

-:(Computer):-

Semester OI:-

- Computer Network :-

A computer network is a connection between two or more network devices, like computers, routers and switches, to share network resources.

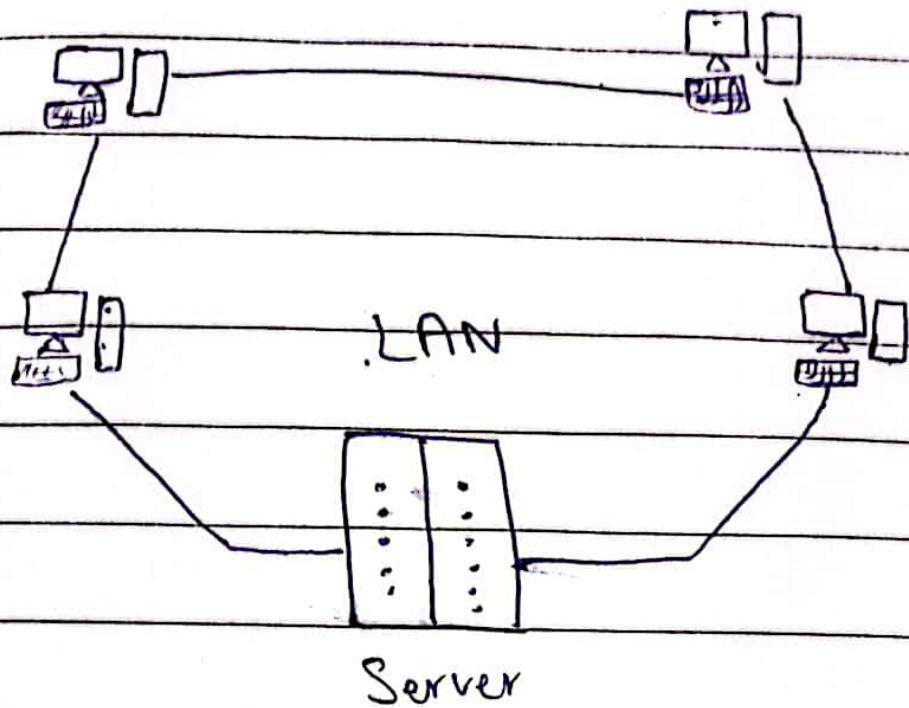
A computer network depends on the requirement of the communication channel i.e, the network can be wired or wireless.

- Types:-

Below mentioned are different types of computer Networks:

- PAN (Personal area network)
- LAN (Local area network)
- MAN (Metropolitan area network)
- WAN (Wide area network)

(i) Local Area Network:-



The local area network (LAN) is designed to connect multiple network device and system within a limited geographical distance.

The data transmit speed in the LAN is higher than the other networks types, MAN or WAN.

LAN uses private network address.

Advantages:-

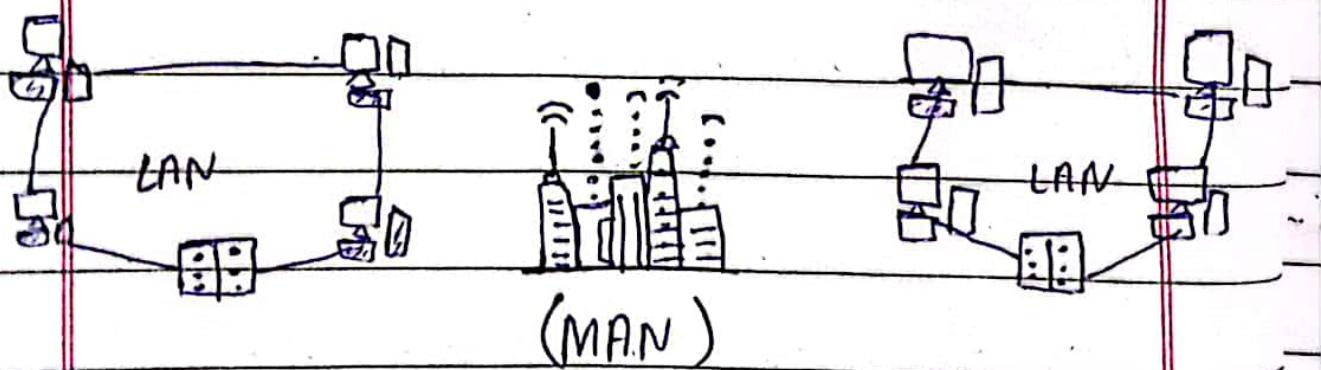
- The transmission of data and services is higher than other networks.

