A computer network is defined as a collection of computers connected that follow similar protocols and allow the computer to interact with another computer and share its resources, data, and applications.

A network topology defines the physical interconnection of its constituent elements. We can say that the topology of a network defines how the various nodes of the network are interconnected. Here the interconnection can be real or logical. The term Real implies physical or actual connection and logical interconnection refers to the way data is exchanged between the constituents.

With this article, we will learn the different types of network topology- Bus, Star, Mesh, Ring, Tree, and Hybrid, their orientation and uses.

Types of Network Topology

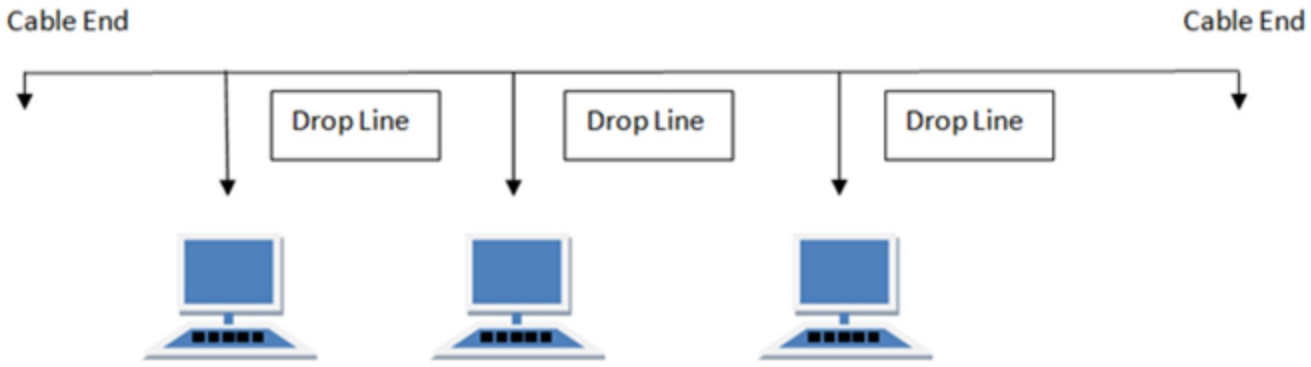
The way to arrange or connect patterns of computers/nodes/devices used in the network is known as network topology. The common types of network topologies are as follows:

1. Bus topology
2. Star Topology
3. Ring Topology
4. Mesh Topology
5. Tree Topology
6. Hybrid Topology

Learn more about the Computer Network here.

BUS Topology

Bus topology is a type of network in which each computer and network device is joined to a single cable. When it consists of exactly two endpoints, then it is called Linear Bus topology.



Features of BUS Topology

1. It sends data only in one direction.
2. Every device is linked to a single cable.

Advantage of BUS Topology

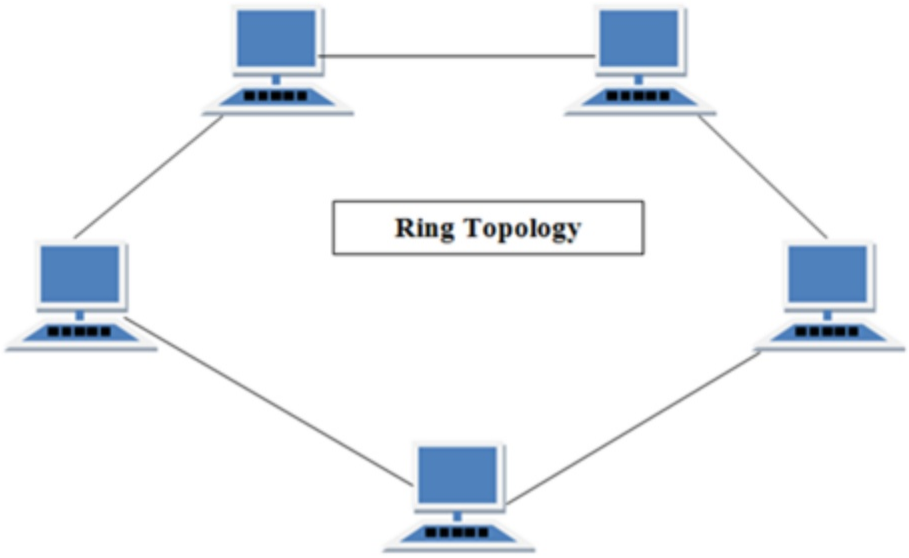
1. Cost-effective.
2. Cable requirement is minimal as compared to other topologies.
3. Useful in small networks.
4. Easy to understand.
5. Easy to expand by connecting two cables.

