Study Regular Computer Networks Day-2 Notes

Types of Network According to Design:

1)Peer-Peer Model:

- Every node act as client-server

- Less expensive

- Used in small business or home users

- Each peer has it own data

- Less Security

2)Client Server Model:

- Specific server & specific clients connected to the server

- Expensive

- Used in Big Business

- Data is stored in centralized server

- More security

Network Topology: Network topology is the arrangement of the various elements of a computer or biological network. Essentially it is the topological structure of a network, and may be depicted physically or logically. Physical topology refers to the placement of the network's various components, inducing device location and cable installation, while logical topology shows how data flows within a network, regardless of its physical design.

Devices on the network are referred to as 'nodes.' The most common nodes are computers and peripheral devices. Network topology is illustrated by showing these nodes and their connections using cables.

Factors to be taken into consideration while choosing a Network topology:

1) Scale of your project (in terms of number of components to be connected).
2) Amount of traffic expected on the network.
3) Budget allotted for the network i.e. amount of money you are willing to invest.
4) Required response time

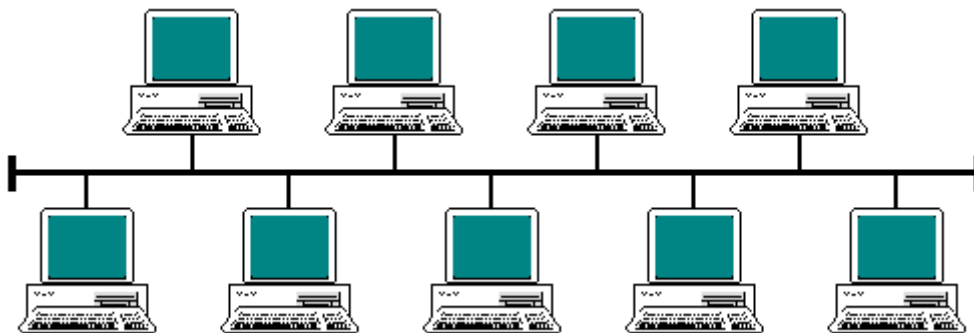**Types of Network Topology:**

1)Bus Topology

2)Ring Topology

3)Star Topology

4)Mesh Topology

5)Tree Topology

1)Bus Topology: In networking a bus is the central cable -- the main wire -- that connects all devices on a local-area network (LAN). It is also called the *backbone.* This is often used to describe the main network connections composing the Internet. Bus networks are relatively inexpensive and easy to install for small networks. Ethernet systems use a bus topology.A signal from the source is broadcasted and it travels to all workstations connected to bus cable. Although the message is broadcasted but only the intended recipient, whose MAC address or IP address matches, accepts it. If the MAC /IP address of machine doesn't match with the intended address, machine discards the signal. A terminator is added at ends of the central cable, to prevent bouncing of signals. A barrel connector can be used to extend it.

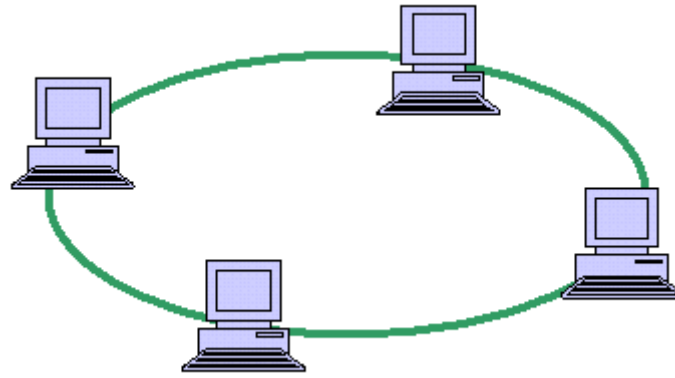

ADVANTAGES OF BUS TOPOLOGY

1. It is cost effective.
2. Cable required is least compared to other network topology.
3. Used in small networks.
4. It is easy to understand.
5. Easy to expand joining two cables together.

DISADVANTAGES OF BUS TOPOLOGY

1. Cables fails then whole network fails.
2. If network traffic is heavy or nodes are more the performance of the network decreases.
3. Cable has a limited length.
4. It is slower than the ring topology.

2)Ring Topology: All the nodes are connected to each-other in such a way that they make a closed loop. Each workstation is connected to two other components on either side, and it communicates with these two adjacent neighbors. Data travels around the network, in one direction. Sending and receiving of data takes place by the help of TOKEN.

