COMPUTER NETWORKING:

- A network can be defined as an interconnected collection of autonomous computers.(Autonomous means that no computer in the network can start stop or control another)
- When two or more than two computers are connected with each other in such a way that they are capable of sharing data,software and hardware devices or peripherals such as printer,scanner then they are said to be a network.

APPLICATIONS OF NETWORK:

1. **Sharing of information**:
   In a network the user can share information data and software easily with other users.

2. **Sharing of peripheral:**
   The computers in a network can share common peripheral e.g:one high speed common printer can be used for all computers.

3. **Communication:**
   In a network communication between different users or computers is possible.by which we can send messages document,data,files,graphics,videos images or an e-mail to different users over n/w.

NETWORK DEVICES:

HUB:

- Hub is a central controller that controls the traffic on the network.A hub has sockets or ports.
- Hub commonly have 4,8,18,24 ports.
- Usually each port has an indicator light called LED.It lights up when a computer attached to a port and turn on.

The following properties of Hub:

- It amplify signals.
- It propagates signals through the network.
- It doesnot required filtering.
- It is used to N/W concentration point.

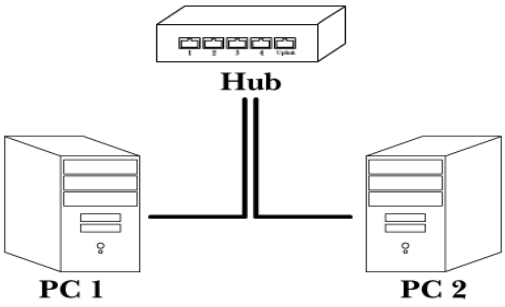
It is of two types:

Active Hub:

An active hub works as a repeater which is a hardware device that regenerates the data received in bit patterns.

Passive Hub:

A passive hub is a simple H/W device which provides a simple physical connection between the attached device.



SWITCH:

- Switch is a N/W device that selects a path or circuit for sending a data unit to its destination.
- It is required in large internetworks where there can be many possible ways of transmission a message from a sender to its destination.
- The purpose of switch is to select the best possible path.
- A switch connect different nodes together like a Hub
- It is more costlier than Hub.

FUNCTIONS:

- Get data packets from a computer connected to a port.
- Read the destination address of the data packet.
- Send the data packet in the port of destination computer.

BRIDGE:

- Bridge are devices that can transmit data between two heterogeneous LAN.
- Bridge divide larger network into smaller segment.
- A bridge is used in big network,when the size of the network increases,the efficiency of the network decreases.
- The bridge is used to break a larger network.

PROPERTIES:

- They are more intelligent than HUB.
- They collect and pass packets between the network segment.
- They control broadcast to network.

ROUTER:

- Router is a computer networking device that forward a data across network towards their destination through a process is known as routing.
- It contains the s/w and can take a decision to choose best path for data transmission.

- It is basically used for inter naetworking.
- Routers use logically and physically addressing to connect two or more logically separate N/W.
- It is also checks for the N/W address of the data packets.

REPEATER:

- Repeater is a H/W device which is operated on the physical layer.
- It receives a weak or low level signals and retransmit.
- Repeaters install on a link receives the signal before it becomes weak or corrupted.
- They are used to interconnected n/w segments in LAN.
- Repeaters are used to extend the length of the cables that connect computer devices together on a network.
- It allows the connection of segments,
- Functions at the physical layer of the OSI model.

GATEWAY:

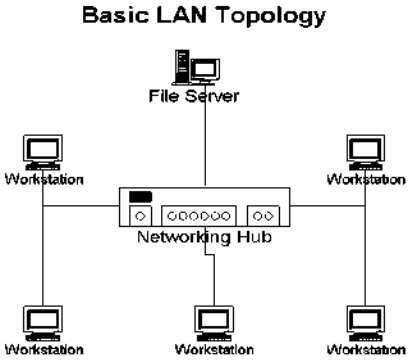
- A gateway is a generally s/w installation within a router.
- It operates in all 7 layers of the OSI.
- It must adjust the data rate size and format as well as gateway is used for connecting two dissimilar N/W.It means a gateway can accepts and transfer datapackets between two different N/W.
- It is also known as protocol converter in which it merge two O/S at a time.

