basic concept of

COMPUTER NETWORKS & COMMUNICATIONS

NETWORK TOPOLOGY

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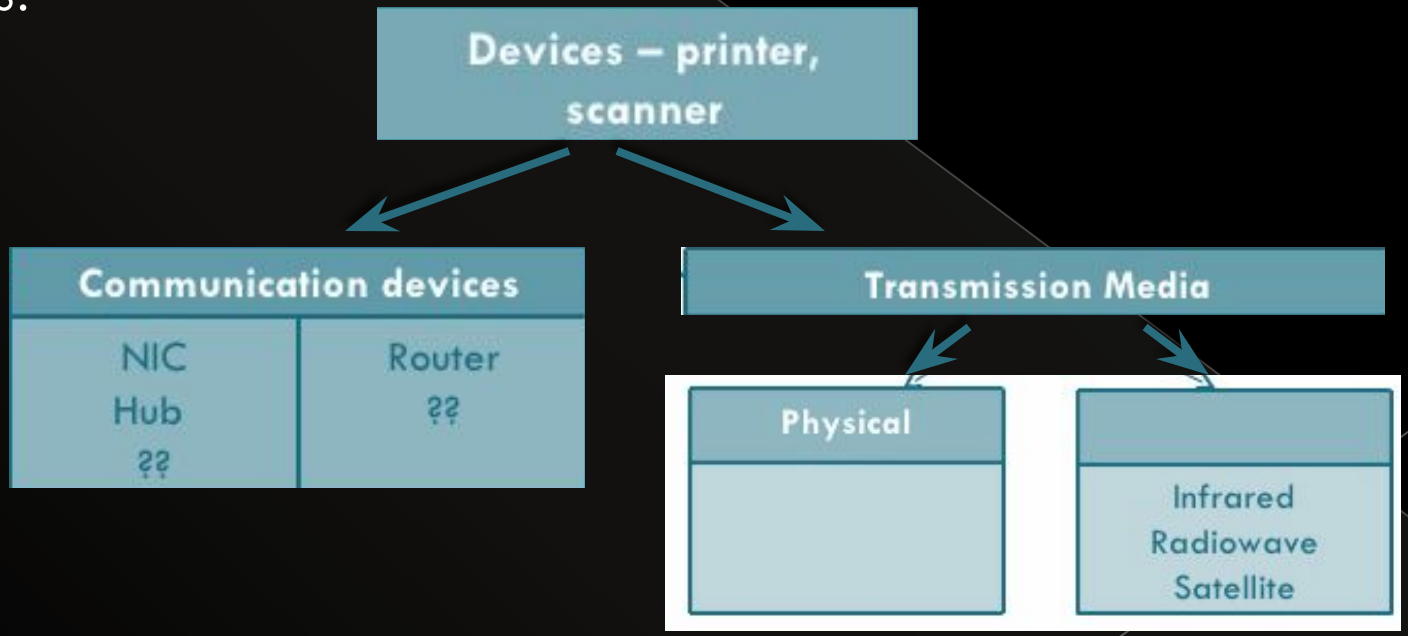
COMPUTER NETWORKS & COMMUNICATIONS

❖ DEFINATIONS ~

• *COMPUTER NETWORK :*

It is a collection of **computers** and **devices** connected together via **communication devices** and **transmission media**. For example it may connect computers, printers and scanners.

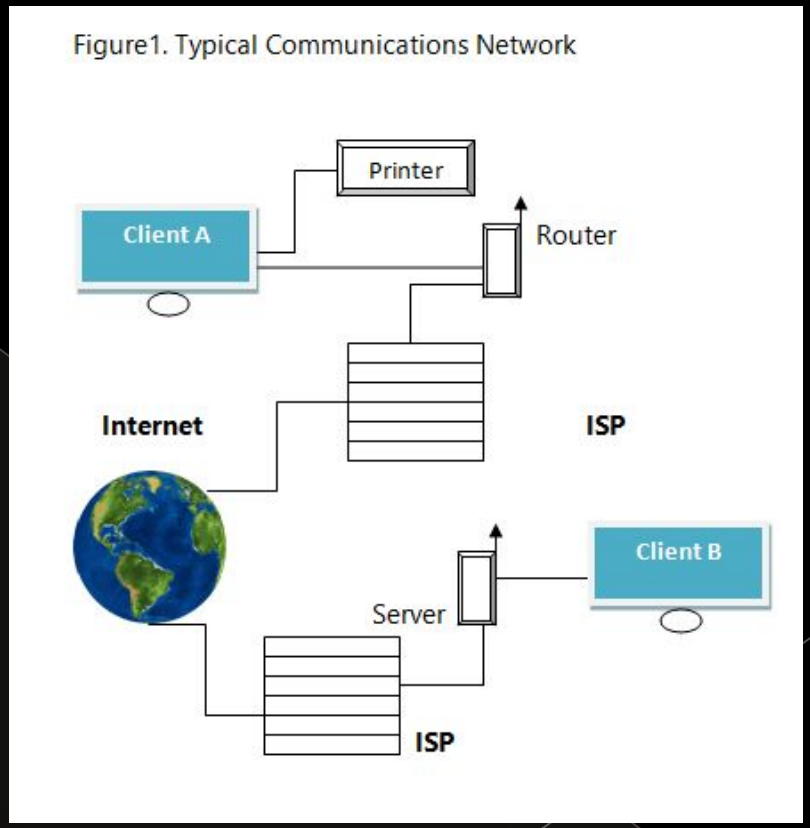


• *Communication* :

