



**STUDY MATERIAL – 6**  
**TOPIC – NETWORKING**

**SUBJECT: COMPUTER APPLICATION**  
**F.M.:15**

**CLASS: XII**  
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## **Network Topologies**

Network topology is the arrangement of the elements of a communication network. It is similar to a building floor plan and represent a layout of the network.

- ☐ It determines the system performance.
- ☐ It determines the cable media type used to connect the network
- ☐ It determines the cost of cabling the network
- ☐ Some data access methods can work only with specific topologies
- ☐ Types of Network Topologies
  - ✓ **BUS Topology**
  - ✓ **STAR Topology**
  - ✓ **RING Topology**
  - ✓ **MESH Topology**
  - ✓ **TREE Topology**

## ❖ **BUS Topology**

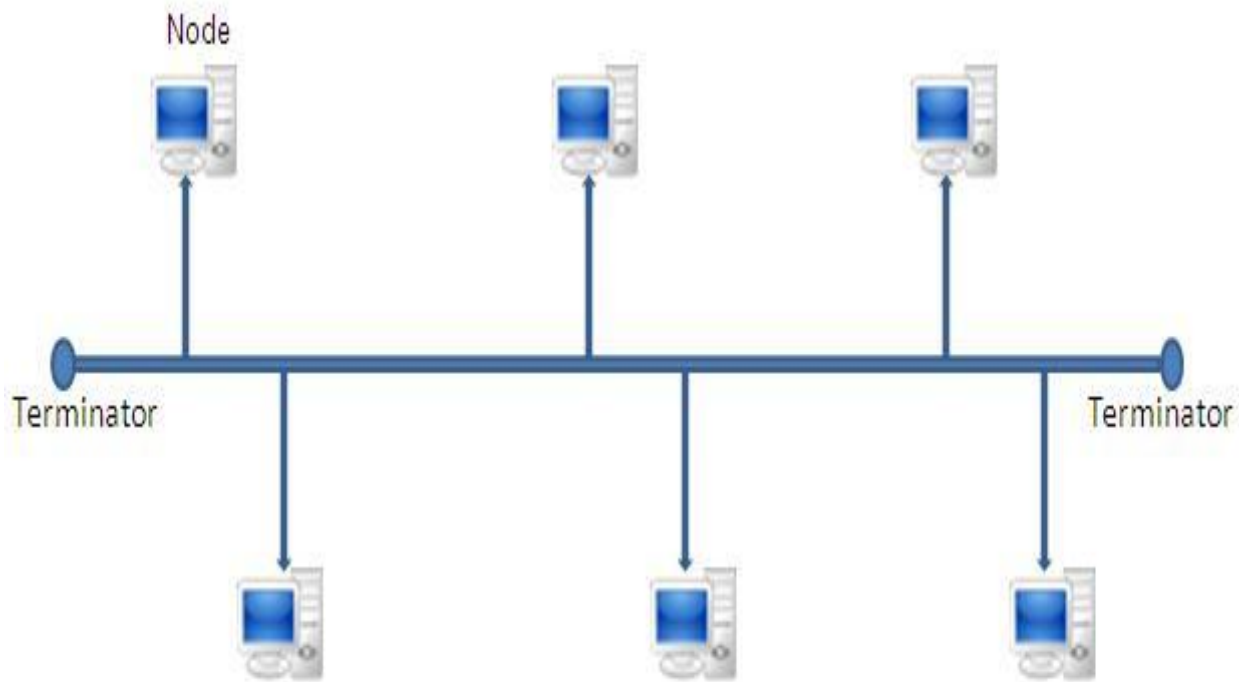
- ❑ A bus topology consists of a main run of cable with a terminator at each end.
- ❑ All nodes like workstations, printers, laptops, servers etc., are connected to the linear cable using small drop cables.
- ❑ Special connectors called T – connectors connect a drop cable to the backbone cable.
- ❑ The terminator is used to absorb the signal when the signal reaches the end, preventing signal bounce.

### ➤ **FUNCTIONS:**

To transmit data, the source node puts the message on the network. All devices receive the message, but only the node whose address matches with the destination address of the message accepts it.

### ➤ **Example:**

10Base5 & 10 Base2 Ethernet LAN topologies.



➤ **Advantages:**

- ✓ It is easy to set-up and extend bus network.
- ✓ Cable length required for this topology is the least compared to other networks.
- ✓ Bus topology costs very less.
- ✓ Linear Bus network is mostly used in small networks. Good for LAN.