TYPES OF NETWORK:

LAN: (local area network)

- A LAN is a data communication network which is used to connect many computers into a local area like within a building office etc.

- The LAN is privately owned and covers the area upto 25km.
- Area coverage is less.
- Data transmission varies from 1mbps to 100mbps.
- Cost of installation of LAN is less.
- Resources to be shared may be printer,file,mass storage devices.

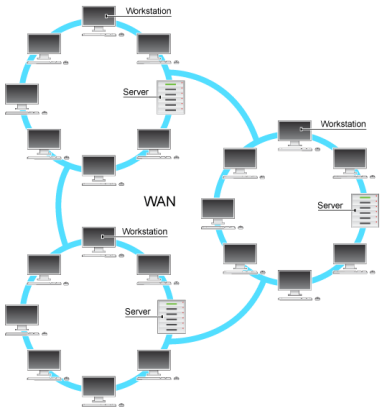


MAN: (metropolitan area network)

- It is bigger than LAN
- It may cover entire city
- MAN use optic fibre or cables as the medium for communication.
- A MAN is designed to extend over a city to form a city wide network.
- It uses high speed transfer medium like Fibre optics.

WAN:(wide area network)

- WAN is used for long distance transmission of data,voice,image and video information over a long geographical area that may covers a country.
- WAN uses public,leased or private communication devices or combination.
- A WAN can be PSTN(public switched Telephone Network.)
- It allows computers over a vast distances to connect and share data and information.



PAN: (Personal area network)

- A personal area network refers to a small network of communication capable devices within a range of rechability of an individual person.
- This range is typically upto 10 meters.
  e.g:when you connect two cell phones through Bluetooth.

TOPOLOGY:

- Topology is the way in which a network is connected together.
- The physical structure of the network is also called topology.
- Topologies are used to determine the complexity of interconnection.

STAR TOPOLOGY:

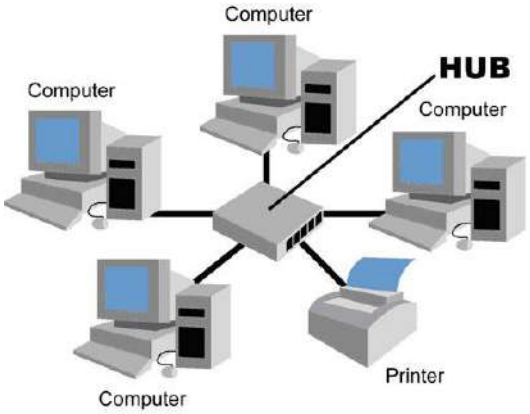
In star topology there is a direct and dedicated connection of every node of the network with the central node or server.The server is directly connected with each and everynode in the n/w through hub.

ADVANTAGES:

- Now device can be easily added without transmission delay.
- If any device gets fail,it doesnot affect to the remaining portion of network.
- High speed data transmission.
- Easy fault identification.
- It is less expensive.

DISADVANTAGES:

- If the central computer or hub fails then the whole n/w gets fail.
- More cables needed for connecting all computers.



RING TOPOLOGY:

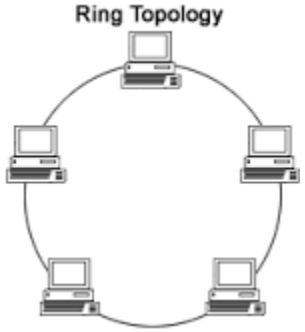
In ring or circular topology the nodes are connected in a circular way.In such arrangement each node is connected to exactly with its two neighbouring nodes.

ADVANTAGES:

- It works better as there is no central computer.It is like a distributed system.
- It is moere reliable because if one link fails for communication then another link may be used for routing.
- It is easy to configure.

DISADVANTAGES:

- Failure of one node in the ring can affect the whole n/w.
- It uses complicated s/w for controlling nodes in n/w.
- It is unidirectional then the data can be transmitted only in one direction.



BUS TOPOLOGY:

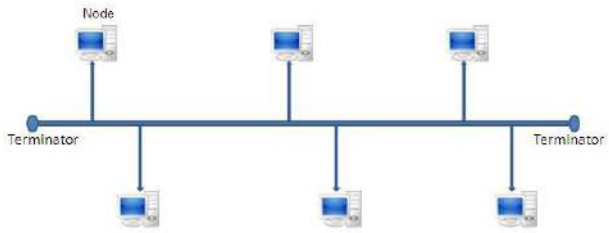
Bus topology is also referred as linear topology,all nodes in the network are connected by a single length of transmission medium which is normally a coaxial cable.Bus network is commonly used in cable TV network.

