

Topology

→ Def :- network Topology refers to the arrangement of different elements (links, nodes, etc.) in a computer network.

→ Types

(1) Point to point Topology :- It's a type of topology that works on the functionality sender and receiver. It is the simplest communication b/w two nodes, in which one is the sender and the other one is the receiver.

Pros :-

It provides high bandwidth.

It's easy to understand and implement.

Ease of Troubleshooting

cost-effective for small networks.

Cons :-

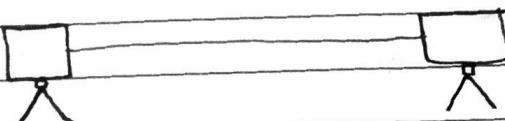
Limited Scalability

High cost for larger networks.

Lack of redundancy/backup

Physical distance limitation.

Limited to two nodes.

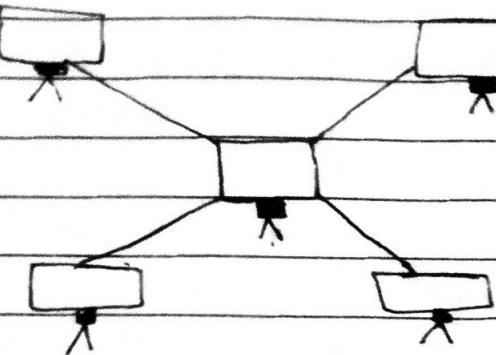


point to point topology.

(2) Point to multipoint Topology :- A central node is directly connected to several other nodes.

Pros:- Efficient for broadcast and multicast transmission, can be used in wireless communication.

Cons:- Dependent on the central node's performance.



Point-to-Multipoint

③ **Mesh Topology**:- In this topology, every device is connected to another device via a particular channel. In mesh topology, the protocols used are AHCp (Ad Hoc configuration protocols), DHCp (Dynamic Host configuration protocol), etc.

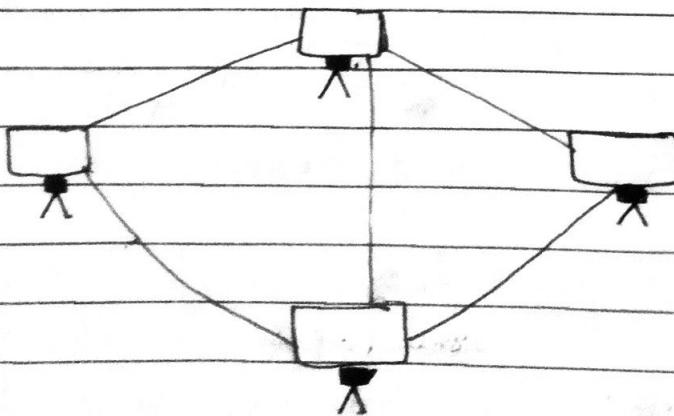
Pros:- Communication is very fast b/w nodes.

It's robust and data is reliable (transferred).
Provides security & privacy.

Cons:- Installation and configuration are difficult.

The cost of cables is high as bulk wiring is required.

The cost of maintenance is high.



mesh Topology.

Date

(4) **Star Topology** :- In star topology, all the devices are connected to a single hub through a cable. This hub is the central node and all the other nodes are connected to the central node.

Pros :- If N devices are connected to each other in a star topology, then the number of cables required to connect them is N . So, it's easy to setup.

Each device require only 1 port to connect to the hub, therefore the total number of port is N .

It is robust.

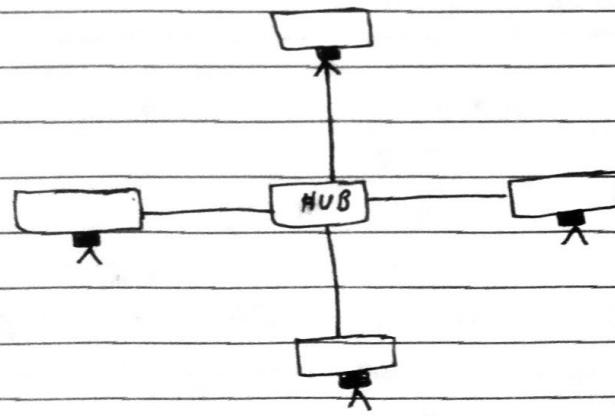
Easy fault identification.

It's cost effective. \Rightarrow we coaxial cable

Cons :- If the hub fails, the whole system will crash down.