➤ **Disadvantages:**

- ✓ There is a limit on central cable length and number of nodes that can be connected.
- ✓ Dependency on central cable in this topology has its disadvantages. If the main cable (i.e. bus ) encounters some problem, whole network breaks down.
- ✓ It is difficult to detect and troubleshoot fault at individual station.
- ✓ Efficiency of Bus network reduces, as the number of devices connected to it increases.
- ✓ It is not suitable for networks with heavy traffic.

## ❖ **STAR Topology**

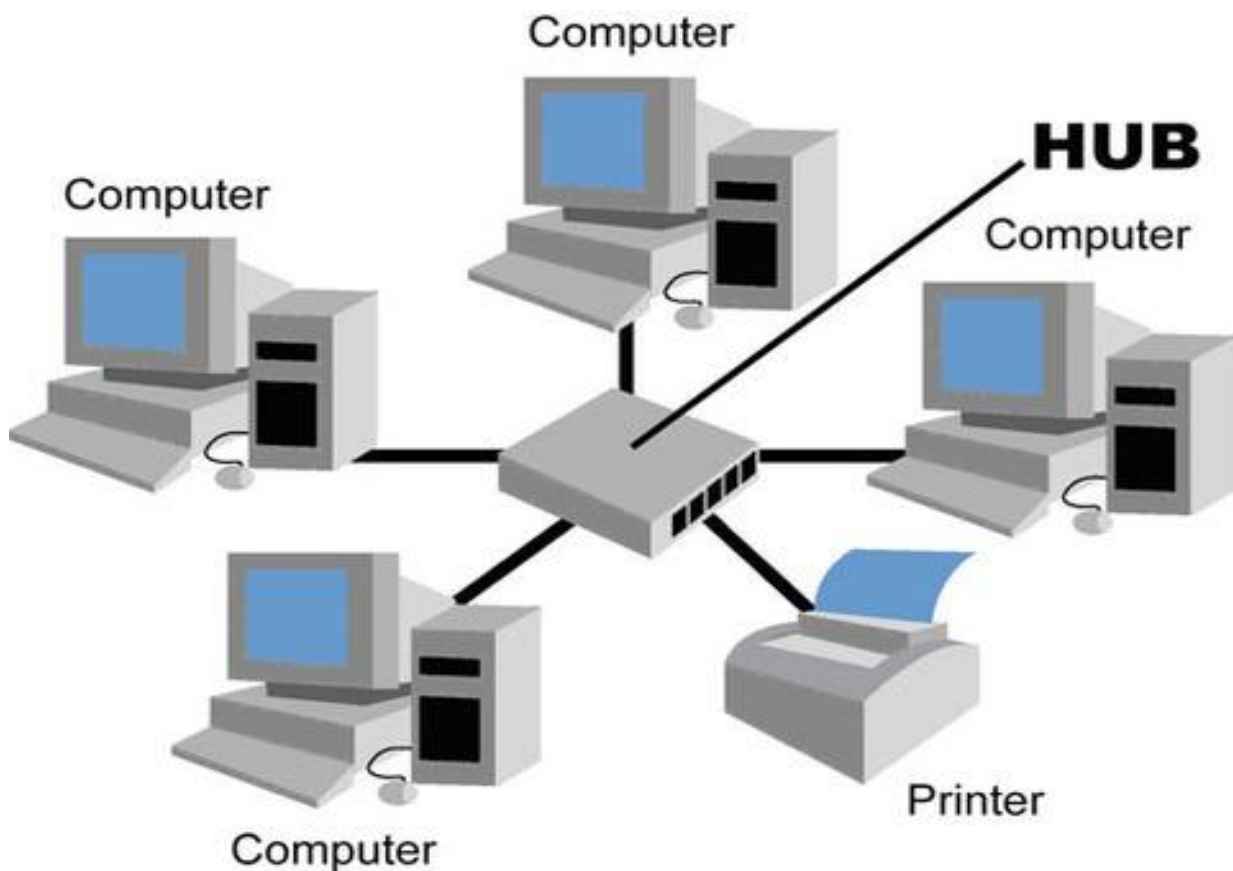
- ❑ In Star topology each network device is connected to a central device(a hub) through a point-to-point link with the help of drop cables extending in all directions from the hub.
- ❑ Usually UTP cable is used over here

