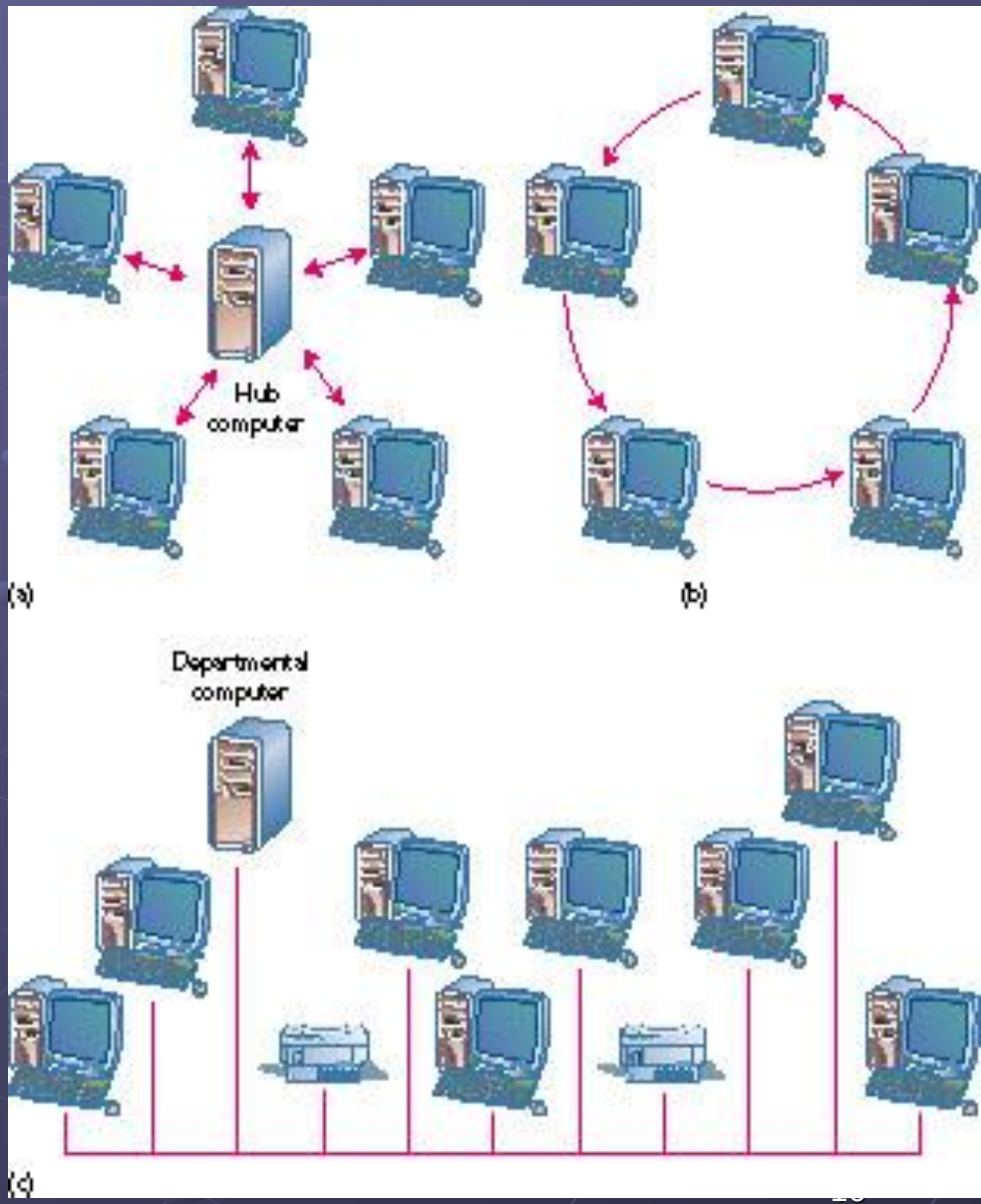
Bandwidth

Transmission Media	Bandwidth
PSTN Twisted pair	56 Kbps
ISDN	128 Kbps
TV Cable	1 to 10 Mbps