*Token Passing***:** Token contains a piece of information which along with data is sent by the source computer. This token then passes to next node, which checks if the signal is intended to it. If yes, it receives it and passes the empty to into the network, otherwise passes token along with the data to next node. This process continues until the signal reaches its intended destination.
The nodes with token are the ones only allowed to send data. Other nodes have to wait for an empty token to reach them. This network is usually found in offices, schools and small buildings.
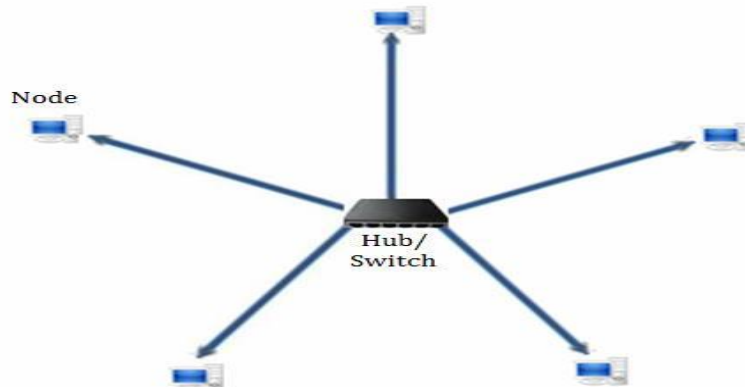
ADVANTAGES OF RING TOPOLOGY

1. Transmitting network is not affected by high traffic or by adding more nodes, as only the nodes having tokens can transmit data.
2. Cheap to install and expand

DISADVANTAGES OF RING TOPOLOGY

1. Troubleshooting is difficult in ring topology.
2. Adding or deleting the computers disturbs the network activity.
3. Failure of one computer disturbs the whole network.

3)Star Topology: In a star network devices are connected to a central computer, called a hub. Nodes communicate across the network by passing data through the hub.

Advantages of Star Topology

1) As compared to Bus topology it gives far much better performance, signals don't necessarily get transmitted to all the workstations. A sent signal reaches the intended destination after passing through no more than 3-4 devices and 2-3 links. Performance of the network is dependent on the capacity of central hub.
2) Easy to connect new nodes or devices. In star topology new nodes can be added easily without affecting rest of the network. Similarly components can also be removed easily.
3) Centralized management. It helps in monitoring the network.
4) Failure of one node or link doesn't affect the rest of network. At the same time its easy to detect the failure and troubleshoot it.
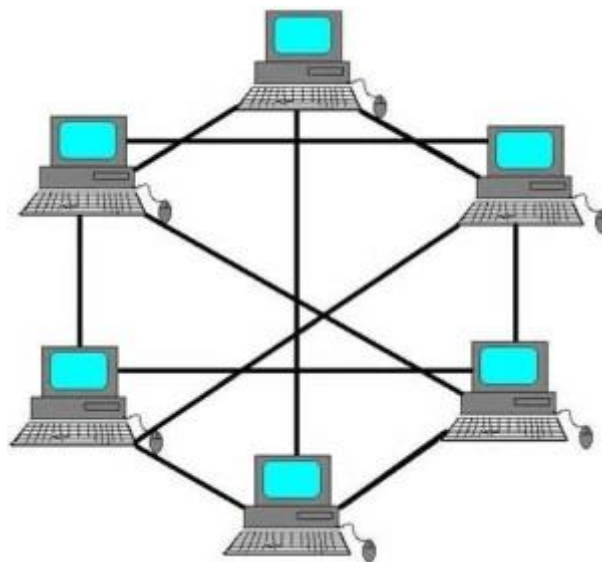
Disadvantages of Star Topology

1) Too much dependency on central device has its own drawbacks. If it fails whole network goes down.
2) The use of hub, a router or a switch as central device increases the overall cost of the network.
3) Performance and as well number of nodes which can be added in such topology is depended on capacity of central device.

4)Mesh Topology: In a mesh network, devices are connected with many redundant interconnections between network nodes. In a true mesh topology every node has a connection to every other node in the network.

There are two types of mesh topologies:

Full mesh topology:occurs when every node has a circuit connecting it to every other node in a network. Full mesh is very expensive to implement but yields the greatest amount of redundancy, so in the event that one of those nodes fails, network traffic can be directed to any of the other nodes. Full mesh is usually reserved for backbone networks.