- The network server act as a central unit for the whole network.

Disadvantages:-

- It's need constant administration of experienced engineers for functioning.
- Probability of leak of sensitive data by LAN administration

(ii) Metropolitan Area Network:-



The metropolitan area network (MAN) is a network type that covers the network connections of an entire city or connections of a small area. The area covered by

the network is connected using a wired network.

MAN networks covers an entire town area or a portion of city.

Data transmission speed is high due to the installation of optical cables and wired connections.

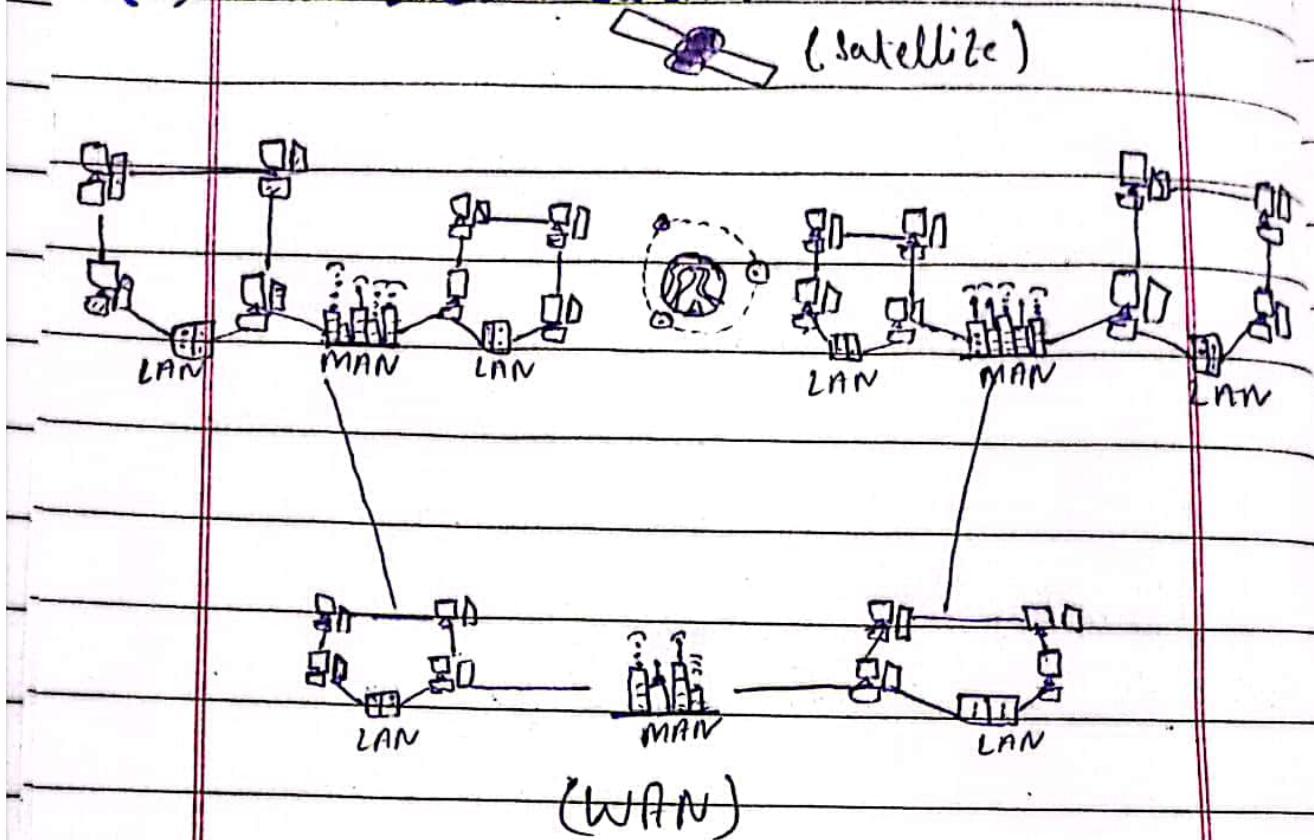
Advantages:-

- It provides Full-Duplex data transmission in the network channel for devices.
- The network connection area covers an entire city by using cables.