The cost of installation is high.

Performance is based on the single concentrator i.e. hub.



star topology

(5) **Bus Topology** :- Bus topology is a network type in which every computer and network device is connected to a single cable. It is bidirectional. It is a multipoint connection.

Date

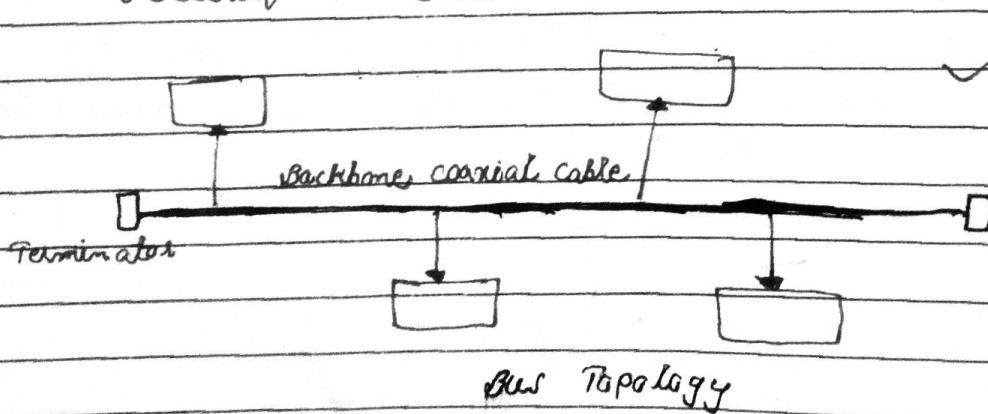
and a mon-to-multipoint topology b/c if the backbone fails the topology crashes.

Pros:- If N devices are connected to each other in a bus topology, the number of cables required to connect them is 1 and N drop lines are required.

- coaxial or twisted pair cables are mainly used in bus-based networks that support upto 10 mbps.
- The cost of cables is less compared to other topologies.

Cons:- It requires a lot of cabling (longer extent). If the common cable fails, then the whole system will crash down.

If the network traffic is heavy, it increases collisions in the network.
Security is low.



⑥ **Ring Topology** :- In this topology, it forms a ring connecting devices with exactly two neighbouring devices. A number of repeaters are used for Ring topology with a large number of nodes.

one direction

uni-direction / dual Ring Topology

Date

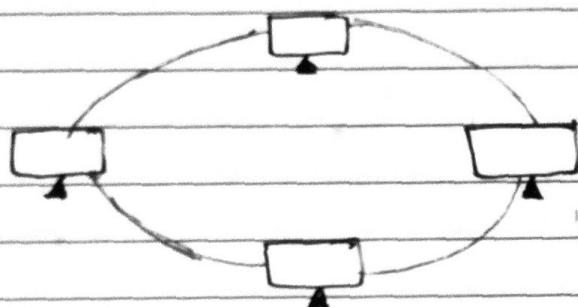
Pros:- The speed of data transmission is high.

The possibility of collision is minimum in this type of topology.

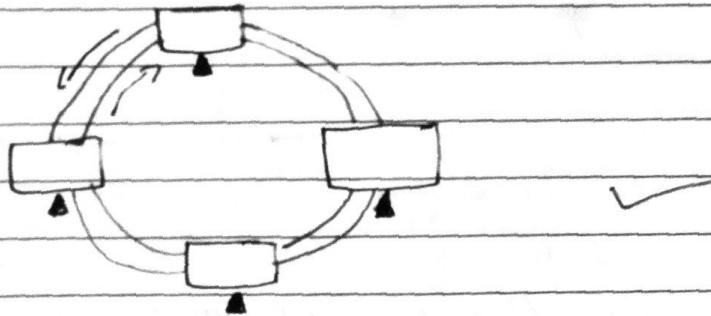
- cheap to install and expand.

- It is less costly than a star topology.

Cons:- The failure of a single node in the network cause the entire network to fail.
Troubleshooting is difficult.
less secure.