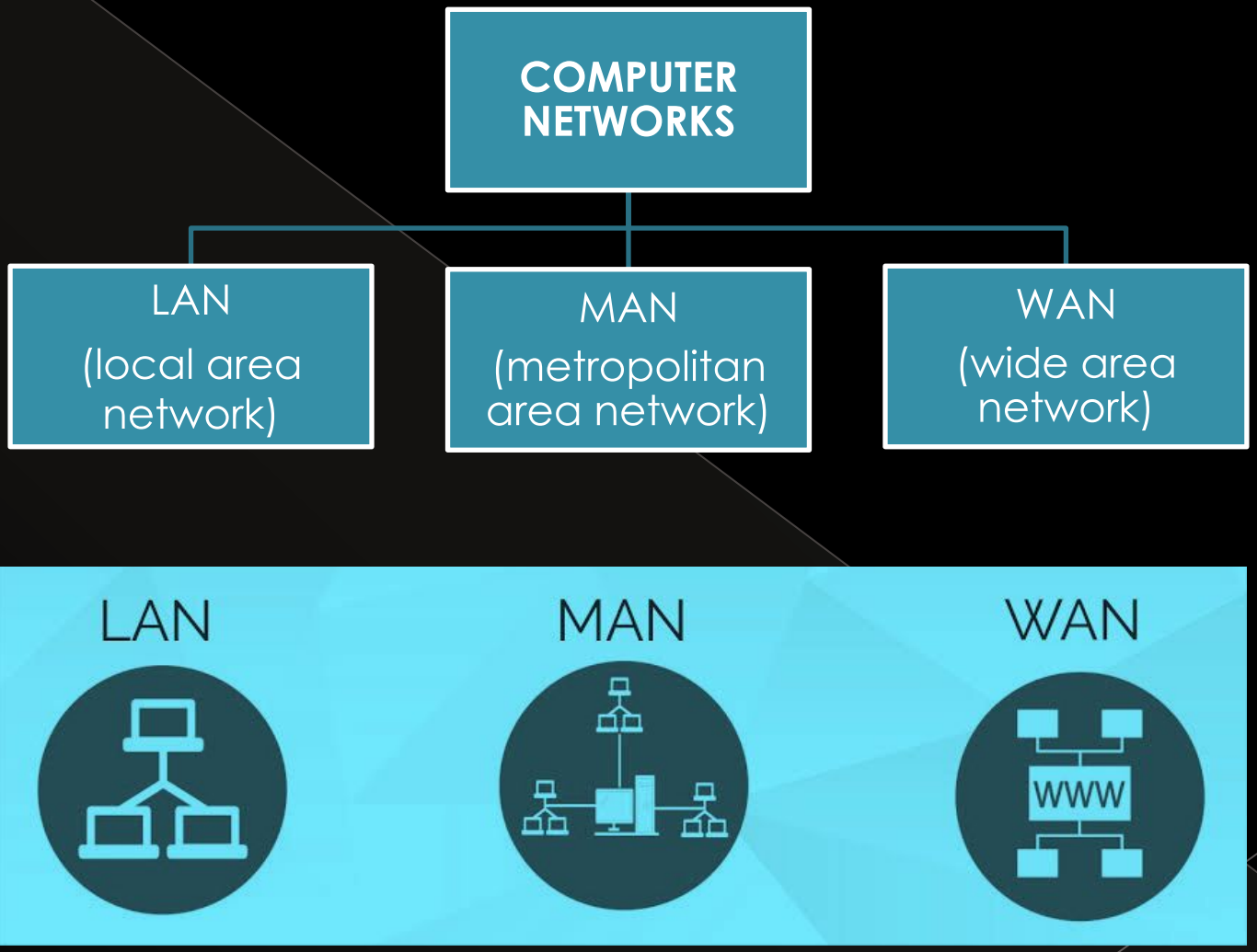
It describes a process in which two or more **computer** or **devices** transfer data, instructions and information. The transmission of data from one computer to another, or from one device to another.

A *communications device,* therefore, is any machine that assists data transmission. For example, modems, cables, and ports are all communications devices.

