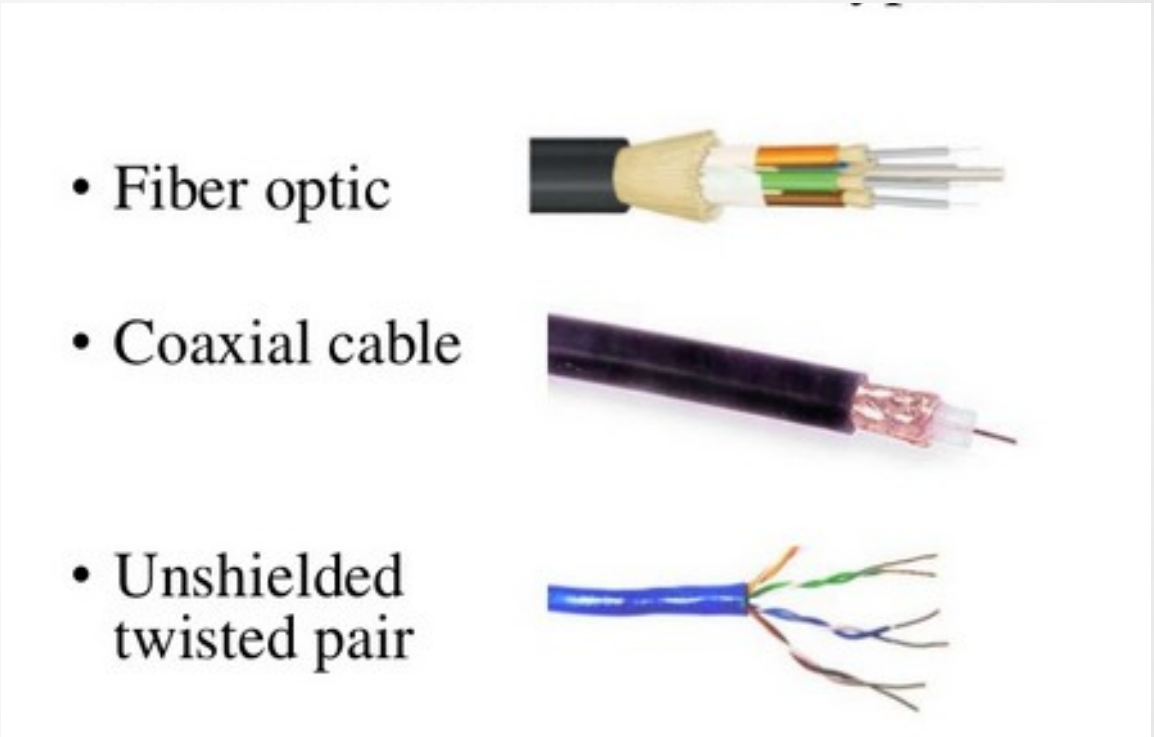
Network Devices

- Network Cable
- Hub
- NIC
- Bridge
- Router
- Gateway
- Modems
- Data Multiplexers

Network Cable

- Fiber optic
- Coaxial
- Twisted pair



Hub

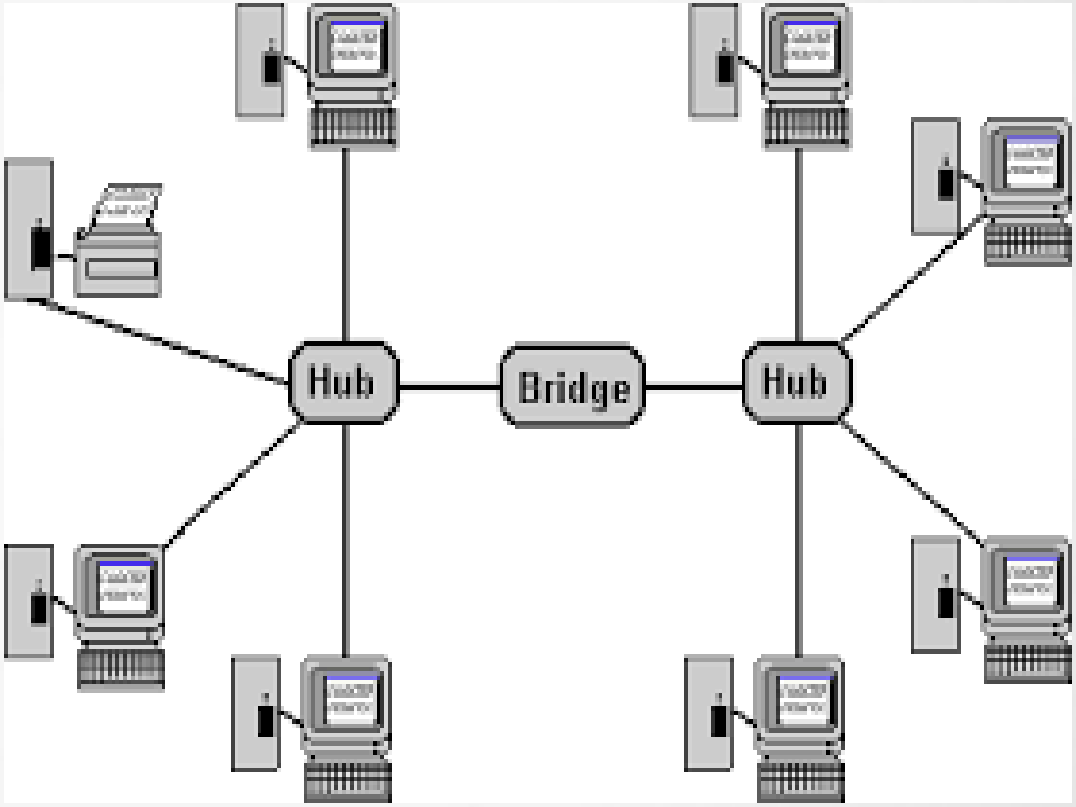
- Sends and recieve signals on network cable