The Disadvantage of BUS Topology

1. The whole network fails if cables fail.
2. The performance of the network decreases in case network traffic is heavy or nodes are more or the cable has a limited length.
3. It works slower as compared to the ring topology.

RING Topology

It is named ring topology because it creates a ring as each computer is linked to the neighbouring computer, with the last one linked to the first, there are exactly two neighbours for each computer.



Features of RING Topology

1. The multiple numbers of repeaters are installed for Ring topology with a high number of nodes, because if one node wants to send some data to the last node in the ring topology with more nodes like 100 nodes, then the data will have to travel through 99 nodes to reach the 100th node. Hence repeaters are used in the network to prevent data loss.
2. The transmission is in one direction, but it is possible to implement bidirectional transmission by having 2 connections between each Network Node, therefore also known as “Dual Ring Topology”.
3. In the case of Dual Ring Topology, two ring networks are created, and data flow is in the opposite direction. Hence, if the ring in one direction fails, the second ring can work as a backup, to keep the network working.
4. Data is transmitted in a sequential manner that is bit by bit. Data transmitted, has to go through each node linked in the network, till the final node.

Advantage of RING Topology

1. Transmitting network is not affected by huge traffic or by the addition of more nodes, as only the nodes having tokens(short message) are allowed to transmit data.
2. Low cost to install and expand.

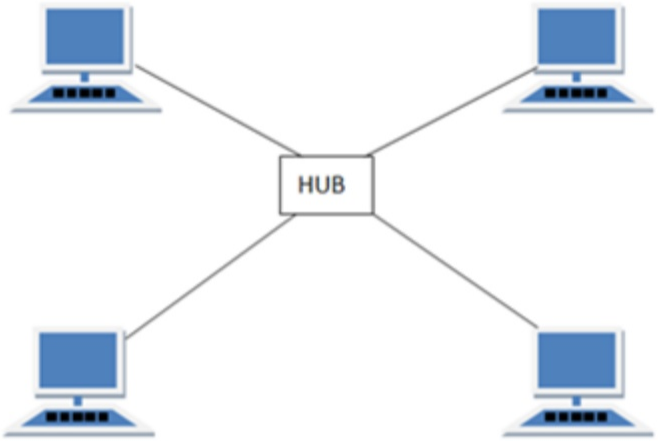
The Disadvantage of RING Topology

1. Troubleshooting is not simple in a ring topology.
2. The addition or removal of the computers interferes with the other nodes and network activity.
3. The crashing of one node affects the whole network.
4. Initial installation cost is high therefore not applied at low-density traffic.

Also, learn about the Types of Computer Network Devices here.

STAR Topology

In Star Topology all the nodes are linked to a common hub via a cable. This hub is the central node and all other nodes are linked to the central node. Unlike Mesh topology, star topology does not permit straightforward communication between the devices, a device needs to communicate through the hub. If a device requires sending data to another device, it has to first transfer the data to the hub, and then the hub forwards that data to the selected device.



Features of STAR Topology

1. Each node has its unique connection to the hub.
2. Hub works as a repeater for data transmission.
3. Can be utilized with twisted pair, Optical Fibre, or coaxial cable.