Communications software refers to programs that make it possible to transmit data



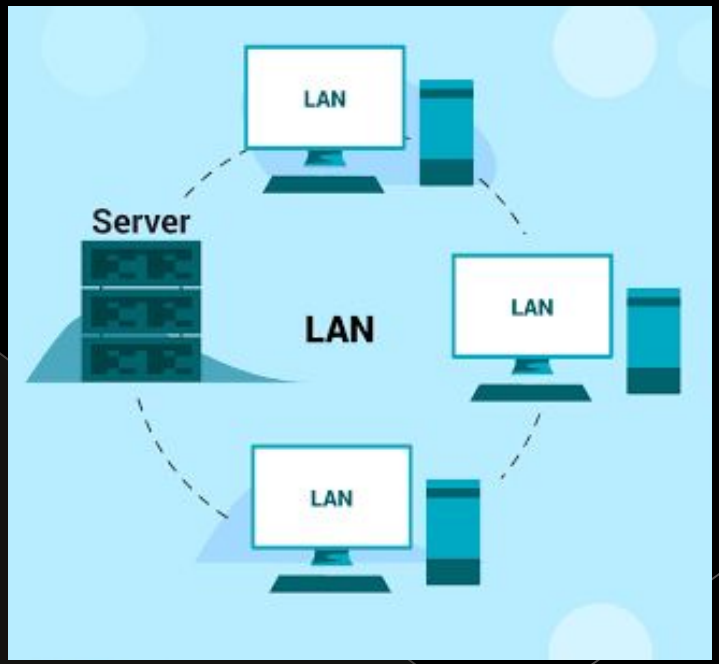
❖ TYPES ~


COMPUTER NETWORKS
LAN
(local area network)
MAN
(metropolitan area network)
WAN
(wide area network)
LAN
MAN
WAN
WWW

LAN (local area network)

- DEFINATION :

*Local Area Network (**LAN**)* is a computer network that spans a relatively small area. Most often, a LAN is confined to a single room, building or group of buildings, however, one LAN can be connected to other LANs over any distance via telephone lines and radio waves.



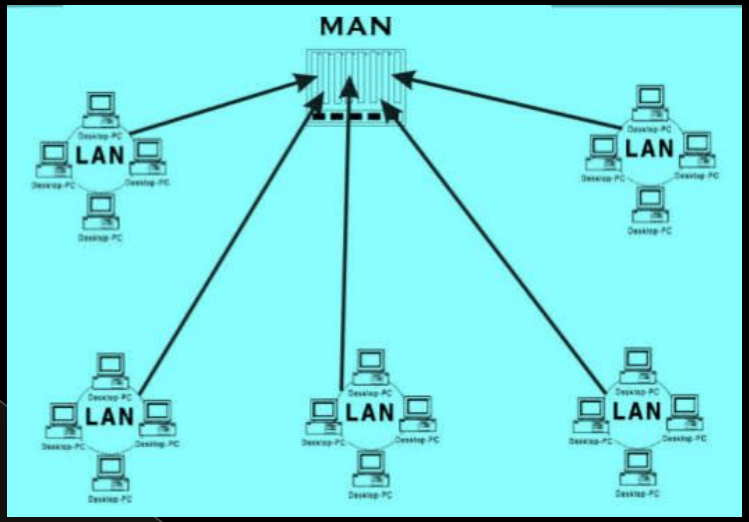
- CHARACTERISTICS :

- LANs come in many sizes.
- A group of devices connected through a home internet connection is a LAN.
- Small businesses have LANs that connect a dozen or a hundred computers with printers and file storage.
- The largest LANs are controlled by a server that stores files, shares data between devices, and directs files to printers and scanners.

MAN (metropolitan area network)

- DEFINATION :

A ***MAN*** is a computer network that interconnects users with computer resources in a geographic region of the size of a metropolitan area. The term MAN is applied to the interconnection of local area networks (LANs) in a city into a single larger network which may then also offer efficient connection to a wide area network.