NIC

- Network interface card
- Sends and recieves messages to and from LAN

Bridge

- Connects two networks

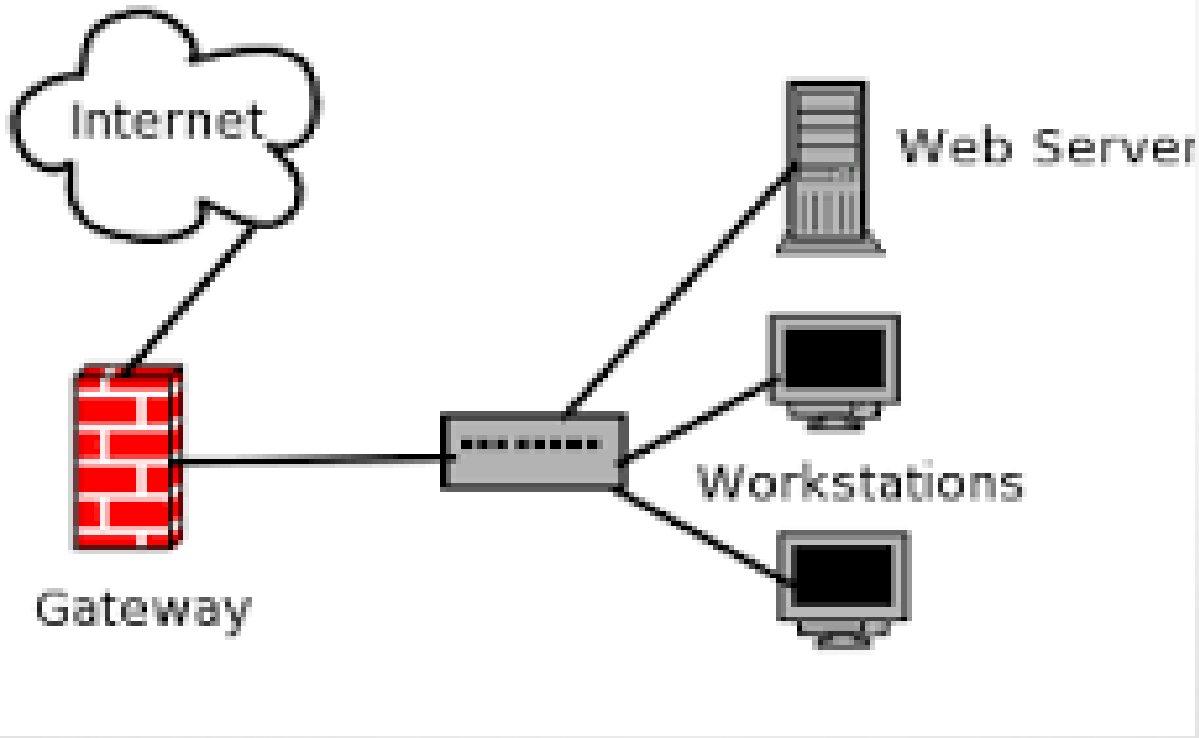


Router

- For large networks
- Route the messages

Gateway

- Connect 2 dissimilar LANs
- Connects multiple networks using protocols and route packets



Modems

- Required tranaslation and interface between the digital and analog signals
- Internal and External modems