Disadvantages:-

- High probability of attack from hackers and cybercriminals due to large network.
- Its need good quality of hardware. The installation cost is very high.

(iii) Wide Area Network:-



The wide area network (WAN) is designed to connect devices over large distances like states or between countries. The connection is wireless in most cases and uses radio towers for communication.

The WAN networks can be made up of multiple LAN and WAN networks.

The speed of the WAN data transfer is lower than MAN or LAN, due to very large distance.

The WAN network uses a satellite medium to transmit data.

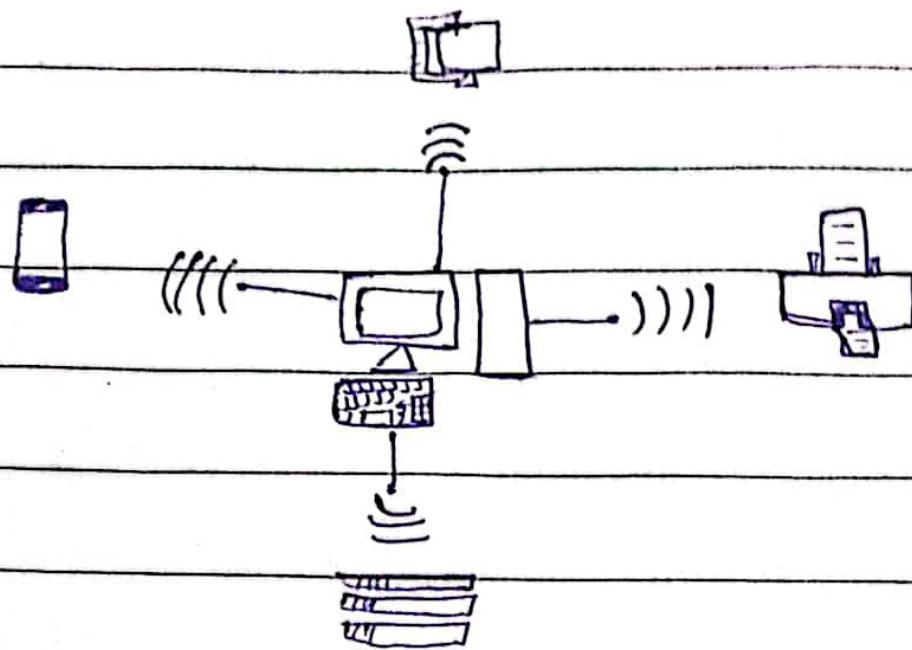
Advantages:-

- This network covers a high geographical area and used for large distance.
- They also uses radio towers or satellite.

Disadvantages:-

- High cost to set up the network.
- It supports experienced technicians is needed to maintain network.
- It is difficult to prevent hacking and debug a large network.

(iv) Personal Area Network:-



A personal area computer is a computer network for interconnecting electronic devices within person's workspace.

A PAN provides data transmission among devices such as computers, smartphones, tablets etc.

Advantages:-

- It is cost-effective, simplicity and data protection.
- It uses less storage space.

Disadvantages:-

- Incompatibility
- Users Interference with radio signals.
- It is insufficient network coverage region or range.

(v) Internet:-

The internet is a vast network that connects computers all over the world.

"Internet is the network of networks in which user at any computer can get information from any other computer.

-Network Topologies:-

Network topology is the arrangement of the elements of a communication network. It can be used to define or describe

-:(Intro to ICT):-

Semester 01:-

-Network Topology:-

Network Topology is the arrangement of the elements of a communication network.