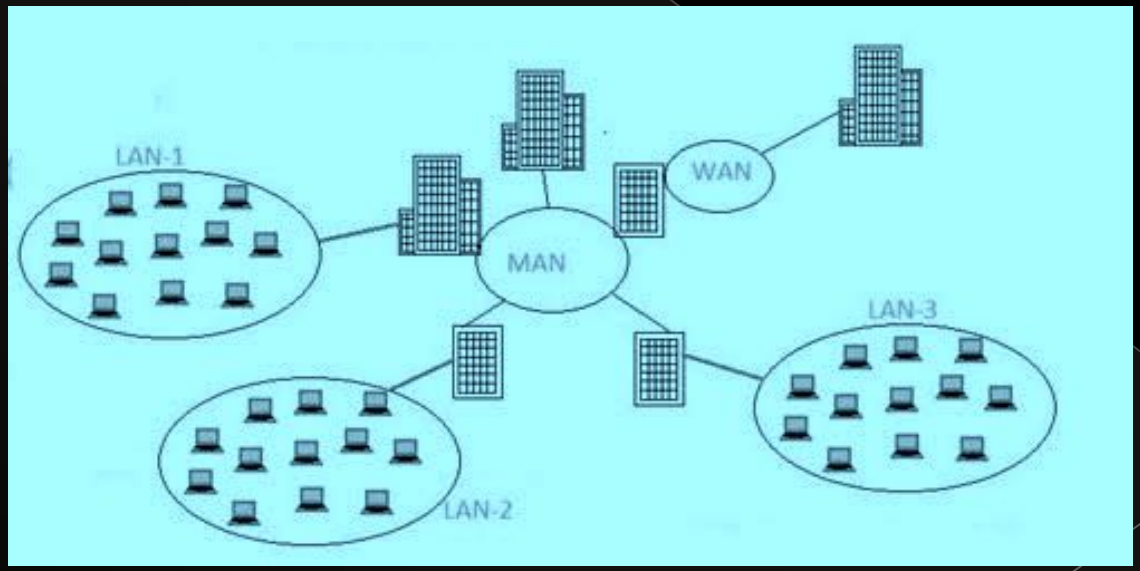


- FEATURES :

- The network size falls intermediate between LANs and WANs.

- A MAN (like a WAN) is not generally owned by a single organization.

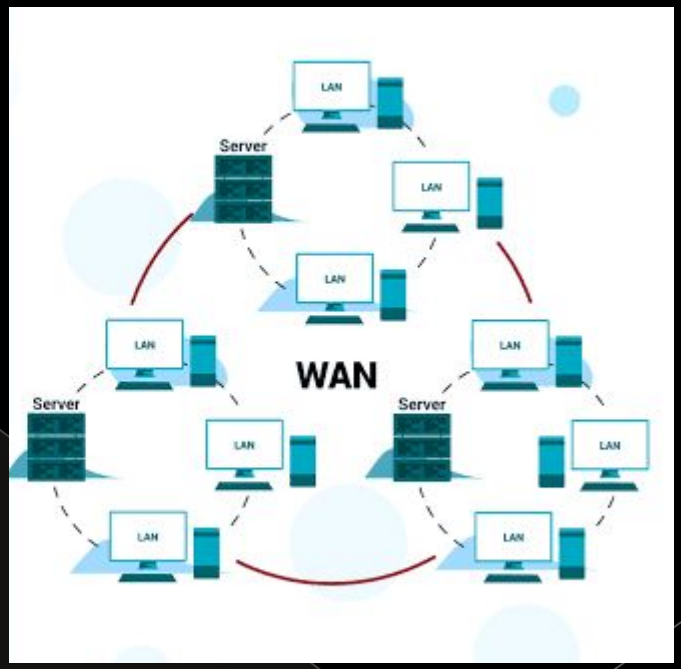
-A MAN often acts as a high speed network to allow sharing of regional resources (similar to a large LAN).



WAN (wide area network)

- DEFINATION :

A **wide area network** (**WAN**) is a **network** that exists over a large-scale geographical area. A **WAN** connects different smaller **networks**, including local area **networks** (LANs) and metro area **networks** (MANs). This ensures that computers and users in one location can communicate with computers and users in other locations.



- FEATURES :

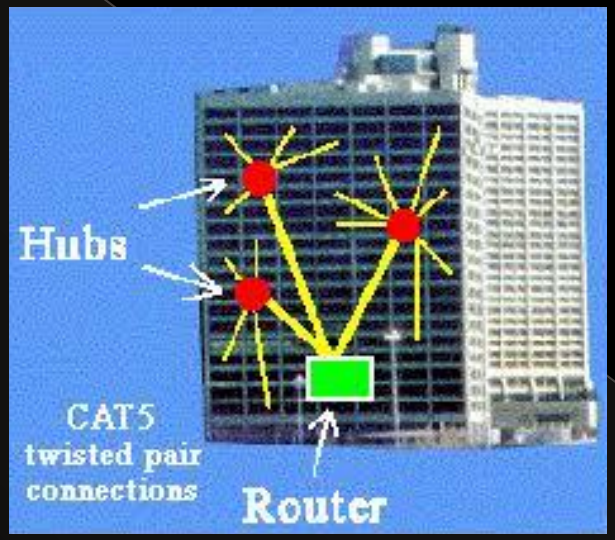
- WANs have a large capacity, connecting a large number of computers over a large area, and are inherently scalable.
-They facilitate the sharing of regional resources.
- They provide uplinks for connecting LANs and MANs to the Internet.
- Communication links are provided by public carriers like telephone networks, network providers, cable systems, satellites.
- Typically, they have low data transfer rate and high propagation delay, i.e. they have low communication speed.
- They generally have a higher bit error rate.