Modems

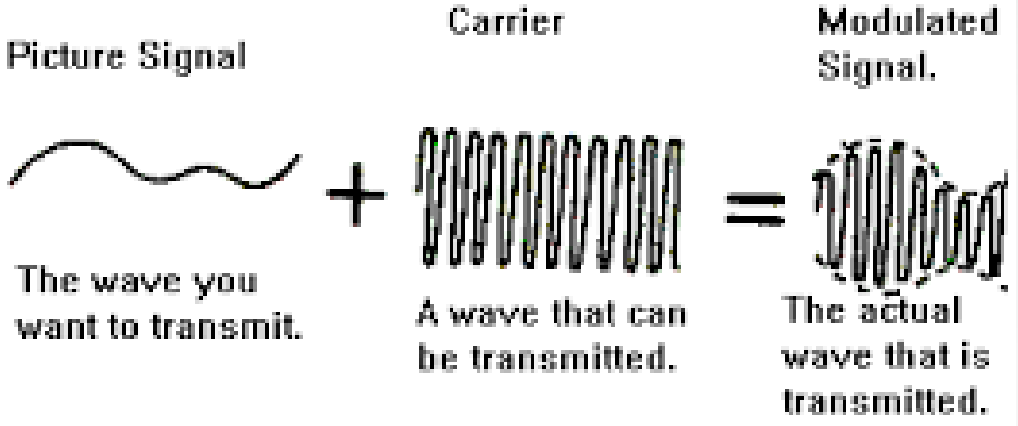
- Internal Modem

External Modem

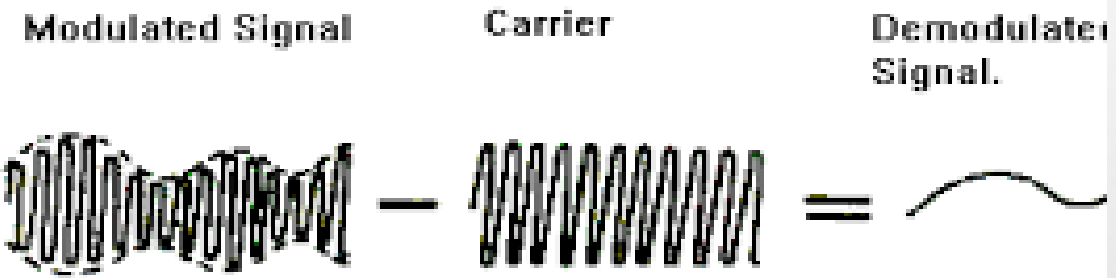
Modems

- Required tranaslation and interface between the digital and analog signals
- Internal and External modems

Modulation



Demodulation



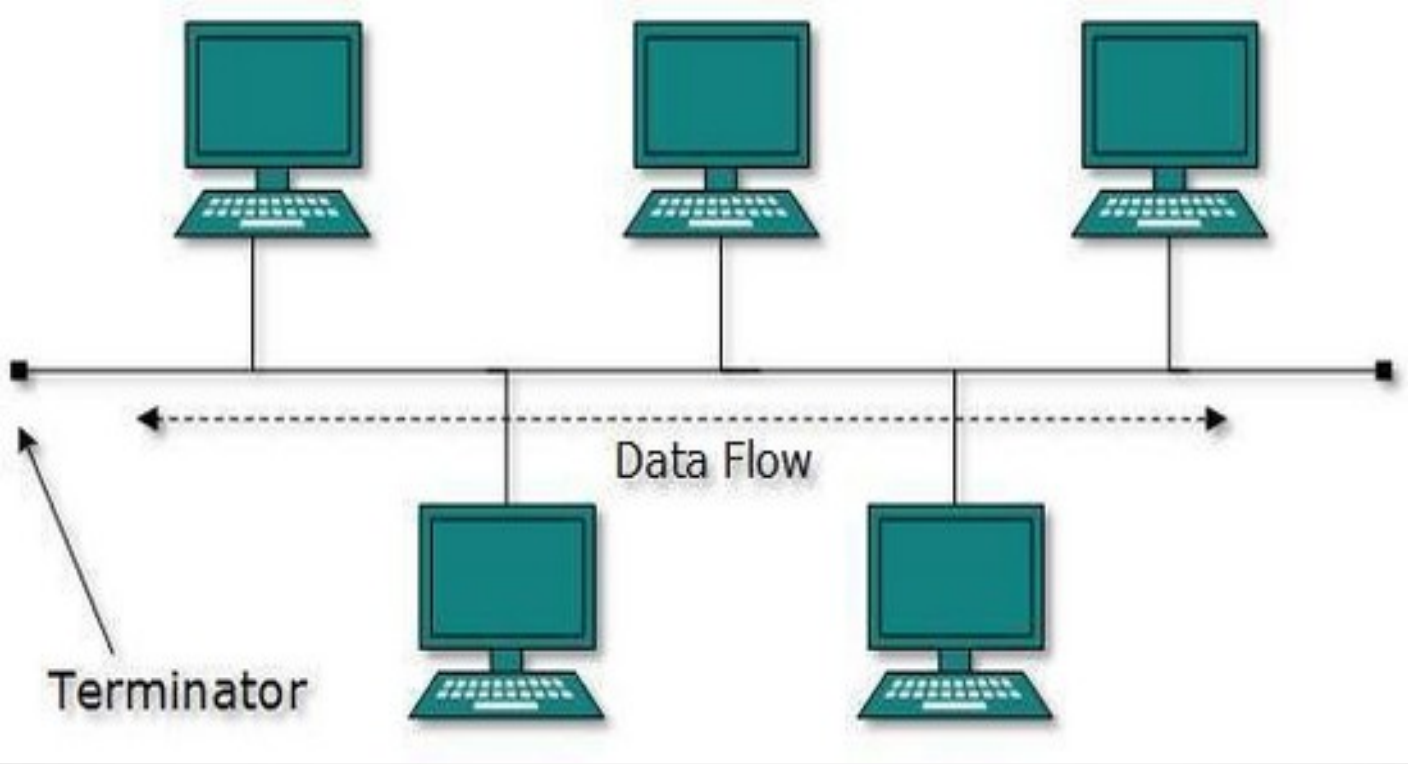
Types of modem

- Low speed modems(upto 600 bps)
- Medium speed modems (from 1200 to 1300 bps)
- High speed modems(4800 bps tp 19.2 kbps)