Advantage of STAR Topology

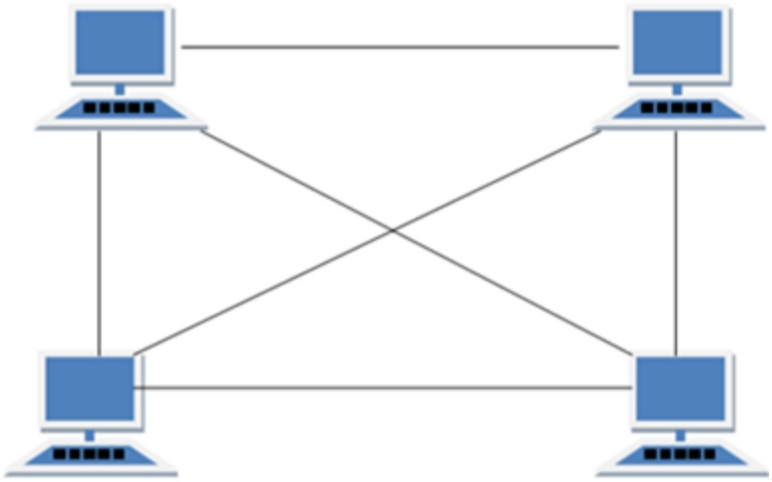
1. Speedy performance with less number of nodes and low network traffic.
2. Hub can be easily upgraded without hassle.
3. Simpler to troubleshoot.
4. Simpler to set up and modify.
5. If there is a failure in one node then the failed node is only affected, and the rest of the nodes can work without any issues.

The Disadvantage of STAR Topology

1. Expensive to install.
2. Expensive in usage.
3. If the hub crashes then the entire network is stopped because all linked nodes depend on the hub.
4. Efficiency is dependent on the hub, that is it depends on its capacity.

MESH Topology

In a mesh topology, every device is correlated to every other device on the network by a dedicated point-to-point connection. Mesh consists of n(n-1)/2 physical channels to link n number of devices. For the same n devices in the network, each device contains (n-1) input and output ports.



There are two types of methods to transmit data via the Mesh topology, they are :

1. Routing
2. Flooding

MESH Topology: Routing

In routing, the linked computers have a routing logic, as per the network need. Like routing logic to direct the data to transmit to the destination via the shortest distance. Or, routing logic which has info related to the broken links, and it neglects those nodes, etc. We can even use routing logic, to re-configure the crashed nodes.

Know more about the Computer Virus here.

MESH Topology: Routing

In flooding, the exact data is sent to all the network nodes, hence no routing logic is needed. The network is robust, and data loss is very unlikely. But it results in unwanted load over the network.

Types of MESH Topology

1. **Partial Mesh Topology:** In this type of topology few of the systems are linked similarly to mesh topology but few nodes are only linked to two or three devices.
2. **Full Mesh Topology:** Every node or device is linked to each other.

Features of MESH Topology

1. Fully lined.
2. Robust.
3. Not flexible.

Advantage of MESH Topology

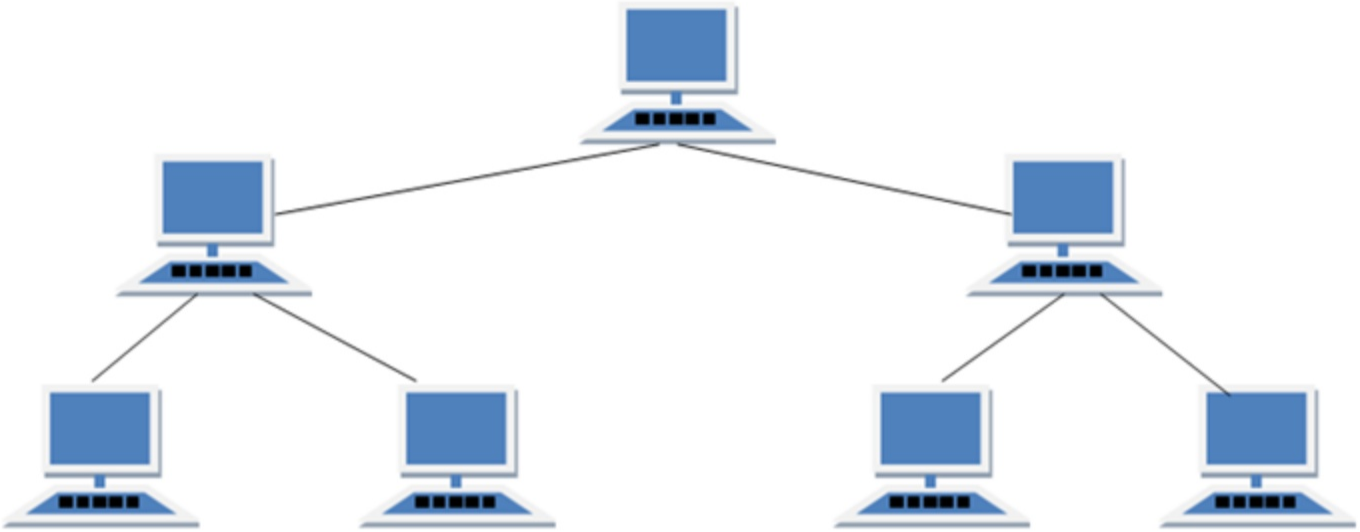
1. Each connection may carry its unique data load.
2. It is robust.
3. Fault can be diagnosed easily.
4. Facilitates security and privacy.

