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Study On The Topologies In Netwoking

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Abstract: In this paper we have to study the different types of the topologies like Bus Topology, Ring Topology, Star Topology, Mesh Topology and Tree Topology. In this paper we have considered above five topology uses and its merits and demerits that will study will help to know that which structure or topology is best for which organization or business. We have to study the topology and finally we have to find the fact that all topologies are alternate options for business like that Bus Topology is use full for small network but its some demerits so its alternate option is Ring Topology. So finally, we can say that all topologies have some extra and different feature are available from other topology and that features are making it special from other topology.
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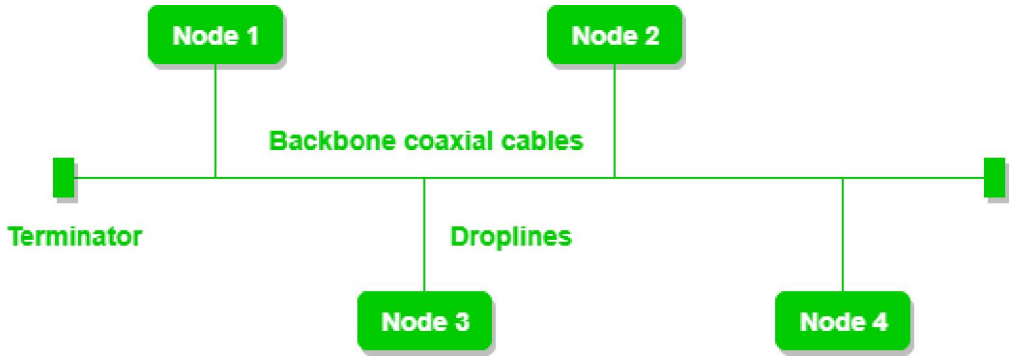
Introduction:

Network Topology is the study of the arrangement or mapping of the elements (links, nodes, etc.) of a network interconnection between the nodes. Topologies can be physical or logical. Physical Topology means the physical design of a network including the devices, location and cable installation. Logical Topology refers to the fact that how data actually transfers in a network as opposed to its design. Some of the most common network topologies are:

1. Bus Topology
2. Ring Topology
3. Star Topology
4. Mess Topology
5. Tree Topology

1. 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. The terminator is used to absorb the signal when the signal reaches the end, preventing signal bounce. When using bus topology, when a computer sends out a signal, the signal travels the cable length in both directions from the sending computer. When the signal reaches the end of the cable length, it bounces back and returns in the direction it came from. This is known as signal bounce. Signal bounce may create problems in the computer network, because if another signal is sent on the cable at the same time, the two signals will collide. Collisions in a computer network can drastically reduce the performance of the computer network.



2. Ring Topology

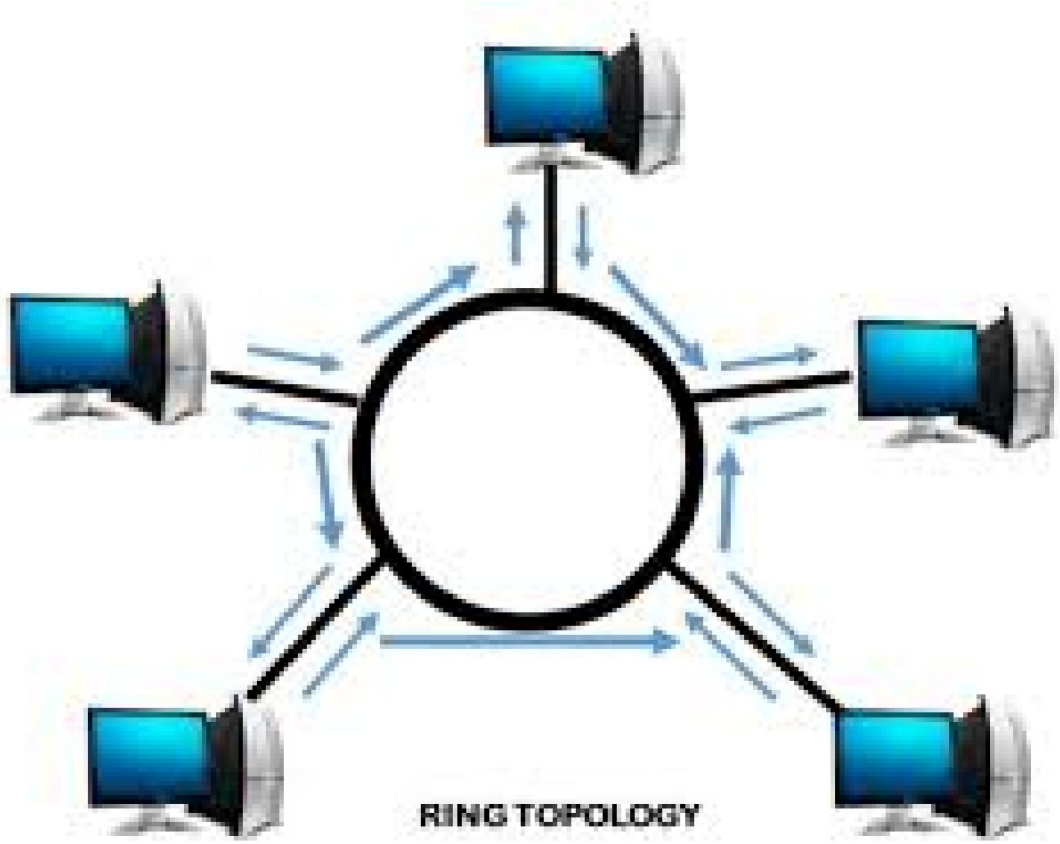
In a ring topology, all devices in the network are connected via a cable that loops in a logical ring or circle. In ring topology, the data circulates in a logical ring shape within the network.