Network topologies

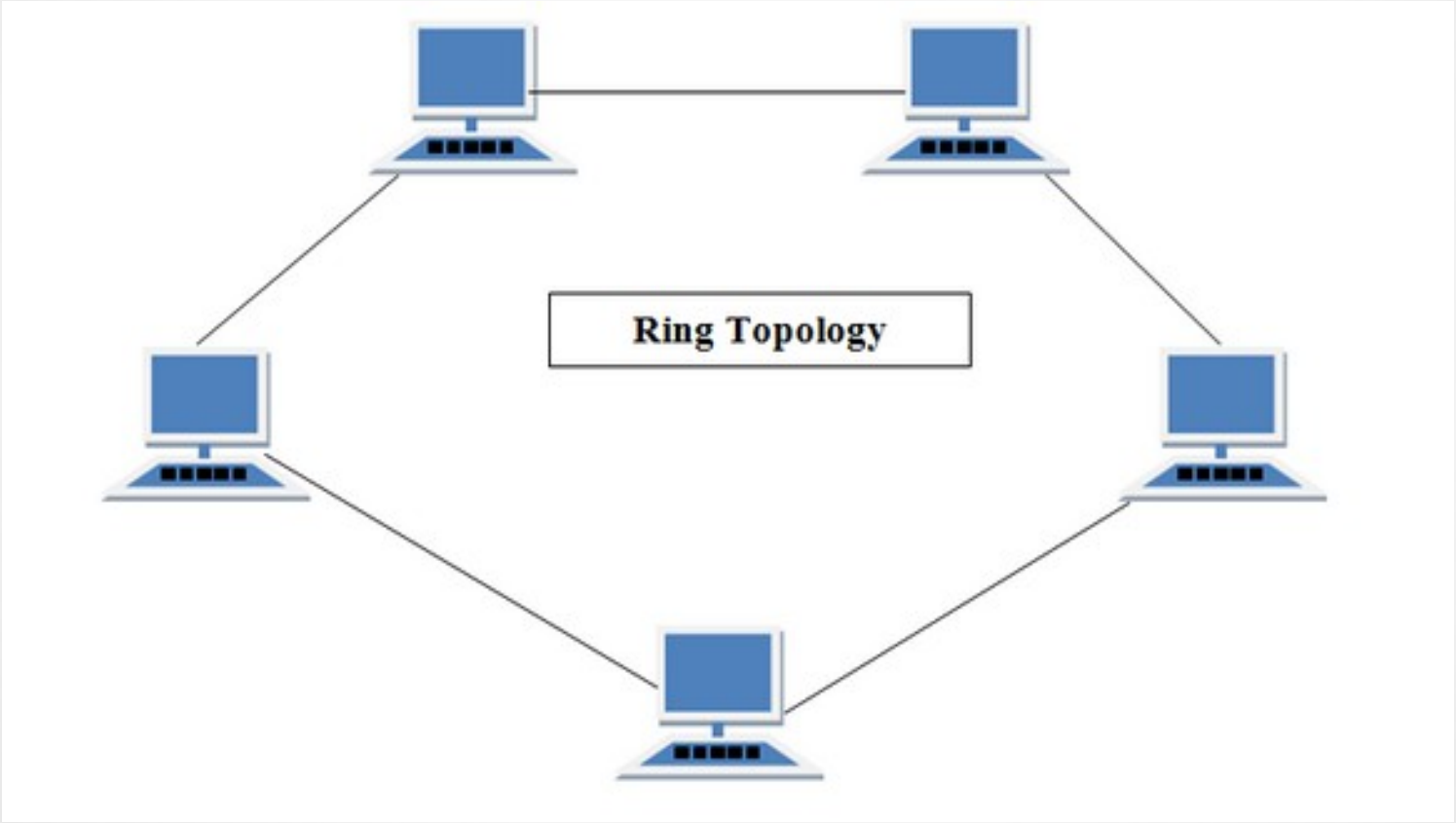
- Bus
- Star
- Ring
- Tree
- Mesh

Bus topology



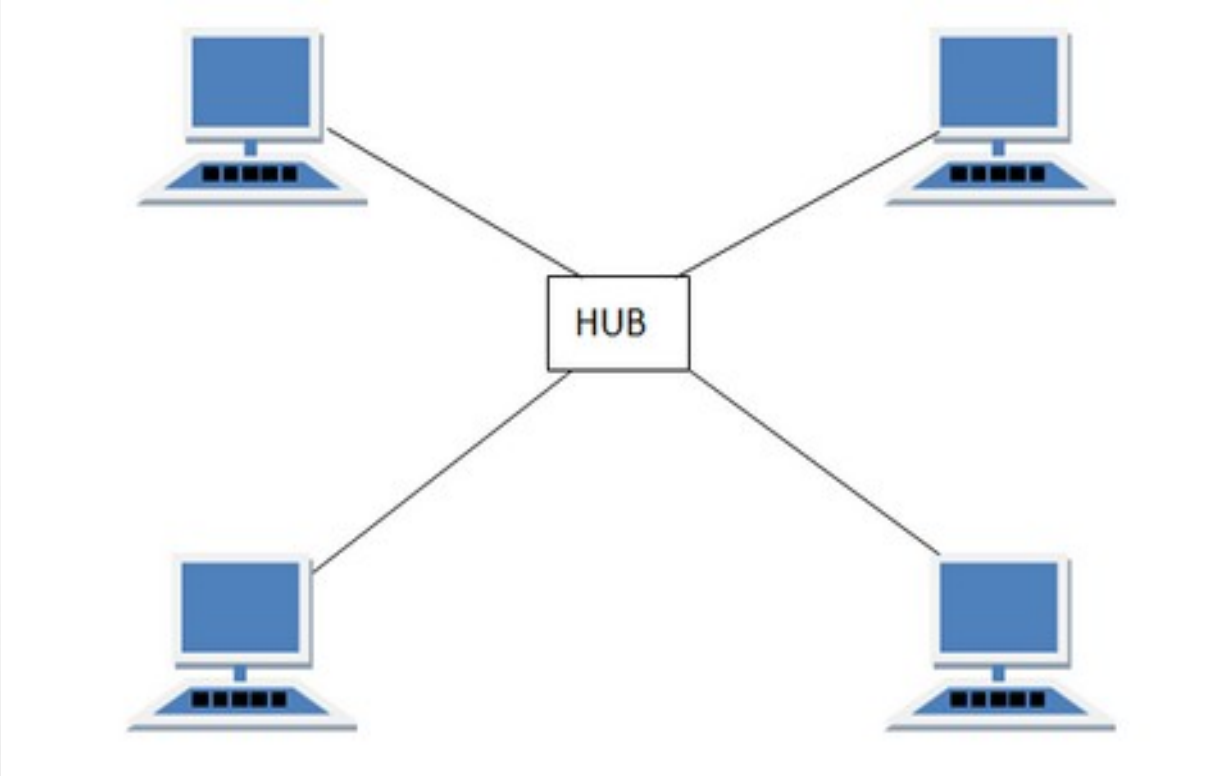
- It transmits data only in one direction.
- Every device is connected to a single cable
- Advantage
  - Easy to implement
  - Cheaper
  - Cost effective
  - Weight reduction
- Disadvantage
  - Limited cable and no of stations
  - Cables fails then whole network fails
  - Maintenance is higher
  - Significant capacitive load

Ring Topology



- Each packet is sent around the ring until it reaches its final destination
- Advantages
  - Each device has access
  - Better than star topology
  - Can create large network
  - Doesnt require network server
- Disadvantage
  - Troubleshooting is difficult
  - Adding or deleting the computers disturbs the network activity.
  - Failure of one computer disturbs the whole network.