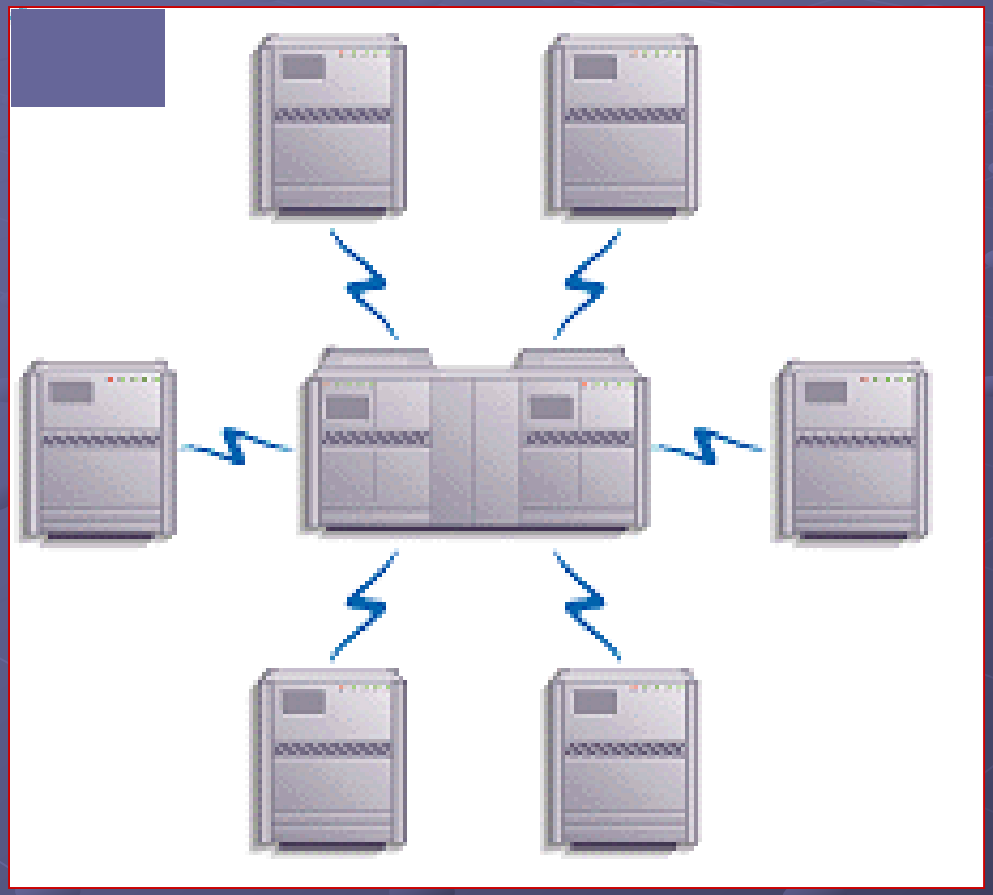
- **Bandwidth** refers to the data transfer capacity of a transmission medium.
- It is measured in kilobits per second (Kbps), megabits per second (Mbps), or gigabits per second (Gbps).

Network Topology

- The physical layout of a network
- Node - each computer, printer, or server on network
- Three common topologies
  - Star
  - Ring
  - Bus

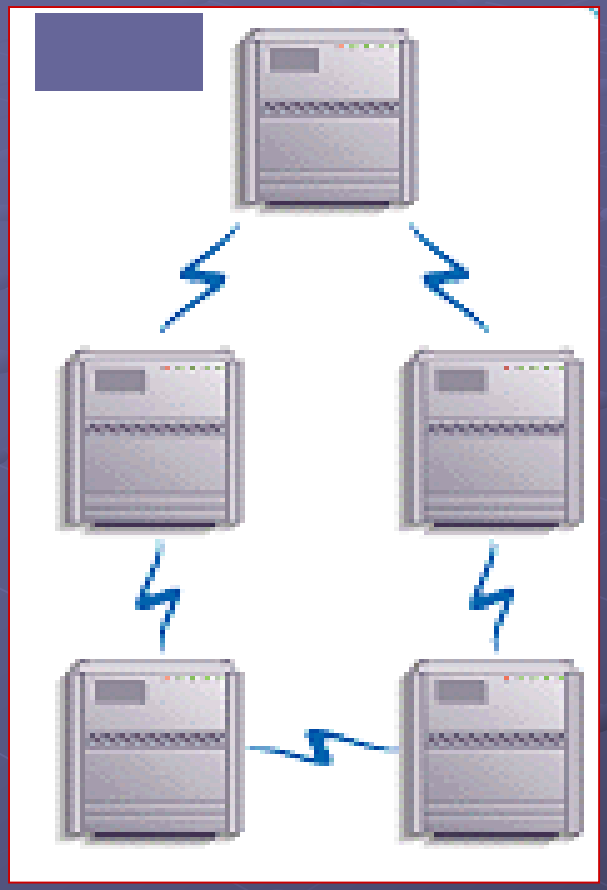


Network Topology - Star



- Uses Category 5 cable (cat 6 is used
- Cat 5 cable uses an RJ-45 connector for the NIC card
- Easy to install/not that expensive
- Computers are concentrated into a star pattern using hubs or switches
- Hubs broadcast data to all devices
- Switches can be used instead of hubs
- If there is a break in the cable it does not disturb the other computers

Network Topology - Ring



- Uses different hardware
- More expensive
- Complex to install
- Data is passed around the ring until it reaches its destination
- Best at passing data with less collisions

Network Topology - Bus

- - Least expensive/easiest to setup
- - Uses coax cable
- - Computers are daisy chained together in a linear bus
- - Data packets are sent along the coax cables
- - All computers hear data sent out