BUS TOPOLOGY

[##]What is Bus Network..?

A bus network is a network topology in which Nodes are connected in a daisy chain by a linear sequence of buses.

*Nodes : Any Device in Network are called nodes.*

[##]How the Bus Network works..?

The Bus Network is in a Linear, means all nodes are connected in a linear as shown in picture. In Bus Network the Bus is actually a data Link. In this Network the bus can only transmit data in one direction. A host in this network is called a station or workstation. But their is a Big problem If any network segment is severed then all network transmission are stopped or in other ways the whole network will ceases.
In a bus network, every station receives all network traffic (it should be generated by each station). Main thing is that, All the station have equal transmission priority. Collision domain is normal in this network.

A collision domain: It is a section of a network where data packets can collide with one another when being sent on a shared medium or through repeaters, particularly when using early versions of Ethernet. A network collision occurs when more than one device attempts to send a packet on a network segment at the same time. In order for nodes to transmit on the same cable simultaneously, they use a media access control technology such as carrier sense multiple access (CSMA) or a bus master.

[#]What are the Advantages and Disadvantages of Bus Topology..?

ADVANTAGES:

1. Easy to connect a computer or peripheral to a linear bus
2. Lower cost than star, hybrid, ring.
3. Requires less cable length than a star topology
4. It works well for small networks.
DISADVANTAGES:

1. If in the main cable their is any breakage than Entire network shuts down
2. It is slow when more devices are added into the network
3. Terminators are required at both ends of the backbone cable
4. Difficult to identify the problem if the entire network shuts down
5. Not meant to be used as a stand-alone solution in a large building

STAR TOPOLOGY

What is STAR Network?

A star topology is a topology for a Local Area Network in which all nodes are individually connected to a central connection point, which should be a hub or a switch. A star takes more cable than e.g. a bus, but the benefit is that if a cable fails, only one node will be brought down.

How the STAR Network works?

Star networks are one of the most common computer network topologies. In its simplest form, a star network consists of one central switch, hub or computer, which acts as a conduit to transmit messages. This consists of a central node, to which all other nodes are connected, this central node provides a common connection point for all nodes through a hub. Data on a star network passes through the hub, switch, or concentrator before continuing to its destination. The hub, switch, or concentrator manages and controls all functions of the network. It also acts as a repeater for the data flow. This configuration is common with twisted pair cable. However, it can also be used with coaxial cable or optical fibre cable. The star topology reduces the damage caused by line failure by connecting all of the systems to a central node.

[See the picture at the top]

The switch is the server and the peripherals are the clients. An active star network has an active central node that usually has the means to prevent echo-related problems. All peripheral nodes may thus communicate with all others by transmitting to, and receiving from, the central node only. The failure of a transmission line linking any peripheral node to the central node will result in the isolation of that peripheral node from all others, but the rest of the systems will be unaffected. It is also designed with each node (file servers, workstations, and peripherals)
connected directly to a central network hub, switch, or concentrator. Star Topology is normally Mostly used in present day. But Should should know Advantages and Disadvantages of Star Network Below:

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**What are the Advantages and Disadvantages of STAR Topology..?**

**ADVANTAGES :**

1. **Easy to troubleshoot :** When any one node or wire is crash or break then identification and replacing is easy and it will not stop or cease the whole network.

2. **Isolation of devices :** Each device is inherently isolated by the link that connects it to the hub. This makes the isolation of individual devices straightforward and amounts to disconnecting each device from the others. This isolation also prevents any non-centralized failure from affecting the network.

3. **Benefits from centralization :** As the central hub is the bottleneck, increasing its capacity, or connecting additional devices to it, increases the size of the network very easily. Centralization also allows the inspection of traffic through the network. This facilitates analysis of the traffic and detection of suspicious behavior.

4. **No disruptions to the network when connecting or removing devices.**

5. **Easy to configure :** Installation and configuration is easy since every one device only requires a link and one input/output port to connect it to any other device.