Partial mesh topology: is less expensive to implement and yields less redundancy than full mesh topology. With partial mesh, some nodes are organized in a full mesh scheme but others are only connected to one or two in the network. Partial mesh topology is commonly found in peripheral networks connected to a full meshed backbone.
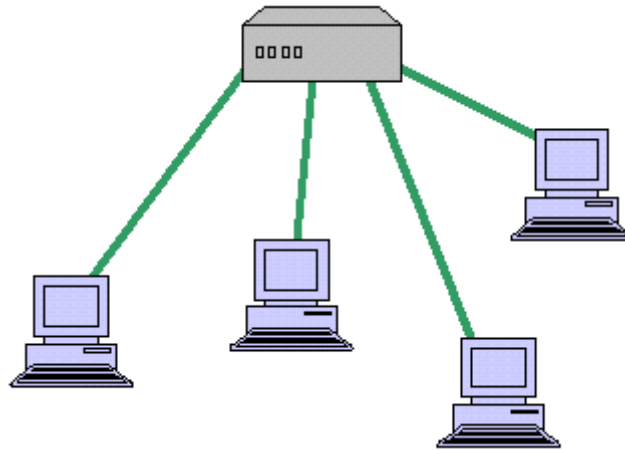

ADVANTAGES OF MESH TOPOLOGY

1. Each connection can carry its own data load.
2. It is robust.
3. Fault is diagnosed easily.
4. Provides security and privacy.

DISADVANTAGES OF MESH TOPOLOGY

1. Installation and configuration is difficult.
2. Cabling cost is more.
3. Bulk wiring is required.

5)Tree Topology: Tree Topology integrates the characteristics of Star and Bus Topology. Earlier we saw how in Physical Star network Topology, computers (nodes) are connected by each other through central hub. And we also saw in Bus Topology, work station devices are connected by the common cable called Bus. After understanding these two network configurations, we can understand tree topology better. In Tree Topology, the number of Star networks are connected using Bus. This main

cable seems like a main stem of a tree, and other star networks as the branches. It is also called Expanded Star Topology.


ADVANTAGES OF TREE TOPOLOGY

1. Extension of bus and star topologies.
2. Expansion of nodes is possible and easy.
3. Easily managed and maintained.
4. Error detection is easily done.

DISADVANTAGES OF TREE TOPOLOGY

1. Heavily cabled.
2. Costly.
3. If more nodes are added maintenance is difficult.
4. Central hub fails, network fails.

6)Hybrid Topology: A hybrid topology is a type of network topology that uses two or more other network topologies, including bus topology, mesh topology, ring topology, star topology, and tree topology.

HYBRID TOPOLOGY
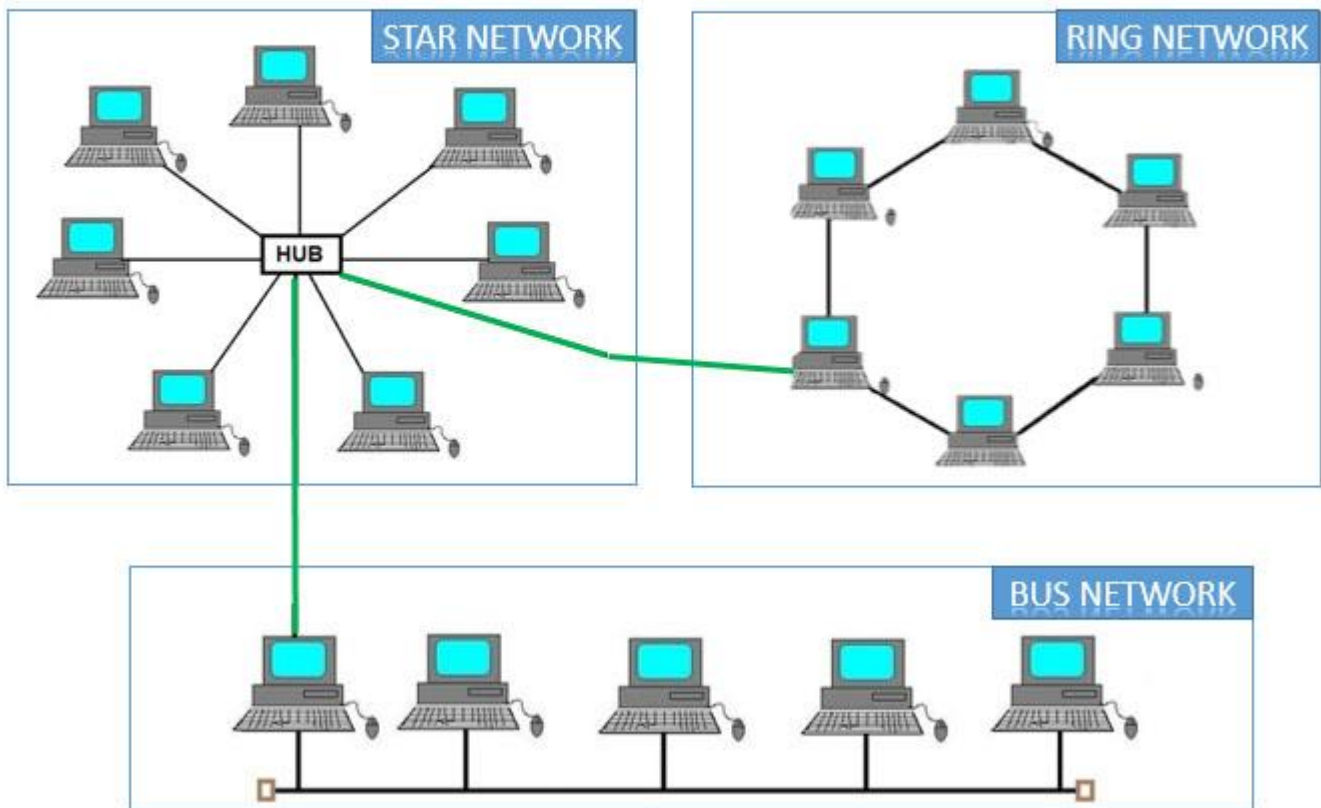
Hybrid network topology has many advantages. Hybrid topologies are flexible, reliable, have increased fault tolerance. The new nodes can be easily added to the hybrid network, the network faults can be easily diagnosed and corrected without affecting the work of the rest of network. But at the same time hybrid topologies are expensive and difficult for managing.