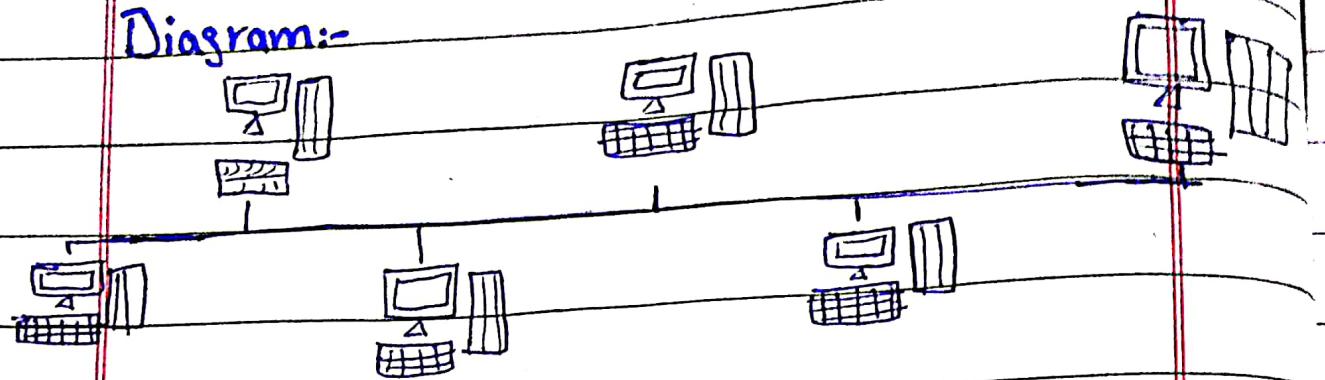
It can be used to define or describe the arrangement of various types of telecommunication networks.

-:Types:-

- Bus Topology
- Star Topology
- Ring Topology
- Mesh Topology
- Tree Topology
- Hybrid Topology

(i) Bus Topology:-

Diagram:-



Bus Topology is the line or horizontal topology in the network. In Bus topology, all the nodes (computer) are connected to single backbone or bus with some medium like twisted pair or co-axial cable.

This topology is mostly used in Local Area networks.

When a node wants to communicate with the other node, it simply sends a message to the common bus. Then all the nodes receive the message.

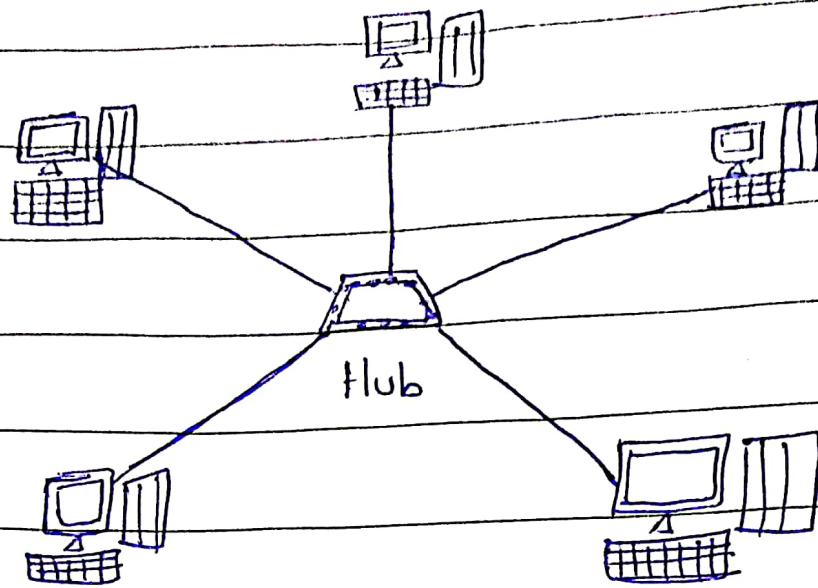
Advantages:-

- The bus Topology requires less cabling.
- The bus Topology is easily to configure and install.
- In bus Topology the failure of one computer does not affect the other computers.

Disadvantages:-

- In Bus Topology, the failure of Backbone cable can breakdown all the network.
- In Bus Topology, the addition of computer decrease the performance of network.
- The bus Topology is difficult to rebuilt in case of faults.

(ii) Star Topology,-



Star Topology is a network layout in which all devices are connected to a central hub or switch. This central hub acts as a central point of communication and controls the flow of data between devices.

This topology is often used in small to medium-sized networks, such as home networks or small office networks.

In star Topology, if a node wants to communicate with

the other node. & it's firstly send the message to the hub and then hub sends the same message to the other nodes.

