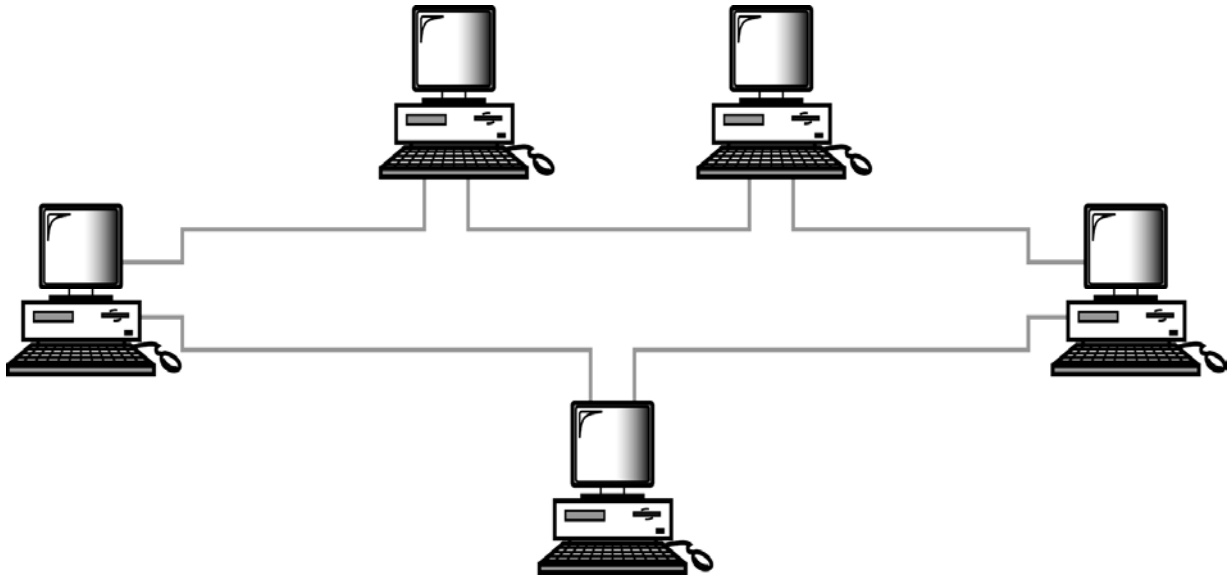


LECTURE #6

Ring Topology

Ring Topology Diagram



- Each device has point-to-point dedicated link with only two devices on either side
- A signal is passed in the ring in one direction from device to device until it reaches its destination
- Each device has a repeater incorporated
- When a device receives a signal destined for another device, it regenerates the bits and pass them along

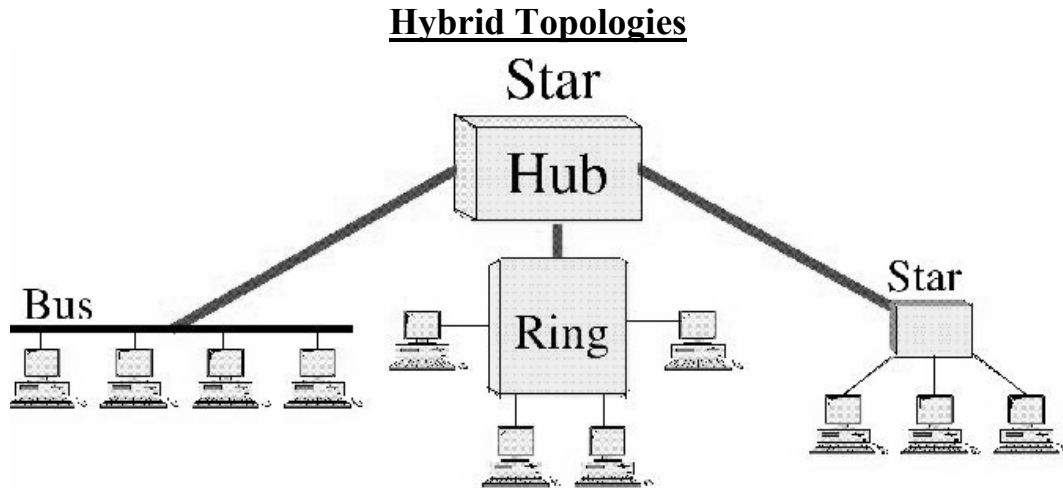
❖ Advantages of Ring Topology

- Easy to Install and Reconfigure
 - ✓ Only two connections to be moved to add or delete a device
- SIMPLE Fault Isolation
 - ✓ Generally a signal is circulating at all times in a ring.
 - ✓ If one device does not receive a signal within a specified period, it can issue an alarm to tell network operator about the problem and its location