6. **Better performance :** Star topology prevents the passing of data packets through an excessive number of nodes. At most, 3 devices and 2 links are involved in any
communication between any two devices. Although this topology places a huge overhead on the central hub, with adequate capacity, the hub can handle very high utilization by one device without affecting others.

7. **Easy to detect faults and to remove parts.**

**DISADVANTAGES:**

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.
**TREE TOPOLOGY**

**What is TREE Network..?**

A tree topology combines characteristics of linear bus and star topologies. It consists of groups of star-configured workstations connected to a linear bus backbone cable. Tree topologies allow for the expansion of an existing network, and enable schools to configure a network to meet their needs.

**How the TREE Network works..?**

Tree Topology is a combination of the bus and the Star Topology. The tree like structure allows you to have many servers on the network and you can branch out the network in many ways. This is particularly helpful for colleges, universities and schools so that each of the branches can identify the relevant systems in their own network and yet connect to the big network in some way. It

**What are the Advantages and Disadvantages of TREE Topology..?**

**ADVANTAGES :**

1. A Tree Topology is supported by many network vendors ad even hardware vendors.
2. All the computers have access to the larger and their immediate networks.
4. A point to point connection is possible with Tree Networks.

**DISADVANTAGES :**
1. Because of its basic structure, tree topology, relies heavily on the main bus cable, if it breaks whole network is crippled.
2. Scalability of the network depends on the type of cable used.
3. As more and more nodes and segments are added, the maintenance becomes difficult.

RING TOPOLOGY

What is RING Network..?

A ring network is a network topology in which each node connects to exactly with two other nodes, forming a single continuous pathway for signals through each node - a ring. Data travel from node to node, with each node along the way handling every packet. 
[Nodes : Devices in Network are called nodes.]
How the RING Network works..?

The ring topology can be a true physical ring or a logical ring. A true ring network is similar to a linear bus, in that each computer is connected to the next in a line--but with one important difference. In this case, the last computer is connected back to the first, eliminating the "beginning" and "end" of the network and forming a complete circle around which the data can travel. This also eliminates any signal bounce problem as well as the need for termination. The ring topology can also be a logical one, in which the signal path is a ring but the external physical appearance is that of a star, as in Token Ring networks. This is sometimes called a star-wired ring. in other ways it uses Token, Unlike Ethernet, Token Ring uses a ring topology whereby the data is sent from one machine to the next and so on around the ring until it ends up back where it started. It also uses a token passing protocol which means that a machine can only use the network when it has control of the Token, this ensures that there are no collisions because only one machine can use the network at any given time. Token Ring networks are now very rare because the cost and flexibility of Ethernet came to dominate the market.

What are the Advantages and Disadvantages of RING Topology..?

ADVANTAGES :

1. Easy set-up and reconfigure
2. Due to the point to point line configuration of devices with a device on either side.
3. Point to point line configuration makes it easy to identify and isolate faults.
4. Active topology implementation strengthens signal as it passes around ring.
5. Very orderly network where every device has access to the token and the opportunity to transmit
6. Performs better than a bus topology under heavy network load
7. Does not require a central node to manage all Devices

DISADVANTAGES :
1. Lack of fault tolerance
2. Moving, adding and changing the devices can affect the network
3. Difficult to add and remove devices once the network has been set up
4. One malfunctioning workstation can create problems for the entire network. This can be solved by using a dual ring or a switch that closes off the break.
5. Communication delay will increase if the number of nodes will increase
6. Bandwidth is shared on all links between devices

HYBRID TOPOLOGY

What is HYBRID Network..?

Hybrid topology is an integration of two or more different topologies to form a resultant topology which has many advantages and disadvantages of all the constituent basic topologies rather than having characteristics of one specific topology.
How the HYBRID Network works..?