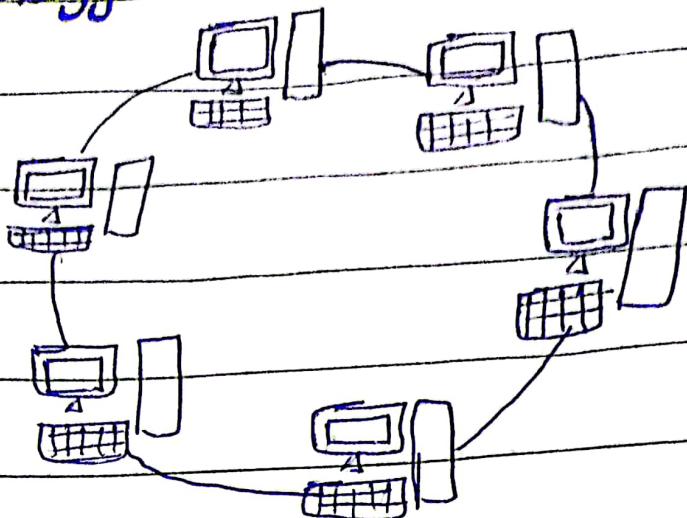
Advantages:-

- It is easy to install and configure.
- It is easy to troubleshoot by disconnecting the device from the hub.
- Star Topology can improve network performance.
- Star Topology can provide high security.

Disadvantages:-

- If the central hub fails, the entire network will be down.
- It is very expensive.
- Star Topology is limited in distance.
- It is limited in Bandwidth.

(iii) Ring Topology:-



(Ring Topology)

In Ring Topology, all the nodes are connected each other in the shape of ring via cable. In this Topology, when one node tries to send a message to other node, then all the nodes discard the message and the desired node receive the message.

For Example If a node (C1) wants to communicate with the node (C4), then it sends a message, to C4, The node

C₃ and C₂ discard the message and C₄ receive it.

Only one extra cable may be needed to connect new node.

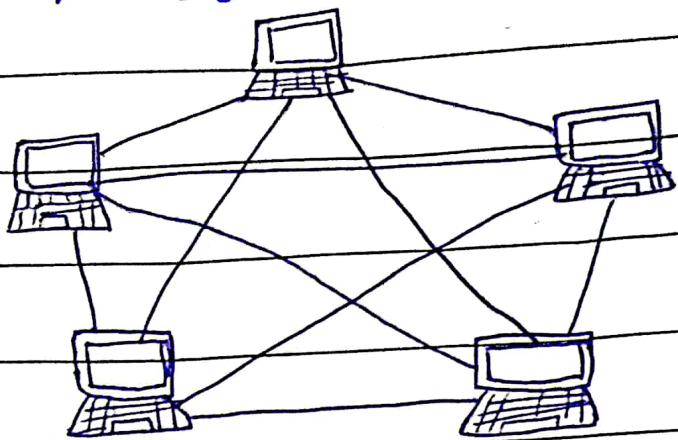
Advantages:-

- We can achieve the ring topology by executing the network with less effort.
- There are no limitations to the number of nodes.
- It is high-speed data transfer.
- It is easy to troubleshoot.

Disadvantages:-

- It requires expensive hardware.
- The addition of a node can affect the speed of data transmission.
- It is not properly secured.
- In the Ring Topology failure of one node breakdown the all network.

(iv) Mesh Topology:-



Mesh Topology is a type of network topology in which every node is connected to every other nodes in the network.

Each computer not only sends its own signals but also relays data from other computers.

Every node features a point-to-point connection to the opposite node. The nodes are connected via cables and wireless.

-Types:-

Full mesh Topology

Partial Mesh Topology.