Ring Topology



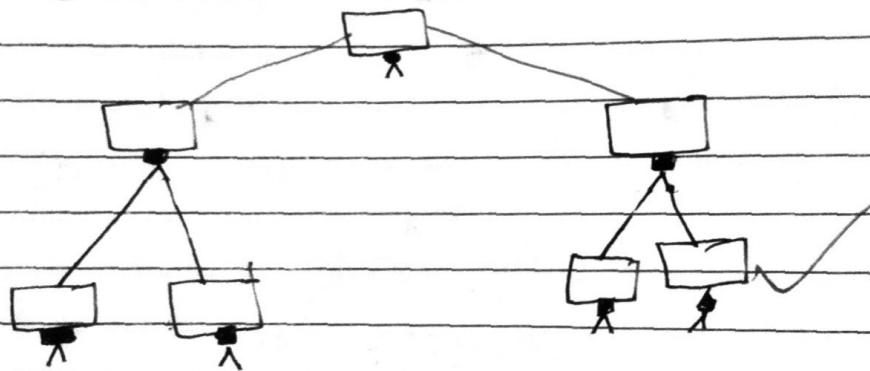
Dual Ring Topology

⑦ Tree Topology:- This topology is the variation of the star topology. This topology has a hierarchical flow of data.

Pros:- It allows more devices to be attached to a single central hub thus it decreases

the distance that is travelled by the signal to come to the devices.

- It allows the network to get isolated and also prioritize from different computers.
 - we can add new devices to the existing network.
 - Error detection and correction is very easy.
- Cons :- If the central hub gets fails the entire system fails.
- The cost is high b/c of cabling.
 - If new devices are added, it becomes difficult to configure.



Tree Topology.

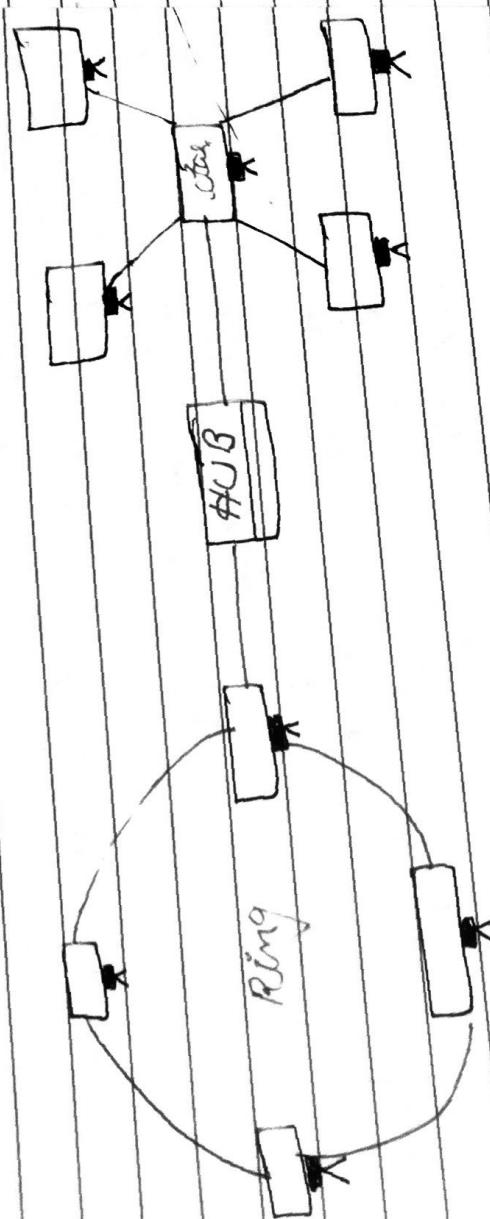
⑧ Hybrid Topology:- This Topology is the combination of all the various types of topologies. Hybrid Topology is used when the nodes are free to take any form. It means there can be individual units as Ring or star topology or can be a combination of various types of topologies.

Pros:- This topology is very flexible.

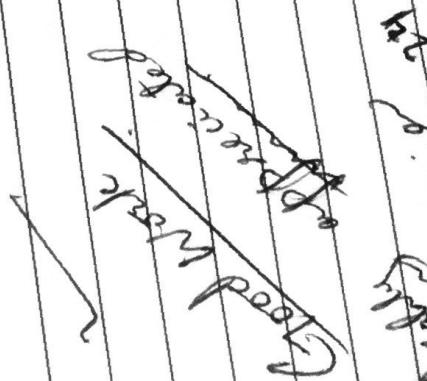
The size of the system can be easily expanded by adding new devices.

Cons :- It's challenging to design the architecture.

- Hubs used in this topology are very expensive
- The implementation cost is very high as a hybrid network requires a lot of cabling and network devices.



Hybrid Topology.



Star . Bus . Ring