❖ Disadvantages of Ring Topology

- Unidirectional Traffic
 - ✓ A break in a ring I.e. a disabled station can disable the entire network
- Can be solved by using:
 - ✓ Dual Ring or
 - ✓ A switch capable of closing off the Break

❖ Hybrid Topologies

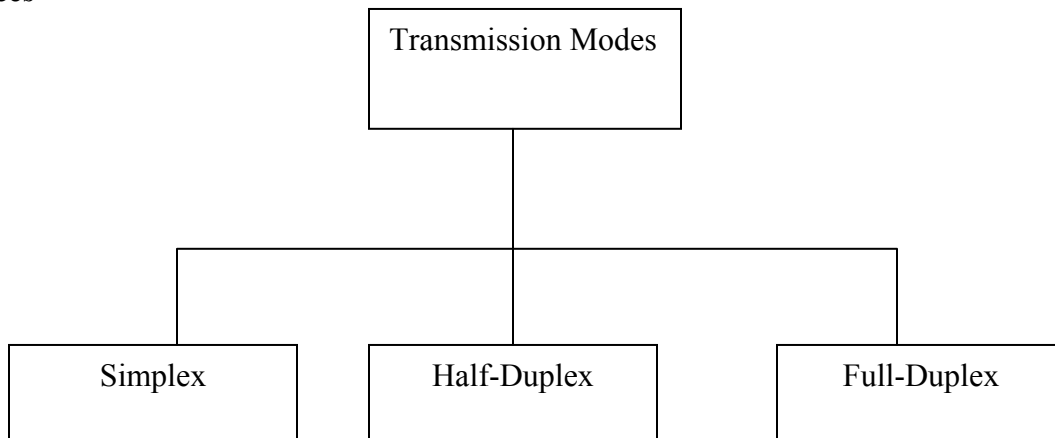


- Several topologies combined in a larger topology
 - ✓ Example: One department of a business may have decided to use a Bus while other has a Ring
- The two can be connected via a Central Controller in Star Topology

TRANSMISSION MODE

“Transmission Mode is used to define the direction of the signal flow between the linked

devices”



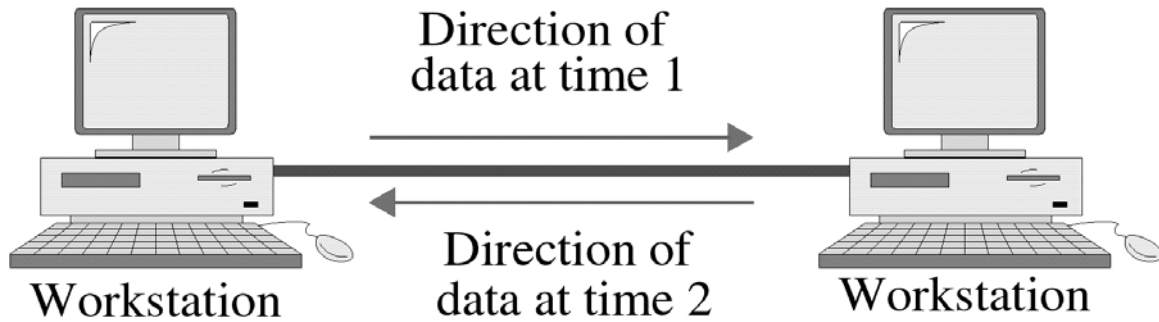
❖ **SIMPLEX MODE**



- Communication is Unidirectional
- Only one of the two stations can transmit
- Other can only receive

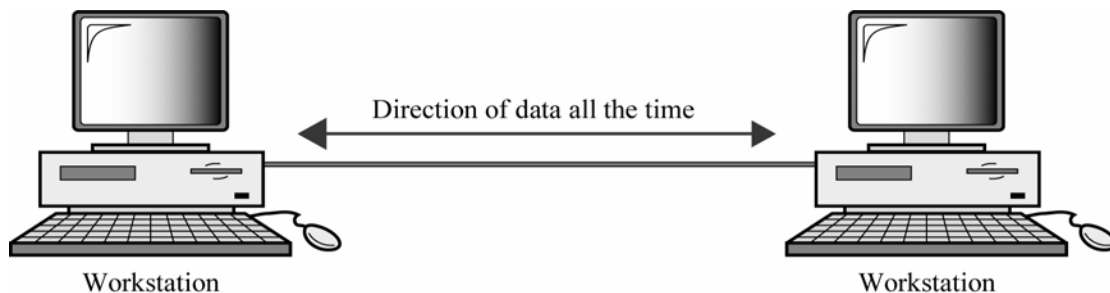
✓ Examples: KEYBOARDS (Only Input), Monitors (Only Output)