ADVANTAGES:

- Cost reduces due to the use of single bus linear structure.
- It is easy to maintain all nodes in the n/w.

DISADVANTAGES:

- T he part of the n/w fails due to failure of any node in the n/w.
- If the main cable goes down the entire n/w is useless.



TREE TOPOLOGY:

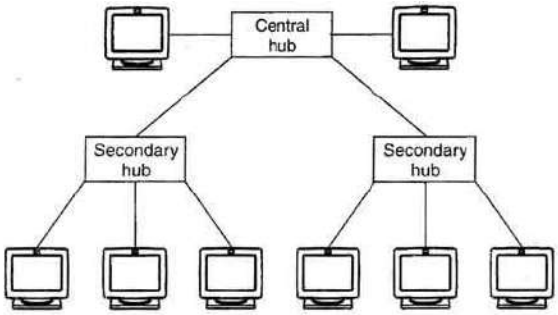
The tree topology is an extension and variation in bus topology.In tree topology nodes are connected to a central hub.which controls all the traffic in the n/w.The devices are connected to secondary hubs which in turn connected to central hub.

ADVANTAGES:

- By using the secondary hub many devices are attached
- Signals can be transverse in the form of distance.
- The maintaince of the tree is easy.
- Easily nodes can be added to the bottom of the tree.

DISADVANTAGES:

- The central computer or hub fails the whole n/w.
- More cables needed for connecting all computers to central computer.



Tree Topology

COMMUNICATION MEDIA

Communication media of a network refer to the connecting media through which different computers in a network are interconnected.

The communication media can be grouped into two categories.

- **Wired Technology or Guided Media.**
- **Wireless Technology or Unguided media**

WIRED TECHNOLOGY:

TWISTED PAIR CABLE:

- The most common form of wiring in data communication application is the twisted pair code.
- The wires come in pairs.

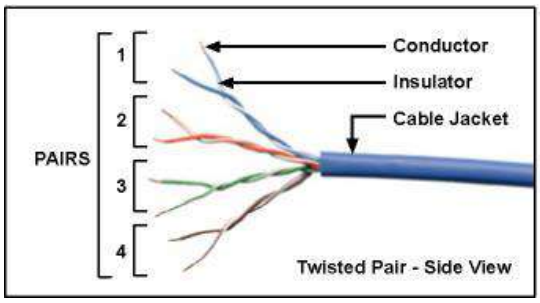
- The pairs of wires are twisted arawd each other.
- A special type of twisted pair cabel jkwn as CATS or CAT6 is mostly used in a specific type of LAN namely Ethernet cabel.

ADVANTAGES:

- It is simple
- It is easy to install and maintain
- It is physically flexible
- It has a law weighe
- It can be easily connected
- It is very inexpensive

DISADVNTAGES:

- The data transmission characteristics of twisted pair cable are not so good.
- Its law bandwidth capabilities make it unsuitable for broadband connection.
- It supports maximum data rates 1mbps without conditioning and 10mbps with conditioning.



CO-AXIAL CABLE:-

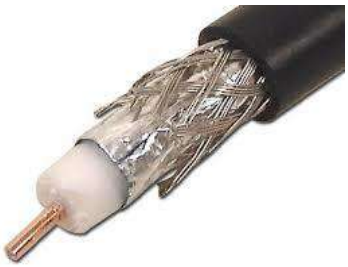
- This type of cable consists of a solid wire core surrounded by one or more foil or wire shields each separated by some kind of plastic insulator.
- The coaxial cable has high electrical properties and is suitable for high speed communication .
- It is less popular than twisted pair ,it is widely used for television signals.
- Data transmission characteristics of coaxial case are considerable better than those of twisted pair.

ADVANTAGES:

- The co-axial cables can be used as the basis for a shared cabel N/W.
- The co-axial cables can be used for broadband transmission .
- It Offer higher bandwidths up to -400mbps.