### ➤ **FUNCTIONS :**

When a node transmits data the central hub receive the data from the node and transmits it to all the other nodes

### ➤ **Example:**

Usually used with a 10BaseT Ethernet LAN



➤ **Advantages:**

- ✓ Easy to manage and maintain the network because each node require separate cable.
- ✓ Easy to locate problems because cable failure only affect a single user.
- ✓ Due to Hub device network control, management is much easier.
- ✓ Easy to extend the network without disturbing the entire network

➤ **Disadvantages:**

- ✓ Entire performance of the network depends on the single device hub.
- ✓ Star topology requires more wires compared to the ring and bus topology.
- ✓ If the hub device goes down, the entire network will be dead.

## ❖ RING Topology

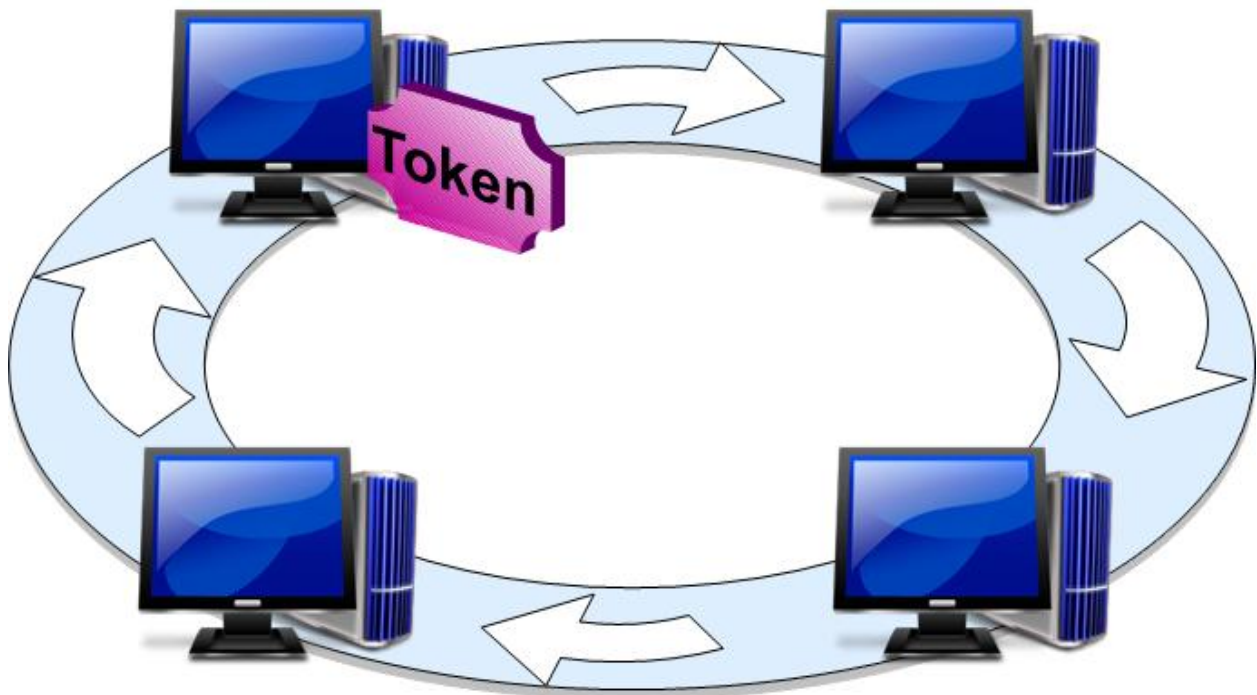
- ❑ In Ring topology each device is serially connected in a closed loop or ring, with each node connected to two other nodes.
- ❑ The ring in a ring topology is actually formed within a central device called a Multi-station Access Unit (MAU).

### ➤ Function:

To send data, a device has to collect a special electronic message called a token. The message along with the token then travels in a circular manner from one node to the next in a particular direction. The station whose address matches with the end address of the data accepts the data and acknowledges its receipt. It then re transmits the data back to the source node, where it is finally removed from the network. The token is again made free to be used by other nodes.

### ➤ Example:

IBM Token Ring & FDDI networks



➤ **Advantages:**

- ✓ Flow of data is in circular direction which minimizes the chance of packet collision.
- ✓ The uni-directional ring topology provides very high speed.
- ✓ It has better performance than bus topology, even when the nodes are increased.
- ✓ There is no need of network server to control the flow of data.

