

# Computer Network and Internet

Network : It is a group of computer systems which are connected through communication channels/wires. It is helpful in ① communication ② resource sharing.

Networks are used to :

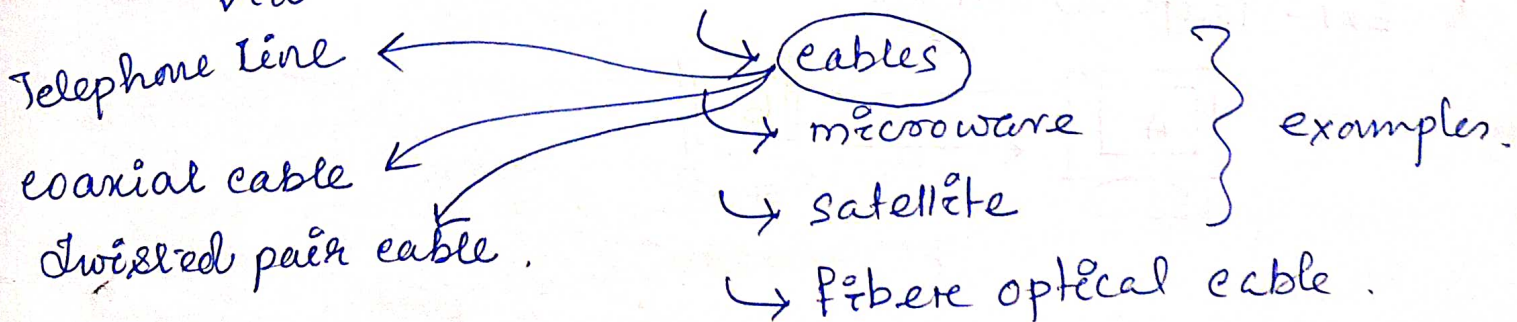
- support communication via email, video conferencing, instant messaging etc.
- Enable multiple users to share single hardware device like printer etc.
- Allows sharing softwares.
- Easier access of information.

There are many types of Networks :

- ① Local area Network (LAN)
- ② Personal area Network (PAN)
- ③ Home area Network (HAN)
- ④ wide area Network (WAN)
- ⑤ Metropolitan area Network (MAN) etc.

## Connecting Media :

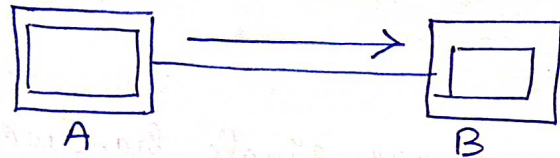
- Data is transmitted from one computer to another via different media / communication channel.



## Mode of Data Transmission :

- It means the direction of the flow of information between two communicating devices.
- There are 3 modes of data transmission
  - Simplex
  - Half duplex
  - Full duplex

Simplex : Communication can take place in one direction only.



→ Unidirectional communication

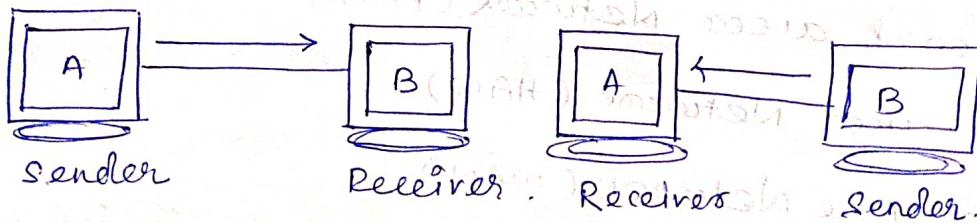
→ Ex1 - TV broadcasting.

Half duplex : Data transmission can be in both directions, but only one direction at a time.

- Both the connected devices can send and receive data, but not at the same time.

- Data transmission is in only one direction at a time.

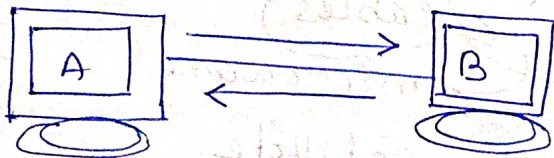
Ex1 - Walkie-talkie.



Full duplex : Data can be transmitted simultaneously in both directions on the communication path.

- Both the connected devices can send and receive data simultaneously in both direction.

Ex1 - Telephone network



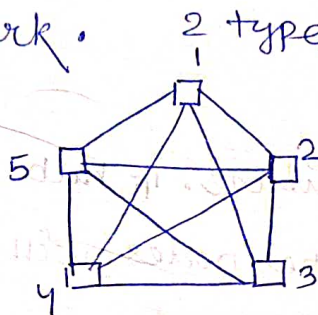
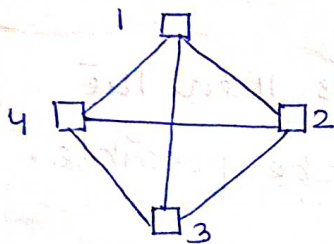
# Network Topology

## Chapter-3

- It is arrangement of the devices or nodes in the network physically or logically.
- Types : ① Mesh topology ③ Ring topology ⑥ Hybrid  
② Star topology ④ Bus topology ⑤ Tree topology

Mesh : -

- Each node is connected with every other node in the network.