❖ **Half – Duplex Mode**



- Each station can both transmit and receive but not at the same time
- When one device is sending the other can only receive and vice versa
- Lets understand the concept by using an example
 - ✓ One Lane Road with two directional traffic
 - ✓ When cars are traveling in one direction, cars going the other way must wait
- Full Channel capacity is allocated to whatever entity that is transmitting at a specific time
 - ✓ Walkie Talkies

❖ Full Duplex (Duplex)



- Both stations can transmit and receive simultaneously
- Two way street with traffic flowing in both directions at the same time
- Signals traveling in either direction share the capacity of the link
- The sharing can take place in two ways:
 - Either the link must contain two physically separate transmission paths:
 - ✓ One for sending and
 - ✓ One for receiving
- Capacity of the channel is divided between signals traveling in opposite directions

✓ EXAMPLE

–Telephone Network

When two people are communicating via a telephone line, both can talk and listen at the same time

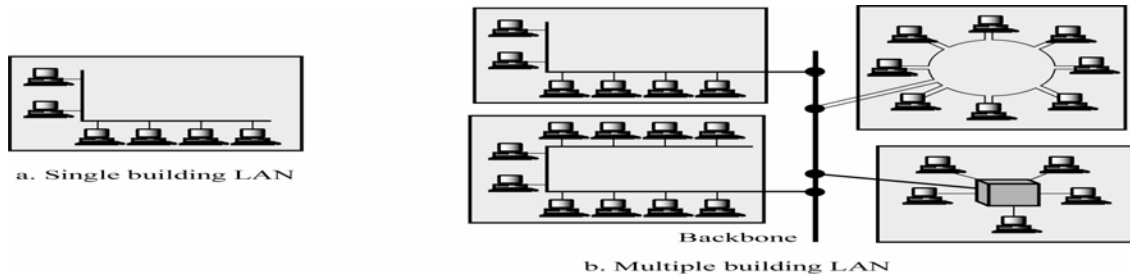
Categories of Networks

- There are three main categories of Networks:

- LANS
- WANS
- MANS

- Into which category a network falls is determined by its **SIZE, OWNERSHIP, DISTANCE IT COVERS**, and its **PHYSICAL ARCHITECTURE**

❖ LANS



- A LAN is usually Privately owned and Links the devices in a single office, Building or a campus

- **Two Implications**

- Care must be taken in choice of a LAN, because there may be a substantial capital investment for purchase and maintenance.
- Secondly, the network management responsibility falls solely on the user/company

- **Size of a LAN**

- Size of a LAN depends upon the Needs of Organization and the Type of Technology
- LAN can be as simple as two PCs and a printer in someone's home office or it can extend throughout a company and include complex equipment too
- Currently LAN size is limited to a few kilometers

- **Design of a LAN**

- LANs are designed to allow resources to be shared between personal computers or workstations
- The resources to be shared can include hardware (printer) , software(an application program) or data.

- ✓ Example of a LAN

A common example of a LAN found in many business environments links a work group of task related computers, for example engineering workstations or Accounting PCs. One of the PCs may be given a large capacity disk and becomes a server to others. Software stored on the server and is used by the whole group. In this case size is determined by software licenses

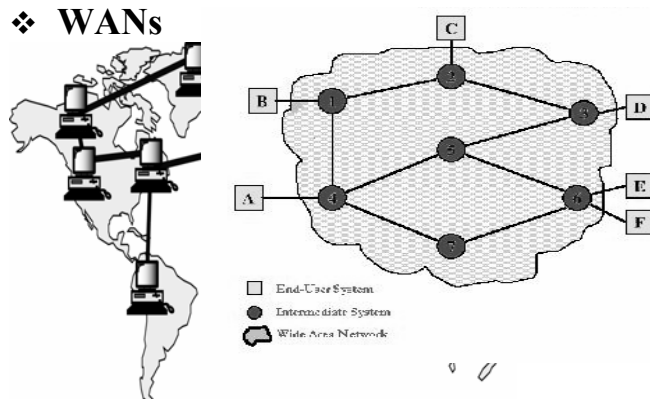
- **Transmission Media & Topology**

- ✓ In addition to size, LANs are distinguished from other types of networks by Transmission media and topology
- ✓ In general a given LAN will use only one type of Transmission medium
- ✓ The most common LAN topology Bus, Star Ring