DISADVANTAGES:

- Expensive compared to twisted pair cable
- The co-axial cables are not compatible with twisted pair cables.



OPTICAL FIBERS:

- Optical fibers consist of thin strands of glass or glass like material which are so constructed that they carry light from a source at one end of the fiber to a detector at the other end.
- The light sources used are either LED or laser diodes .
- The bandwidth of the medium is potentially very high. For LED ranges between 20 and 150mbps and higher rates are possible using LDS.

It consist of three pieces:

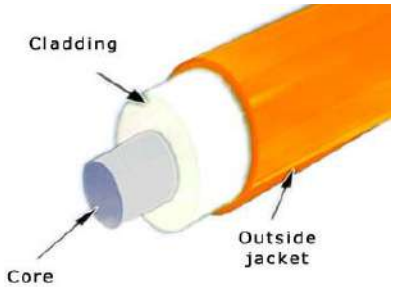
- **The core** : -i.e glass or plastic through which the light travels
- **The cladding**: -which is a covering of the core that reflects light back to the core.
- **Protective coating**:- which protects the fiber cable from hostile enviornments .

ADVANTAGES:

- It is immune to electrical and magnetic interference.
- It is highly suitable for harsh industrial enviornments .
- It guarantees secure transmission and has a very high transmission capacity .
- Fiber optic cables can be used for broadband transmission where several channels are handled in parallel e.g telescope, qraphics ,TV and sound.

DISADVANTAGES:

- Installation problem.
- Connection either two fibers together or a light source to a fiber is a difficult process .
- Light can reach the receiver out of phase .
- Connection looses are common problem .
- They are most expensive of all the cables



ETHERNET CABLE:

It is a form of twisted pair cable .There are two identical wires wrapped together and twisted around each other.

ADVANTAGES: .

- It is simple and physically flexible.
- It is inexpensive and easy to install and maintain.

DISADVANTAGES:

- Using ethernet cable, signals cannot be transported over long distance without using repeaters .
- It is not suetasle for broadband application.

WIRELESS TECHNOLOGIES:-(UNGUIDED MEDIA)

BLUETOOTH :

- It is a wireless teehnology which is used for exchanging data over short distance from fixed and mobile device
- This type of network categorized under PAN
- Bluetooth was developed by telecom vendor ericsson in 1994

ADVANTAGES:

- It allows you to stay cord free.
- You are able to exchange data across your cell phone.
- You can use Bluetooth on laptops cell phone music players headsets printers.

DISADVANTAGES:

- You are using up more battery power when you leave your bluetooth enabled on your phone all day.
- It only takes a few seconds to enable and disable .

INFRARED:

- In this type of transmission infrared light signal are used .
- Infrared signal are used in TV remotes, wireeos speaus as a mode of transmission.
- In infrared transmission, signal are transmitted though the air.

ADVANTAGES:

- Low power requiremests laptop ,telephone ,personal digital assistant.
- Low circuitry cost

DISADVANTAGES:

- Blocked by common materials,people,walls, plants.
- Line of sight .

MICROWAVE:

- In this type of transmission , signals are transmitted in the same way as the radio and television transmission .
- The requirement for microwave transmission is transmitter receiver and the atmosphere.

ADVANTAGES:

- Using microwave ,signal can be transmitted in the air without using cables.
- Using microwave communication is possible over oceans.

DISADVANTAGES:

- It is not secured mode of communication
- Microwave communication is affected by weather conditions.

RADIO LINK :

- When two terminals are connected by using radio frequencies then such type of communicate is referred as radiowave transmission or radio link .
- Any radio transmission set-up has two parts the transmitter and the receiver .

ADAVANTAGE:

- It is a cheaper means of transmission than wired communication .
- It provides mobility and manes communication easy

DISADVANTAGES:

- It is not a secured mode of transmission .

- These signal are affected by the weather conditions.

SATELLITE:

- In this type of communication data are transmitted through satellite.
- In satellite communicate the earth station transmits data towards the satellite and the satellite accepts these signals ,amplifies them and then retransmit them towards the earth.

ADVANTAGES:

- In satellite communication large area could be covened.
- This mode of transmission is very useful in multimedia transmission.

DISADVANTAGES:

- Satellite communication is very costly .
- It is not suitable for personal or low budget communication.
- There is atmospheric loss of transmitted signal.