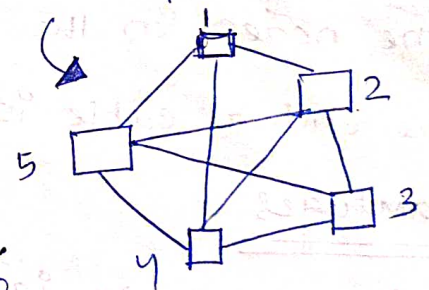
2 types

Full mesh

Partial mesh

• Some nodes are fully connected and some other nodes are only connected to one or two node in n/w.

• less expensive.



Full Mesh topology  
• every node is connected to every other node in the network.  
• It is very expensive.

### Advantages

- More robust and strong network, because, as there are more no. of cables.
- Due to more no. of links or cables, this network is more reliable (less failure occurs)

### Disadvantages

- Very expensive.
- very costly and ~~expens~~ complicated to set up mesh network.

$$n \rightarrow \text{nodes} \\ \text{Cables} = \frac{n(n-1)}{2}$$

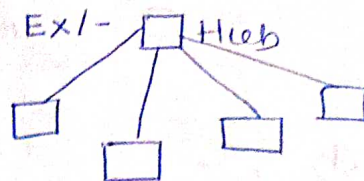
$$n = 5 \\ \text{Cables} = \frac{5 \times 4}{2} = 10$$

Star :-

- The nodes are connected to a central computer which is called as Hub.
- The nodes communicate with each other via Hub.

Advantages

- less no. of cables / connections are required.



Disadvantages

- Prone to single point failure. If Hub fails, then the communication among the nodes will not be possible.

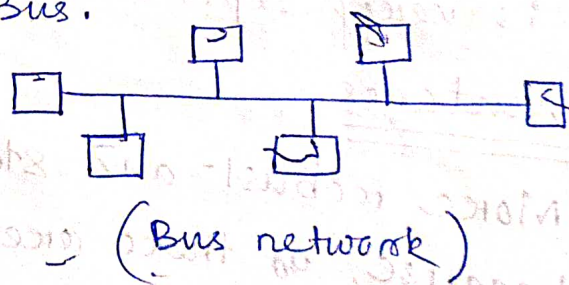
Bus :-

- There is a central cable / main wire that connects all the nodes in the network. It is the backbone of the n/w.
- The central cable is known as Bus.

Advantages

- only one cable is required.

Ex/-



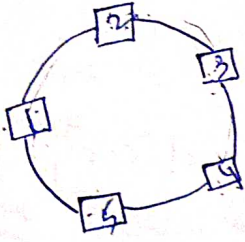
- Very simple network.

- less expensive.

Disadvantages

- If the bus fails then the total network will fail. It will also face single point-failure.

Ring :- All the nodes are connected in a closed loop. One node is connected to only its two neighbour nodes.



Advantages :-

- less no. of connections are required.
- simple network.
- less costly.

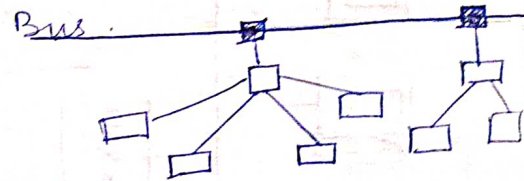
Disadvantage ~~less~~

→

Tree :- It is a hybrid topology.

- It combines the characteristics of Bus topology and star topology.

- A group of star networks are connected to a linear bus.



## Types of Network

Depending on the coverage area computer networks are categorized into 3 types :

(1) LAN (2) MAN (3) WAN

(1) LAN :

- Local Area Network.

- The computers are interconnected in a single room, building or buildings in one site.

- It is a privately owned network with in a single building or campus, with in few kilometers.

- The connected PCs can share files, applications, h/w resources among themselves.

2 types : ① Server based LANs

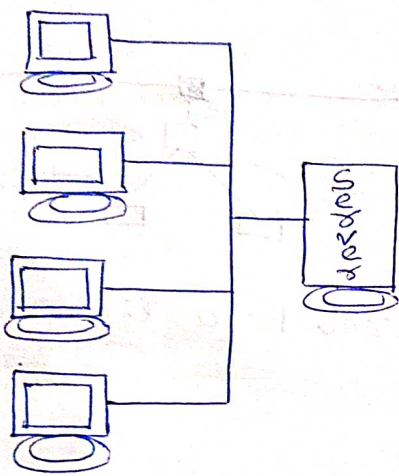
② Peer-to-peer LANs

Server based LANs : There is a separate computer which ~~acts~~ is known as server.