- **Data Rates in a LAN**

- ✓ Traditionally 4 – 16 Mbps
- ✓ Speeds increased and now 100Mbps and above are also possible
- ✓ Giga Bit LAN technologies

- ❖ **WANs**



- Generally cover a large geographical area and it usually span an Unlimited number of miles by utilizing Public or Leased networks instead of having their own hardware as in the case of LANs

- **Design of a WAN**

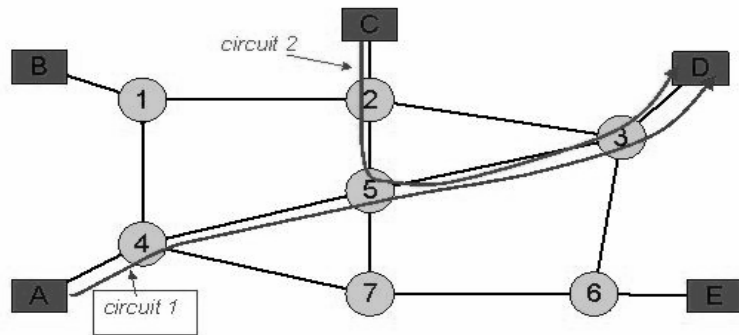
- ✓ Typically , it consists of a large number of Switching Nodes
- ✓ Transmission from any one device is routed through these internal nodes to the specified destination device
- ✓ These nodes are not concerned with the content of the data, rather their purpose is to provide a switching facility that will move the data from node to node until it reaches its destination

- How to Implement a WAN?

- ✓ Traditionally WAN s have been implemented using one of the 2 technologies:
 - Circuit Switching
 - Packet Switching

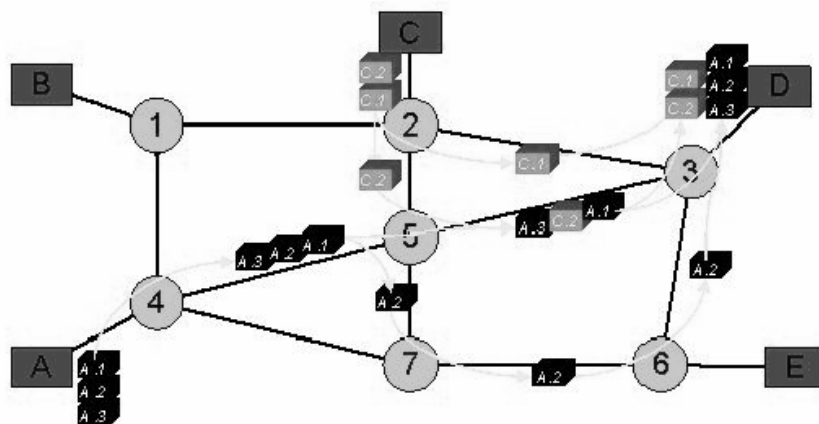
- Frame Relay and ATM Networks play important role nowadays too

❖ Circuit Switching



- A dedicated communication path is established between two stations through the nodes of the network
 - This path/CAPACITY stays up for the duration of the communication
- Example is **Telephone Network**

❖ Packet Switching



- No capacity is dedicated along a path through the network
- Data Is sent out in small chunks called “**Packets**”
- Each path is passed from node to node

- At each node, entire packet is received, stored briefly and then transmitted to the next node.

✓ Example is : **Computer to Computer Communication**

Frame Relay & ATM

- Overhead bits for Error Protection are removed
- 10's of 100's of Mbps and also Gbps is possible

Summary

- ◆ The OSI Model
- ◆ Layered Architecture
- ◆ Encapsulation and Decapsulation
- ◆ Physical Layer
- ◆ Data Link Layer

Reading Sections

- ◆ Section 2.4,2.5, “Data Communications and Networking” 2nd Edition by Behrouz A. Forouzan
- ◆ Sections 1.3, “Data and Computer Communication” 6th Edition by William Stallings