The Disadvantage of MESH Topology

1. Installation and configuration are not simple.
2. Cabling cost is higher.
3. Bulk wiring is needed.

TREE Topology

It has a root node and all other nodes are linked to it creating a hierarchy. It is also called “hierarchical topology”. It must have a minimum of three levels to the hierarchy.



Features of TREE Topology

1. Ideal if workstations are situated in groups.
2. Useful in Wide Area Network.

Advantage 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.

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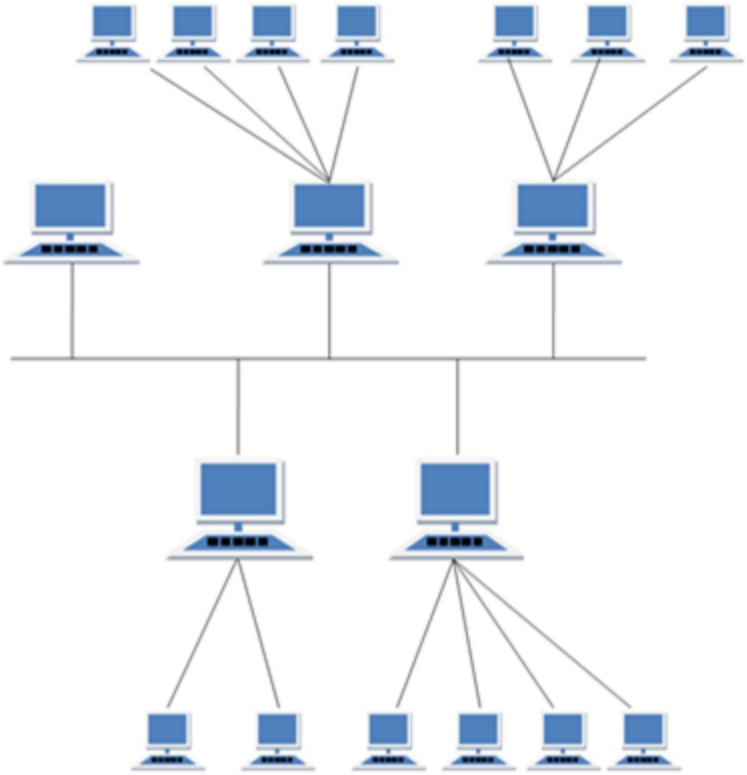
The Disadvantage of TREE Topology

1. Heavily cabled.
2. Costly.
3. If additional nodes are introduced, maintenance is difficult.
4. If the central hub fails, the network fails.

HYBRID Topology

It is two different kinds of topologies, which is a combination of two or more topologies. For example if in an office in some department ring topology is used and in another department in the same place, star topology is used, connecting these topologies will form a Hybrid Topology (ring topology and star topology).



Features of HYBRID Topology

1. It is an encapsulation of two or topologies
2. Inherits the benefits and disadvantages of the topologies included.

Advantage of HYBRID Topology

1. Reliable because Error detecting and troubleshooting are easy.
2. Effective.
3. Scalable as size can be increased easily.
4. Flexible.

Learn about the Types of Computers here.

The Disadvantage of HYBRID Topology

1. Complex in design.
2. Costly.

We hope that the above article on Types of Computer Network Topology is helpful for your knowledge and exam preparations. Stay tuned to the Testbook app for more updates on similar topics from Computer Awareness, and numerous such subjects. Also, access the test series available to test your knowledge regarding various exams.

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