LAN v/s MAN v/s WAN :

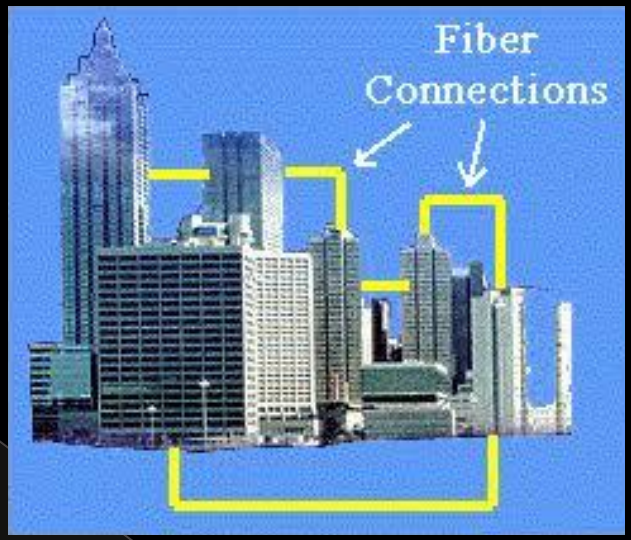
	LAN	MAN	WAN
Ownership of Network	Private	Private or Public	Private or Public
Design and maintenance	Easy	Difficult	Difficult
Propagation Delay	Short	Moderate	Long
Speed	High	Moderate	Low
Used for	College, School, Hospital.	Small towns, City.	Country/Continent.
Allows	Single pair of devices to communicate.	Multiple computers can simultaneously interact.	A huge group of computers communicate at the same time.

- PICTURISED DIFFERENCE B/W *LAN, MAN* AND *WAN* ~

1. LAN



2. MAN



3. WAN

NETWORK TOPOLOGY

- DEFINATION ~

Topology refers to

Physical and logical network layout

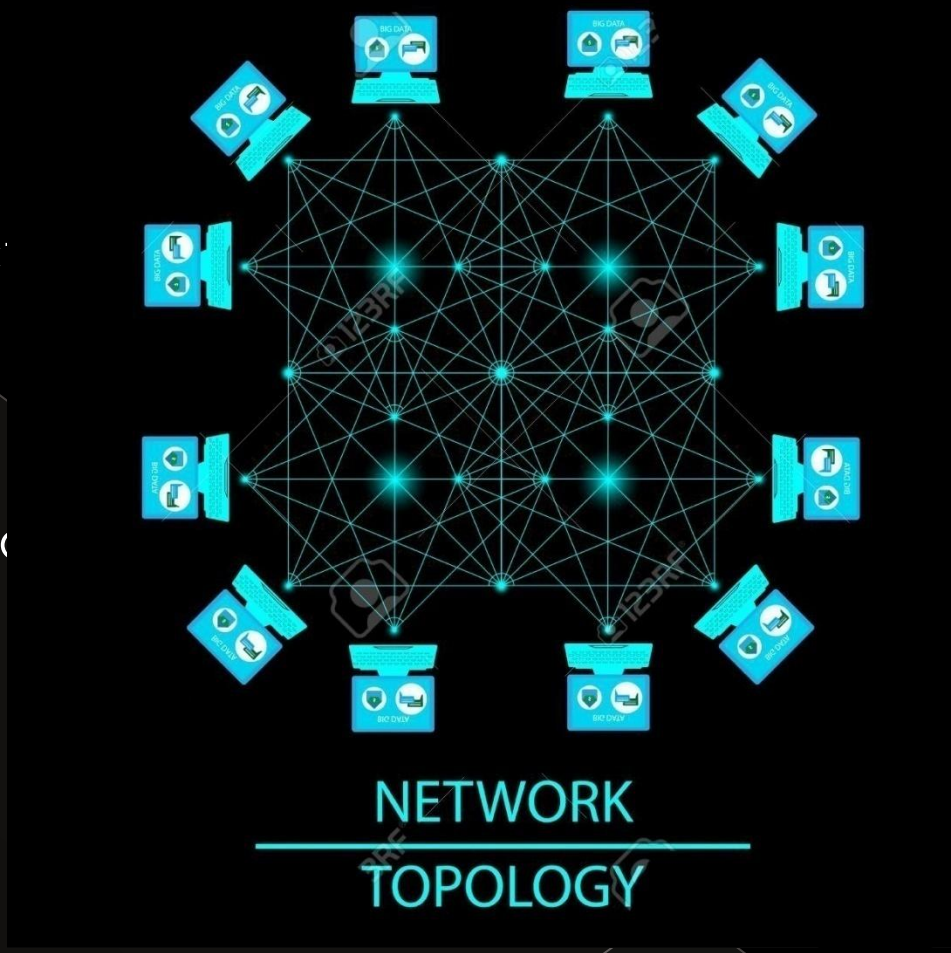
the network. In which physical is ac

layout of the computer cables and

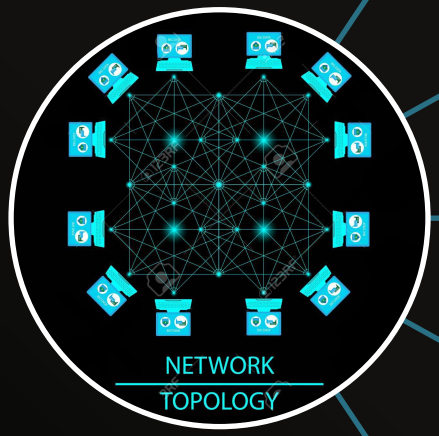
other network devices and Logical

the way in which the network appe

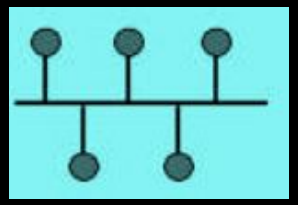
to the devices that use it.