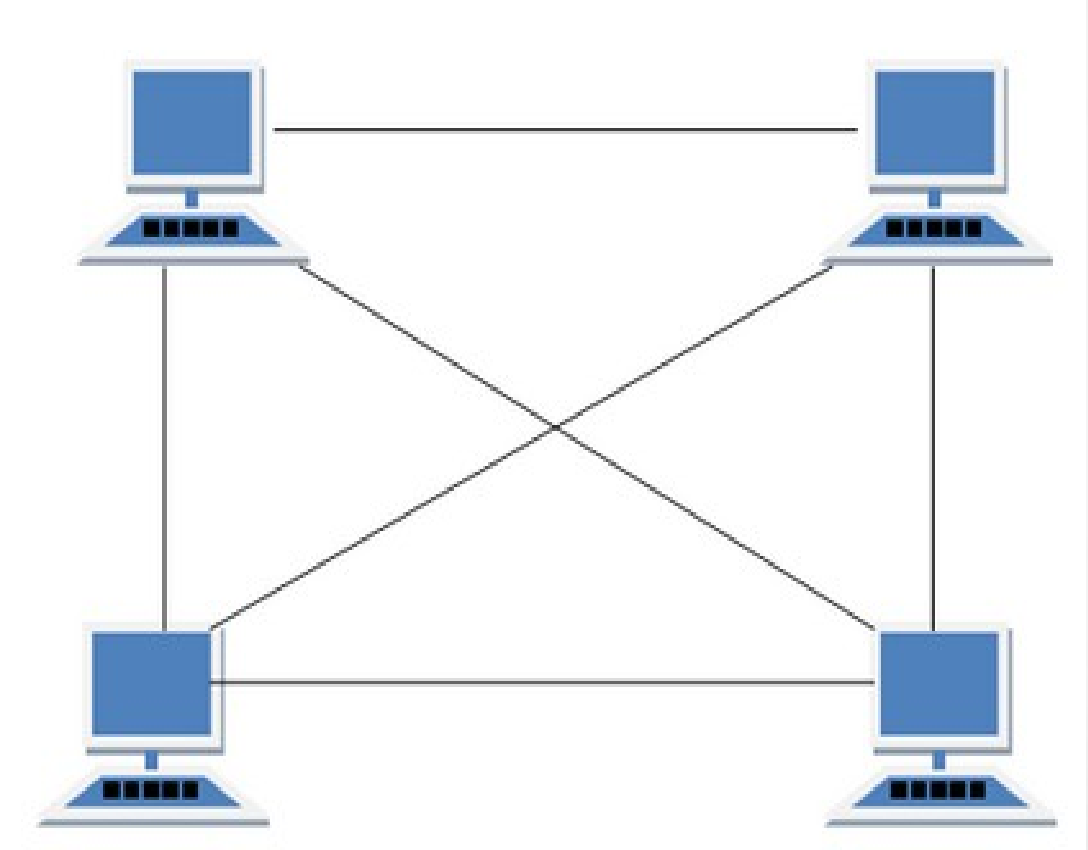
Star topology



- Every node has its own dedicated connection to the hub.
- Hub acts as a repeater for data flow.
- Can be used with twisted pair, Optical Fibre or coaxial cable.
- Advantages
  - Better & Fast performance with few nodes and low network traffic.
  - Isolation(separation) of devices, Hub can be upgraded easily.
  - Easy to troubleshoot.
  - Benifits from centralization
  - Easy to setup and modify.
  - Only that node is affected which has failed, rest of the nodes can work smoothly.

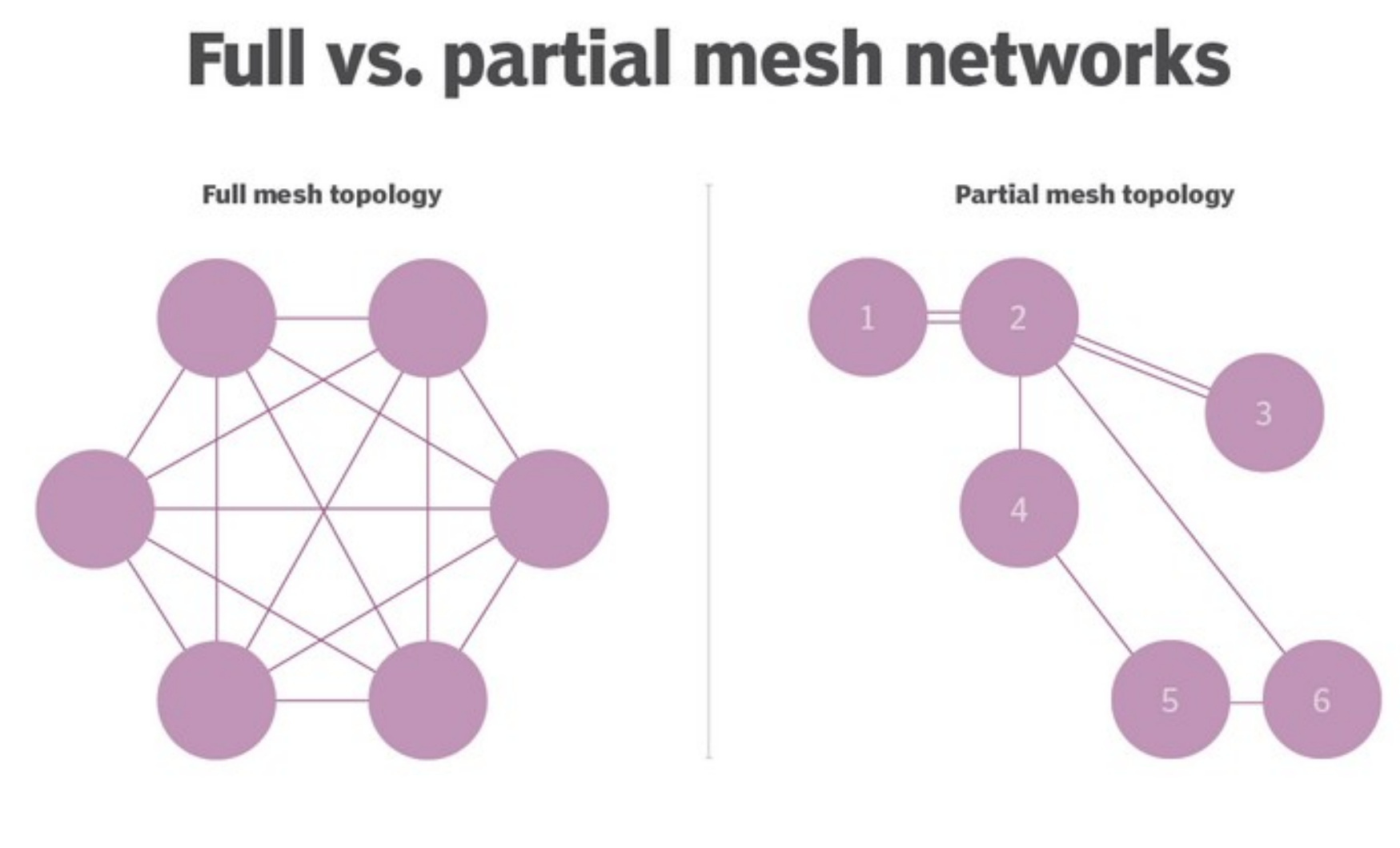
- Disadvantages
  - High Dependence
  - Network size is limited
  - Cost of installation is high.
  - Expensive to use.
  - Physical Complexity
  - If the hub fails then the whole network is stopped because all the nodes depend on the hub.