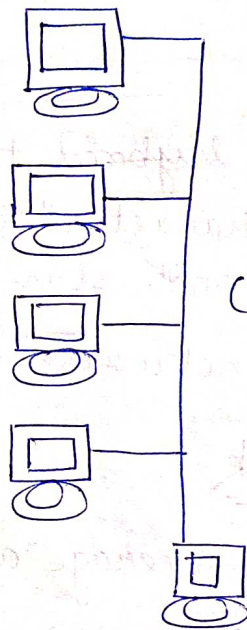
→ It takes requests from clients (other connected computers) and processes the requests.

Peer-to-peer LANs : There is no server.

→ All the computers in the network act as resource provider and user.



(Server based LANs)



(Peer to Peer LANs)

(2) MAN :

- Metropolitan Area Network.
- Its size is between LAN and WAN.
- MAN covers an area 5 to 50 km.
- It covers the area within a city.
- MAN is a network that interconnects the users with computer resources in a geographic area larger than area covered by LAN and smaller than area covered by WAN.
- Interconnection of computers within a city.

## WAN :

- Wide Area Network.
- Its coverage area is a large geographic area such as state, country.
- It connects multiple smaller networks such as LAN / MAN
- World's most popular WAN is internet.
- For communication WAN uses high speed telephoner lines or wireless technology <sup>such</sup> as satellites.

### LAN

Local Area Network  
will in a small area, a building or campus.  
Easy installation

### MAN

- Metropolitan Area Network
- Located within in a city.

- Easy

### WAN

- Wide Area Network.
- World wide coverage

# Networking Devices

## (1) Hub :

- It is used to connect different segments of a LAN.
- It contains multiple no. of ports.
- When a packet of data arrives at one port, it is copied to other ports so that other segments of LAN can see those packets.
- Hubs handles the data known as frames.
- When Hub passes a frame to every node of its port, it is called broadcasting.
- It creates more traffic on network.

## (2) Repeater :

- It is a network device that regenerate or replicate a signal which are distorted by transmission loss.
- Analog repeaters frequently amplify the signal.
- Digital repeater reconstruct a signal near to the original quality.
- A repeater can relay messages between subnetworks that use different protocol or cable.

## (3) Switch :

- It is a networking device that is used to connect devices together on a computer network by performing packet-switching.
- It is more advanced than hubs.
- Switch will only send a message to that device that needs it instead of broadcasting it.

#### (4) Bridge :

- It provides interconnection with other bridge networks that use same protocol.
- It connects two different networks together.
- It broadcasts data to every node.

#### (5) Router :

- It is a device that forwards data packets along networks.
- A router is connected to at least two networks.
- Routers are located at gateways, the place where two networks connect.
- Routers use headers and forwarding table (or routing tables) to decide the best path for transmission of data packet.
- It finds out the most suitable path between any two nodes.

#### (6) Gateway :

- It is the node on the network that acts as an entrance or entry point to another network.
- It is the computer that routes the traffic from one node to the outside network.
- Gateway is like the ISP that ~~acts as a~~ connects the user with the internet.
- Gateway is associated with router and switch.

#### (7) NIC :

- Network Interface Card.
- It is the computer hardware component that allows a computer to connect to a network.
- NIC is also known as Network Interface Controller, Network Interface Controller Card, expansion card, network card or LAN card.

## Internet Services

- (i) e-mail :- It is the most popular and useful feature of internet.
- It allows us to exchange text messages and computer files with any one with e-mail address.
  - It is cheap.
  - It is quick.
  - It can be delivered to a number of people around the world.
  - The delivery of messages is almost instantaneous.
  - Multiple copies of the same message can be sent to a group of people at the same time.
  - Pictures, documents and other files can also be attached to the message.
  - The message can be printable.

## Disadvantage

- Slight error in the mail-address prevent delivery of the message.
- Security is a concern in email system.
- E-mail system depends on the electricity and telephone system.

## Internet Conferencing / Online Conference

- It works by using web-based software.
- It allows participants to create a face-face meeting.
- Every participant must have the software.
- The participant has to log in first.
- There will be one presenter and a group of participants who are viewing the presenter's desktop screen.
- It has the voice conferencing, chatting, instant-messaging.

and video conferencing feature.

→ It provides a central meeting place.

→ There is no travelling expense, cost of renting a building etc.

→ Internet conferencing is cheap in comparison with traditional meetings.

E-newspapers :- Electronic newspaper.

→ It is the online version of a printed periodical.

→ It is like hard-copy newspaper.

→ It has same legal boundaries, privacy and copyright.

Online shopping :- e-shopping.

→ It is the form of electronic commerce which allows consumers to directly buy goods or services from a seller over internet using a web browser.

→ It is also called as e-shop, e-store etc.

→ In this case products or services can be sold and purchased through internet.

→ The largest selling online shopping websites are amazon.in, snapdeal, flipkart, ebay, myntra etc.

Different types of Internet Connectivity

- Dial up Modem

- Wireless Modem

- DSL

- Cable Modem

- Ethernet LAN

- ISDN

- Leased Line