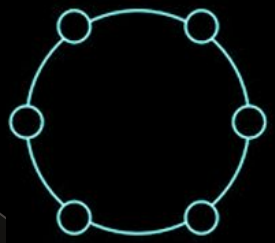


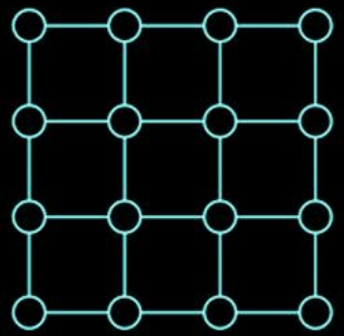
❖ BASIC TYPES ~

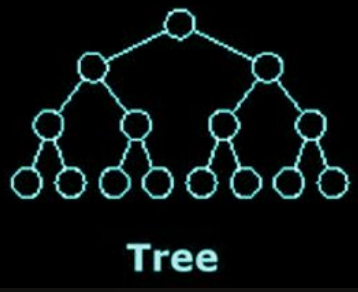


- BUS
- RING
- STAR
- TREE
- MESH

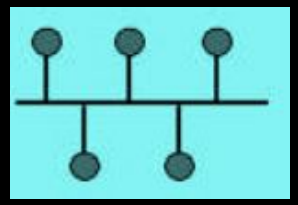








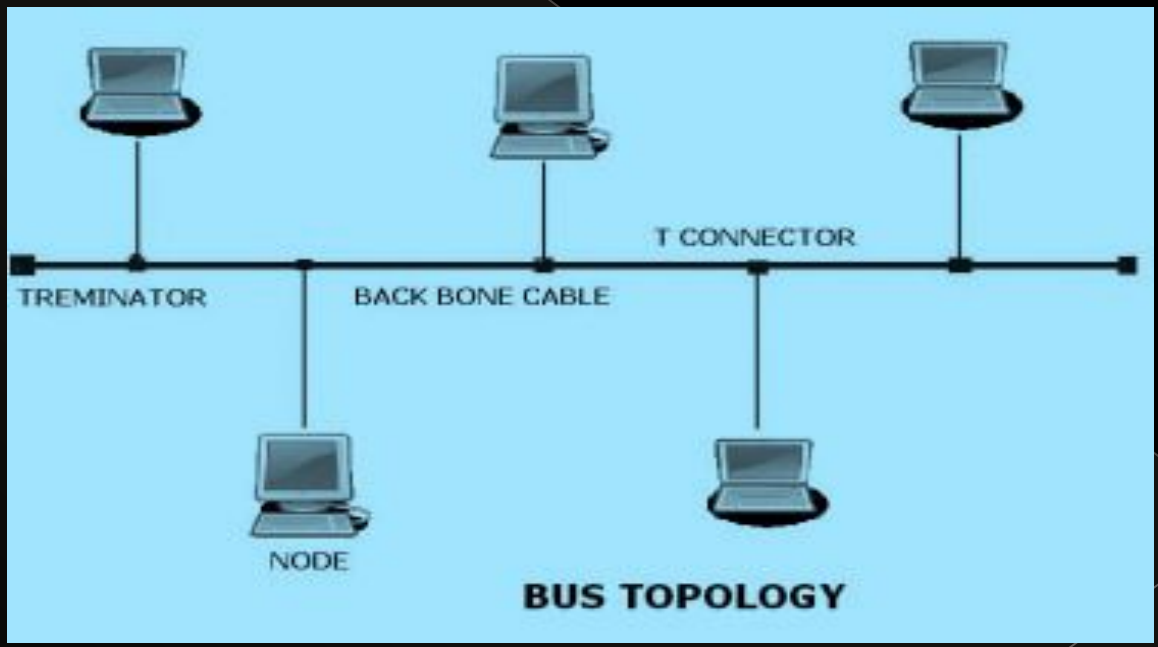
BUS



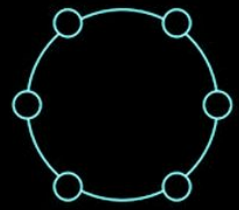
Bus

- DEFINATION :

A bus topology is a type of network setup where each computer and network device are connected to a single cable or backbone. A bus topology is multipoint.