➤ **Disadvantages:**

- ✓ A single break in the cable can cause disturbance in the entire network.
- ✓ In Uni-directional Ring, a data packet (token) must pass through all the nodes.
- ✓ Addition and removal of any node in a network is difficult and can cause issue in network activity.

## ❖ MESH Topology

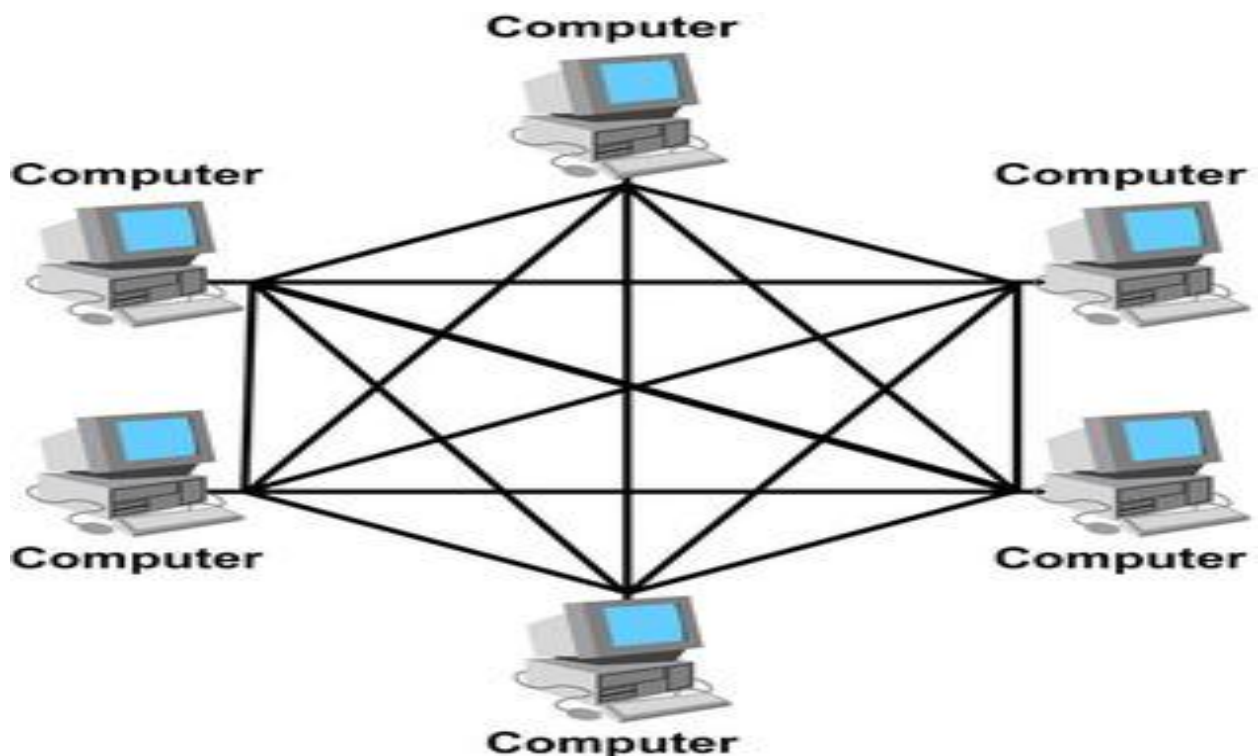
- ❑ In this topology each node on the network is connected to multiple nodes through separate cable links.
- ❑ In a full mesh topology, each computer is connected to all the other computers

### ➤ **Function:**

It functions like the bus topology, where a device accesses another device by putting the message addressed to that device in the network. Though all devices receive the message, only the node whose address matches with the destination address of the data packet, accepts it.

### ➤ **Example:**

Used in mission critical applications where a fault in the network cannot be tolerated.





➤ **Advantages:**

- ✓ There is no traffic problem as there are dedicated point to point links for each computer.
- ✓ It has multiple links, so if one route is blocked then other can be accessed for data communication.
- ✓ It provides high privacy and security.

➤ **Disadvantages:**

- ✓ Mesh topology requires high number of cables and I/o ports for the communication; hence, expensive.
- ✓ Installation is very difficult in mesh topology, as each node is connected to every node.