Mesh Topology



- Advantages
  - Provide redundent paths
  - Network can be expanded without disruption to current users
- Disadvantages
  - Requires more cable than other LAN topologies
  - Complicated implementation
  - Difficult to detect fault

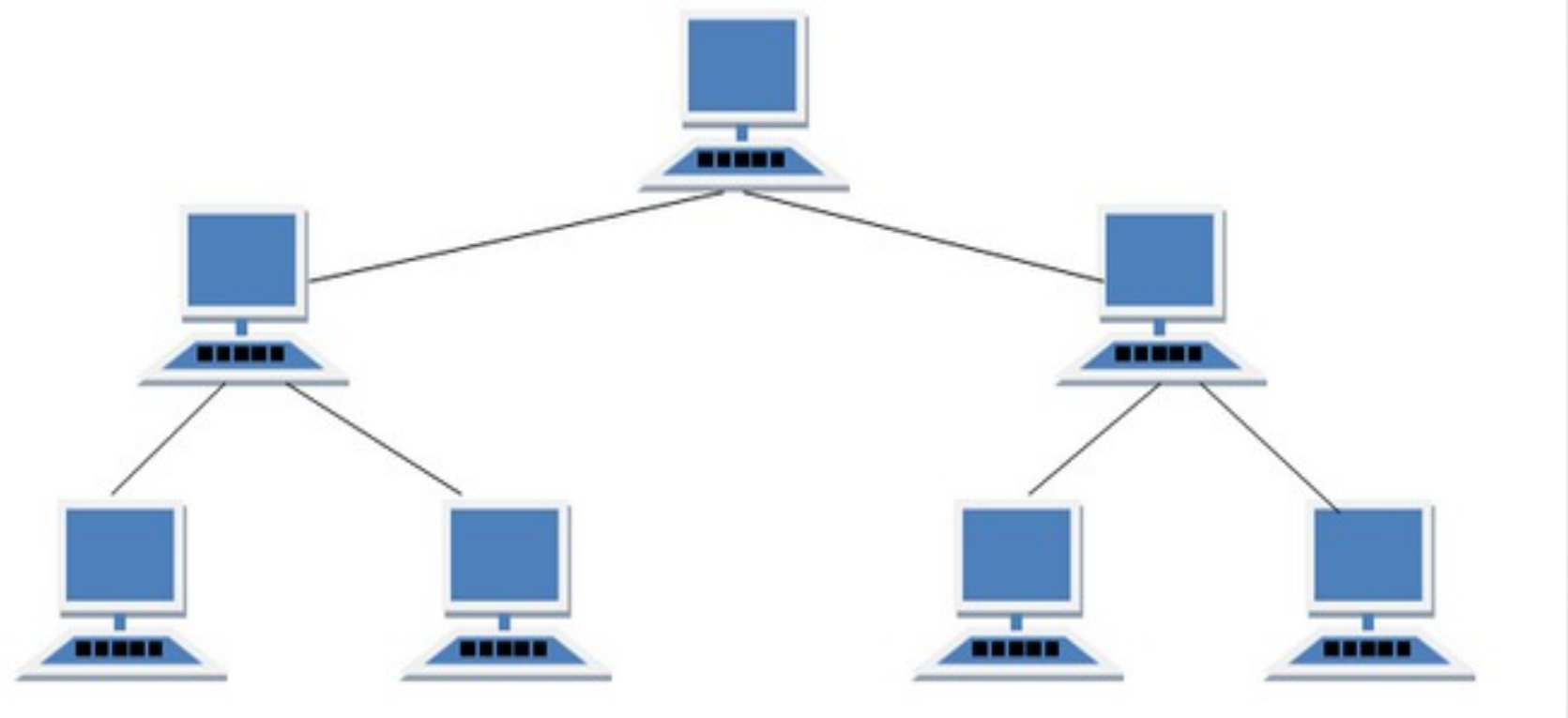
Full mesh vs Partial mesh networks



Full Mesh/ Partial Mesh network

- In a full mesh network topology, each node is connected directly to all the other nodes.
- In a partial mesh topology, only some nodes connect directly to one another. In some cases, a node must go through another node to reach a third node.

Tree topology



- Ideal if workstations are located in groups.
- Used in Wide Area Network.