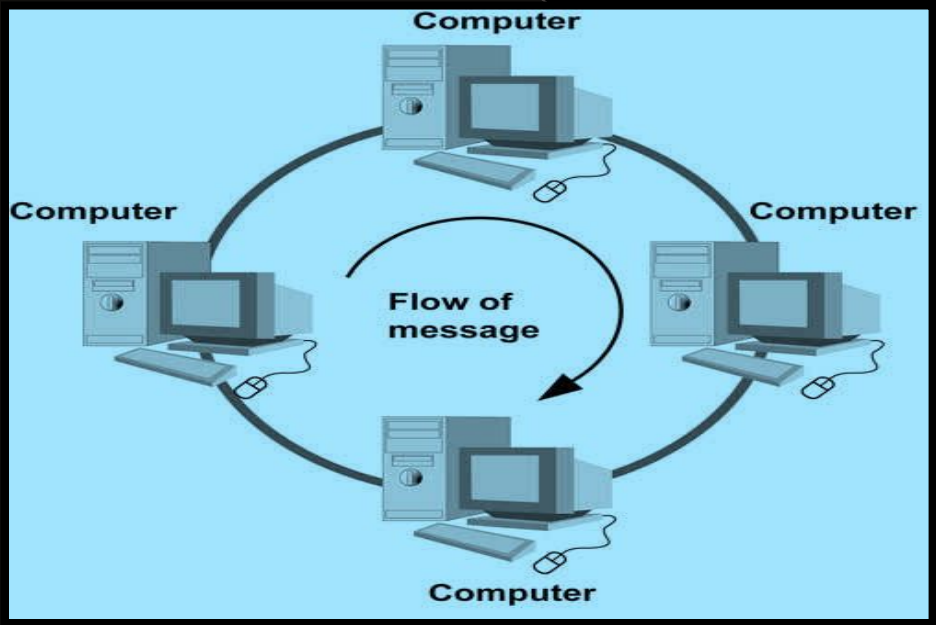
RING



Ring

- DEFINATION :

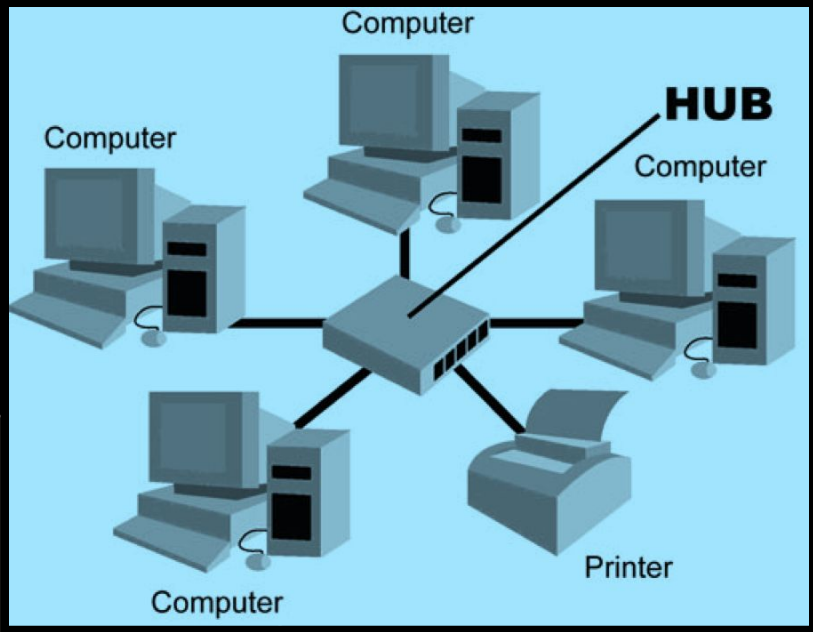
Devices are connected to each other in a circular shape. Each packet is sent around the ring until it reaches its final destination. Data travel from node to node, with each node along the way handling every packet.



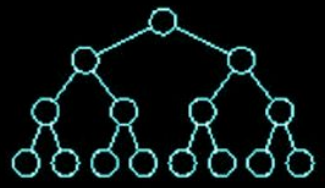
STAR

- MEANING :

All the components of network are connected to the central device called “hub” which may be a hub, a router or a switch. There is no direct traffic between devices. The switch is the server and the peripherals are the clients. The star topology reduces the damage caused by line failure by connecting all of the systems to a central node.



TREE



Tree

- MEANING :

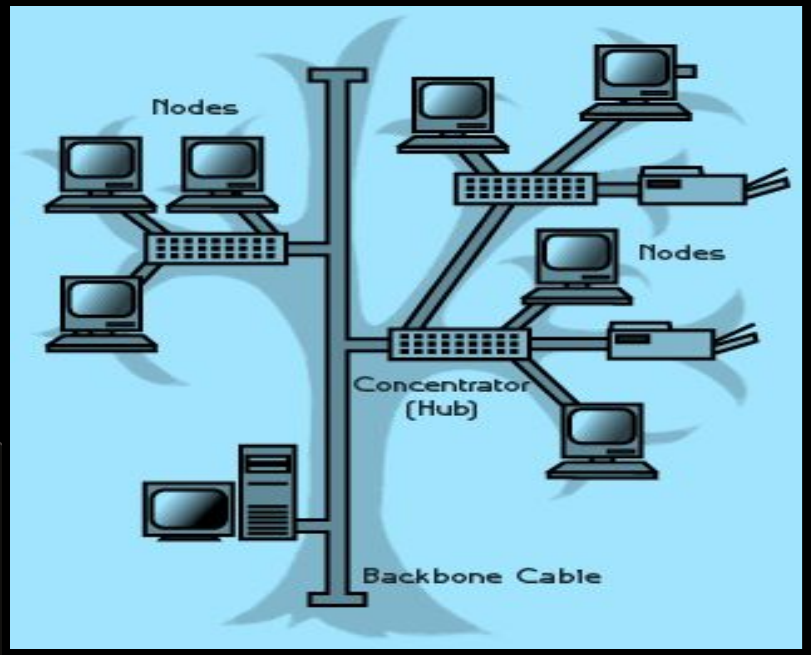
Tree Topology integrates the characteristics of Star and Bus topology.