## ❖ TREE Topology

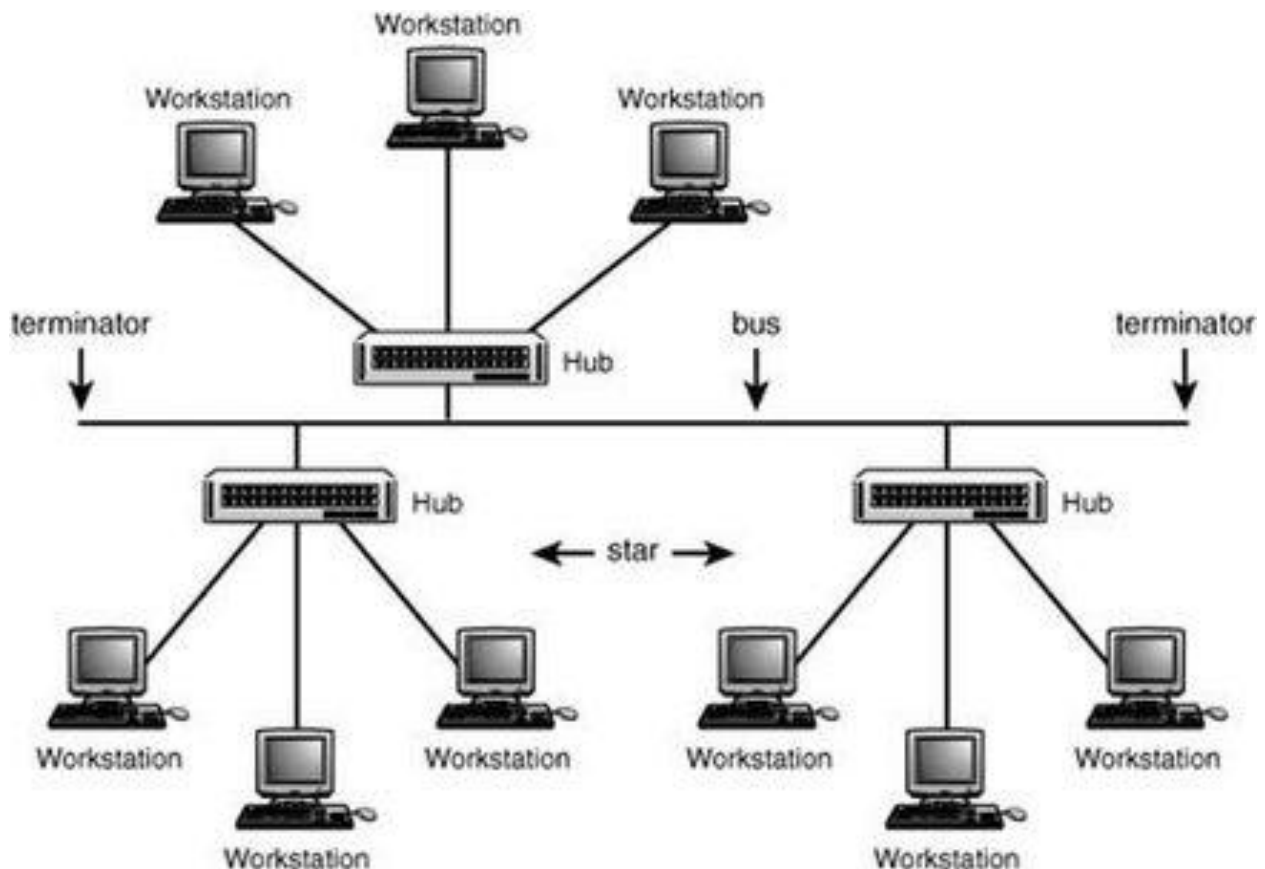
- ❑ Tree topology is used in a point to point network and looks like an inverted tree.
- ❑ It usually consists of groups of star-configured nodes connected to a central hub.

### ➤ Function:

A hub accepts data from one node and sends it to the other nodes and hubs like bus topology.

### ➤ Example:

Used in areas like domain name servers.



➤ **Advantages:**

- ✓ It provides high scalability, as leaf nodes can add more nodes in the hierarchical chain.
- ✓ Other nodes in a network are not affected, if one of their nodes get damaged
- ✓ It provides easy maintenance and fault identification.

➤ **Disadvantages:**

- ✓ Large cabling is required as compared to star and bus topology.
- ✓ On the failure of a hub, the entire network fails.
- ✓ Tree network is very difficult to configure than other network topologies.

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