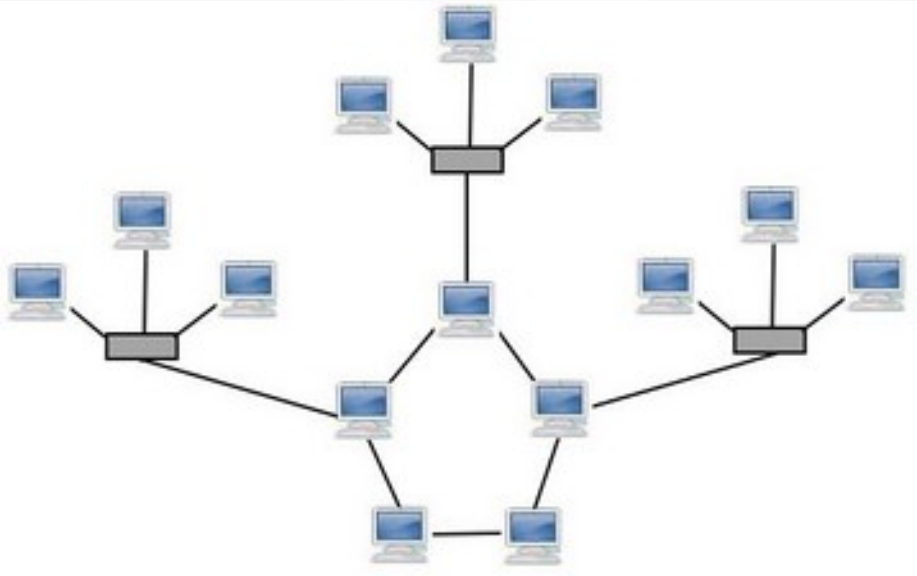
- Advantages
  - Point to point connection is possible
  - Access to imidiate networks
  - Best for branched out networks
- Disadvantages
  - Length is depend on type of cable
  - Dependent on the main computer
  - Difficult to configure

Hybrid Network

- A hybrid topology is a type of network topology that uses two or more differing network topologies. These topologies can include a mix of bus topology, mesh topology, ring topology, star topology, and tree topology.
- The choice to use a hybrid topology over a standard topology depends on the needs of a business, school, or the users. The number of computers, their location, and desired network performance are all factors in the decision.

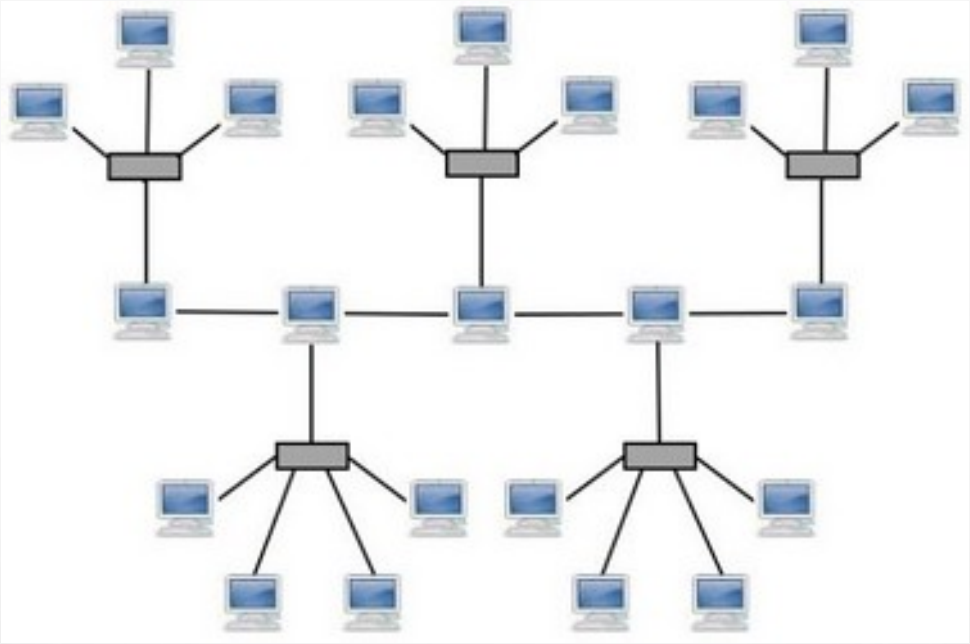
Types of hybrid topologies

- Star-Ring hybrid topology
- A star-ring hybrid topology is a combination of the star topology and ring topology. Two or more star topologies are connected together through a ring topology.



Star-Bus hybrid topology

- A star-bus hybrid topology is a combination of the star topology and bus topology. Two or more star topologies are connected together through a bus topology.



Advantages of Hybrid Topology

- This type of topology combines the benefits of different types of topologies in one topology.
- Can be modified as per requirement.
- It is extremely flexible.
- It is very reliable.
- It is easily scalable as Hybrid networks are built in a fashion which enables easy integration of new hardware components.
- Error detecting and troubleshooting are easy.
- Handles a large volume of traffic.
- It is used to create large networks.
- The speed of the topology becomes fast when two topologies are put together.

Disadvantages of Hybrid Topology

- It is a type of network expensive.
- The design of a hybrid network is very complex.
- There is a change in the hardware to connect one topology with another topology.
- Usually, hybrid architectures are larger in scale so they require a lot of cables in the installation process.
- Hubs which are used to connect two distinct networks are very costly. And hubs are different from usual hubs as they need to be intelligent enough to work with different architectures.
- Installation is a difficult process.

Thank you