The number of Star networks are connected using Bus.

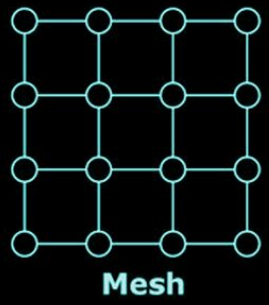
Main cable seems like a main stem of a tree, and other star networks as the branches.

It is also called **Expanded Star Topology**.

Ethernet protocol is commonly used in this type of topology.



MESH

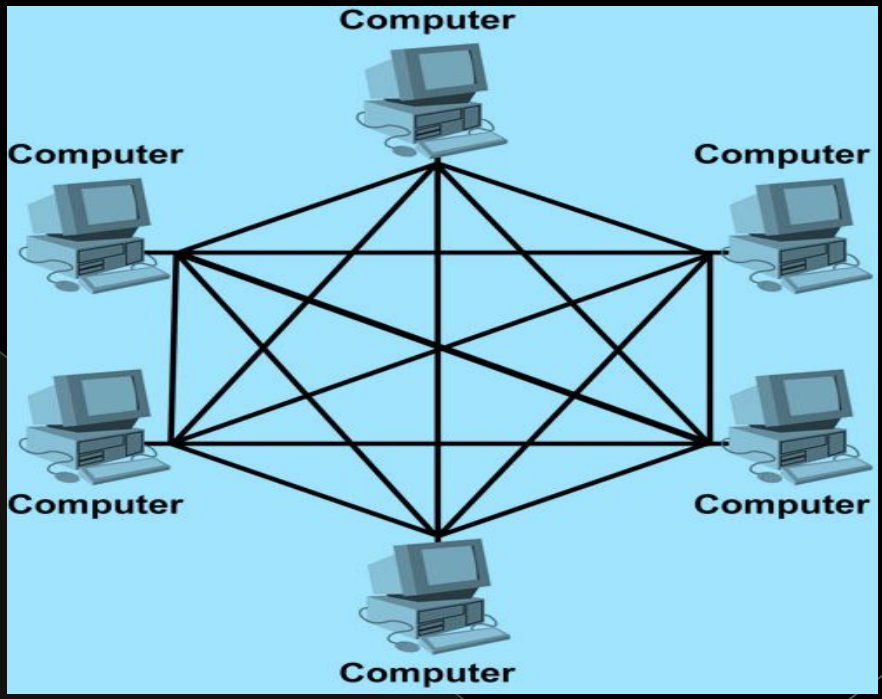


- MEANING :

A **mesh network** is a network topology in which each node (called a mesh node) relays data for the network.

All nodes cooperate in the distribution of data in the network.

A mesh network can be designed using a *flooding* technique or a *routing* technique.



❖ APPLICATIONS ~

1. BUS TOPOLOGY - Used for broadcasting the message.
   - Most Computer Motherboards.
   - Used in LAN.
2. RING TOPOLOGY - Ring Topologies are often found in office Buildings.
   - Also used in Schools for networking.
3. STAR TOPOLOGY - Star Topology used in Local Area Network (LAN).
   - High speed LAN often use Star Topology.
4. TREE TOPOLOGY - This provides great flexibility for expanding and modifying the network.
5. MESH TOPOLOGY - Telephone Regional Office.
   - Wide Area Network.

- ADVANTAGES ~

BUS	RING	STAR	TREE	MASH
Requires less cable length than a star topology	Better performance than Bus topology.	Components can also be removed easily.	Expansion of Network is possible and easy.	This topology can withstand high traffic.
It works well for small networks.	Each computer has equal access to resources.	Easy to detect the failure and troubleshoot it.	Error detection and correction is easy.	Data transfer doesn't get affected.

- DISADVANTAGES ~

BUS	RING	STAR	TREE	MASH
Terminators are required at both ends of the backbone cable	Bandwidth is shared on all links between devices.	Too much dependency on central device has its own drawbacks.	As more and more nodes and segments are added, maintenance becomes difficult	There are high chances of redundancy in many of the network connections
It is slow when more devices are added into the network	More difficult to configure than a Star.	If hub fails whole network goes down.	Scalability of the network depends on the type of cable.	Set-up and maintenanc e of this topology is very difficult.

THANK YOU