Types of Network:

1)LAN: A LAN connects network devices over a relatively short distance. A networked office building, school, or home usually contains a single LAN, though sometimes one building will contain a few small LANs (perhaps one per room), and occasionally a LAN will span a group of nearby buildings. In TCP/IP networking, a LAN is often but not always implemented as a single IP subnet.A LAN typically relies mostly on wired connections for increased speed and security, but wireless connections can also be part of a LAN. High speed and relatively low cost are the defining characteristics of LANs.the maximum span of **10 km**.

2)WAN: A wide area network, or WAN, occupies a very large area, such as an entire country or the entire world. A WAN can contain multiple smaller networks, such as LANs or MANs. The Internet is the best-known example of a public WAN.

3)MAN: A metropolitan area network (MAN) is a hybrid between a LAN and a WAN. Like a WAN, it connects two or more LANs in the same geographic area. A MAN, for example, might connect two different buildings or offices in the same city. However, whereas WANs typically provide low- to medium-speed access, MAN provide high-speed connections, such as T1 (1.544Mbps) and optical services.
The optical services provided include SONET (the Synchronous Optical Network standard) and SDH (the Synchronous Digital Hierarchy standard). With these optical services, carriers can provide high-speed services, including ATM and Gigabit Ethernet. These two optical services provide speeds

ranging into the hundreds or thousands of megabits per second (Mbps). Devices used to provide connections for MANs include high-end routers, ATM switches, and optical switches.

4)PAN: A Personal Area Network (PAN) is a computer network used
for communication among computer devices, including telephones and personal digital assistants, in proximity to an individual's body. The devices may or may not belong to the person in question. The reach of a PAN is typically a few meters. PANs can be used for communication among the personal devices themselves (intrapersonal communication), or for connecting to a higher level network and the Internet .

5)*Campus Area Network*: This is a network which is larger than a LAN, but smaller than an MAN. This is typical in areas such as a university, large school or small business. It is typically spread over a collection of buildings which are reasonably local to each other. It may have an internal Ethernet as well as capability of connecting to the internet.

6)*Storage Area Network*: This network connects servers directly to devices which store amounts of data without relying on a LAN or WAN network to do so. This can involve another type of connection known as Fibre Channel, a system similar to Ethernet which handles high-performance disk storage for applications on a number of professional networks.

MCQ:

1)Which model is more secure in the network?
a)Peer-Peer model
b)Point to Point
c)Client-Server model
d)None of these

2)In ring topology which technology is used for implementation?
a)FDDI
b)SONET
c)Token
d)All of the above

3)In which topology,every node are connected to a single cable ?
a)Bus
b)Mesh
c)Ring
d)Star

4)Most widely used topology is
a)Tree
b)Ring
c)Bus
d)Star

5)If no of node is 6 then what is the no of links/wire in mesh topology?
a)12
b)15
c)20
d)10

6)Mesh topology widely used in
a)LAN
b)WAN
c)MAN
d)None of these

7)Which technology used in LAN & MAN?
a)Ethernet
b)Token
c)FDDI
d)None of these

8)Tree topology is
a)Ring+Star
b)Bus+Star
c)Bus+Ring
d)Ring+Mesh

Answers:

1)c

2)d

3)a

4)d

5)b

6)b

7)a

8)b