A hybrid topology is always produced when two different basic network topologies are connected. Two common examples for Hybrid network are: star ring network and star bus network. A Star ring network consists of two or more star topologies connected using a multistation access unit as a centralized hub. A Star Bus network consists of two or more star topologies connected using a bus trunk. While grid and torus networks have found popularity in high-performance computing applications, some systems have used genetic algorithms to design custom networks that have the fewest possible hops in between different nodes. Some of the resulting layouts are nearly incomprehensible, although they function quite well. A Snowflake topology is really a "Star of Stars" network, so it exhibits characteristics of a hybrid network topology but is not composed of two different basic network topologies being connected.

What are the Advantages and Disadvantages of HYBRID Topology..?

ADVANTAGES:

1. **Reliable**: It is very reliable. It detect the Fault very easily and troubleshooting is easy in this type of topology.

2. **Flexible**: Hybrid Network can be designed according to the requirements of the organization and by optimizing the available resources. Special care can be given to nodes where traffic is high as well as where chances of fault are high.

3. **Effective**: Hybrid topology is the combination of two or more topologies, so we can design it in such a way that strengths of constituent topologies are maximized while there weaknesses are neutralized. For example we saw Ring Topology has good data reliability and Star topology has high tolerance capability, so these two can be used effectively in hybrid star-ring topology.

4. **Scalable**: It's easy to increase the size of network by adding new components, without disturbing existing architecture.
DISADVANTAGES:

1. **Complexity of Design:** One of the biggest drawbacks of hybrid topology is its design is very tough. Reconfiguration and installation process needs to be very efficient.

2. **Costly Infrastructure:** As hybrid architectures are usually larger in scale. The hybrid network needs lot of cables, cooling systems, etc.

3. **Costly Hub:** The hubs used to connect two distinct networks, are very expensive. These hubs are different from usual hubs as they need to be intelligent enough to work with different architectures and should be function even if a part of network is down.

4. **MAU (Multistation Access Unit) is required.**

**MESH TOPOLOGY**

What is MESH Network..?
A mesh network is a network topology in which each node relays data for the network. All nodes cooperate in the distribution of data in the network. Every node in a mesh network is called a mesh node. Mesh networks can relay messages using either a flooding technique or a routing technique.

How the MESH Network works..?

Mesh networks can use a full mesh topology or a partial mesh topology. In a full mesh topology, each network node is connected to all the other nodes in the network. In a partial mesh topology, at least one node connects directly to every other node while others may only connect to those nodes they exchange data with on a frequent basis. Few years ago when mesh networks were always wired, the topology could be expensive and tough to configure because each node had to be physically connected to the other nodes. And now advances in wireless communication and short-range wireless personal network (WPAN) specifications have removed the physical and financial barriers. The illustration shows a full mesh network with six nodes. Each node is shown as a sphere and connections are shown as straight lines.

What are the Advantages and Disadvantages of MESH Topology..?

ADVANTAGES:

1. Traffic Abundance Due to the fact that every connected device to a mesh topology is a node, a mesh topology can withstand high amounts of traffic. Also the interconnection of many devices at once also means that simultaneous transfers do not hinder or affect the network in anyway.

2. Ever growing Mesh topologies aren't affected by size or a shortage of users. As previously stated the internet functions on the mesh topology. The internet is constantly growing with more and more devices connecting and information being flooded into the network. This creates a large hub of data and useful information that many users connected to the network can avail.

3. Reliability Mesh topologies do not collapse if a single node disconnects or has connection issues. This is because each node is singularly connected to many different
ones. One device falling off the network will not affect file transfers as this topology will allow your connection to find alternatives very quickly.

**DISADVANTAGES:**

1. **Conclusion** The mesh topology is very handy and practical in the world today. Considering that information is flowing in every direction from an innumerable amount of sources, the mesh topology provides a layout that makes it much easier for this constant flow of data.

2. **Highly expensive:** The layout of a mesh topology requires constant supervision and is very expensive to implement. However once implemented a mesh topology can bring back a lot of the lost revenue.

3. **High maintenance** Mesh topologies are very hard to maintain and manage. They require constant supervision due to redundancies and failures in the network. However a capable team of administrators can manage a mesh topology without too much of a hassle.