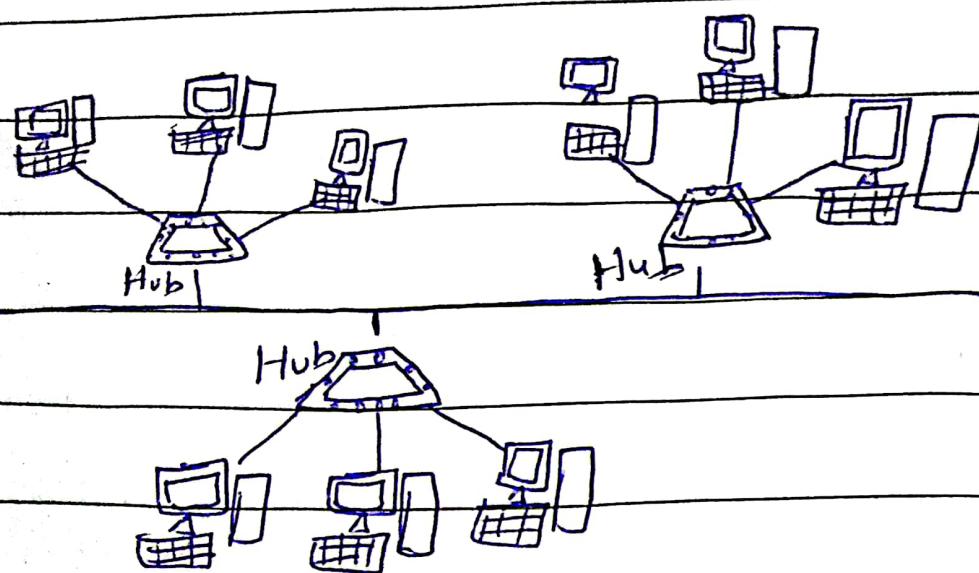
Advantages:-

- The failure of one node does not affect the network.
- They provide multiple path for data transmission.
- The addition of new device does not affect the network.
- It is very easy to add other mesh Topology.
- It is flexible.

Disadvantages:-

- The implementing cost is very high.
- They consumed a large number of time to build and maintain.
- The initial setup of mesh topology is very difficult.
- It is very costly.

(v) Tree Topology:-



(Tree Topology)

It is the combination of Bus and Star topology. So, it is also known as Bus-star topology. It is not commonly used in networks. Since it appears like a tree, the structure of a tree topology is quite different from others. The many central hubs are used for data communications in tree topology.

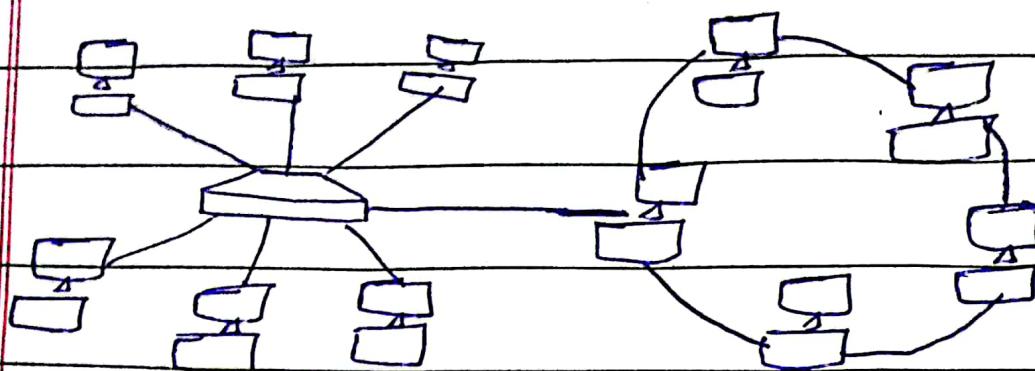
Advantages:-

- Error detection in tree topology is more accessible.
- The expansion of a tree topology is a straightforward method.
- It require less cables.

Disadvantages:-

- It is difficult to install.
- Weak security is present in tree topology.
- If the main backbone is defective or fail, then the whole network will collapse.
- Maintenance and configuration of tree topology is difficult due to its large size.

(vi) Hybrid Topology:-



A hybrid topology combines two or more network topologies, including ring, bus, star and mesh topologies.

It offers a complicated structure and a range of technologies are required for its practical execution, it has the benefit of increased flexibility.

It is used to create a large networks.

Advantages:-

- It can be modified as per requirements.
- It is extremely flexible.
- It is very reliable.
- It handles a large volume of traffic.
- The speed of the topology becomes fast when two topologies are put together.

Disadvantages:-

- The design of hybrid topology is very complex.
- The installation is a difficult process in hybrid topology.