The physical shape of the network need not be in ring or circular shape. A ring topology can be a logical circle that has no start and no end. Terminators are not necessary in a ring topology. Signals travel in one direction on a ring while they pass from one computer to the next. Each device in ring topology can regenerate the data signal, so that the data signal may travel the required distance, without signal quality deterioration.

Logical ring networks are wired like star topology. For example; in a Token Ring network, a Multistation Access Unit (MAU) plays the role of a network switch on an Ethernet star topology based network. The physical layout of ring topology looks similar to star topology.

Below image shows a Multistation Access Unit (MAU).

The main advantage of ring topology is that the signal degeneration is low since each workstation participating in the network is responsible for regenerating the weak signal.



The disadvantage of ring topology is that the failure of one device in the network can cause the failure entire network. Ring down can happen also when computers are added or removed from the network. Ring will become down also when any network maintenance happen.

3. Star Topology

A star topology is a topology for a Local Area Network (LAN) in which all nodes are individually connected to a central connection point, like 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.

A **star network** is an implementation of a spoke–hub distribution paradigm in computer networks. In a star network, every host is connected to a central hub. In its simplest form, one central hub acts as a conduit to transmit messages. The star network is one of the most common computer network topologies.

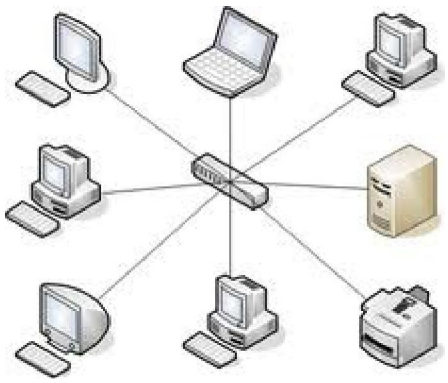
The hub and hosts, and the transmission lines between them, form a graph with the topology of a star. Data on a star network passes through the hub before continuing to its destination. The hub manages and controls all functions of the network. It also acts as a repeater for the data flow.

The star topology reduces the impact of a transmission line failure by independently connecting each host to the hub. Each host may thus communicate with all others by transmitting to, and receiving from, the hub. The failure of a transmission line linking any host to the hub will result in the isolation of that host from all others, but the rest of the network will be unaffected.[2]

The star configuration is commonly used with twisted pair cable and optical fiber cable. However, it can also be used with coaxial cable.

A star topology is designed with each node (file server, workstations, and peripherals) connected directly to a central network hub, switch, or concentrator (See fig. 3).

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 fiber optic cable.



4. Mess Topology

Mesh topology is a type of networking where all nodes cooperate to distribute data amongst each other. This topology was originally developed 30+ years ago for military applications, but today, they are typically used for things like home automation, smart HVAC control, and smart buildings. Within this article, we'll provide a general overview of how mesh topology works, the benefits and considerations associated with mesh networks, industry standards, and alternatives.

Many mesh networks allow radios to spontaneously organize themselves by using something called *ad hoc on-demand distance vectoring*. This is a *reactive* protocol using some characteristics of proactive routing—meaning the developer creates some of the routes and identifies nodes to play different roles, like an end node or repeater. In simplified terms, an endpoint doesn't just act as destination and a source of data, but also as a *relay point*.

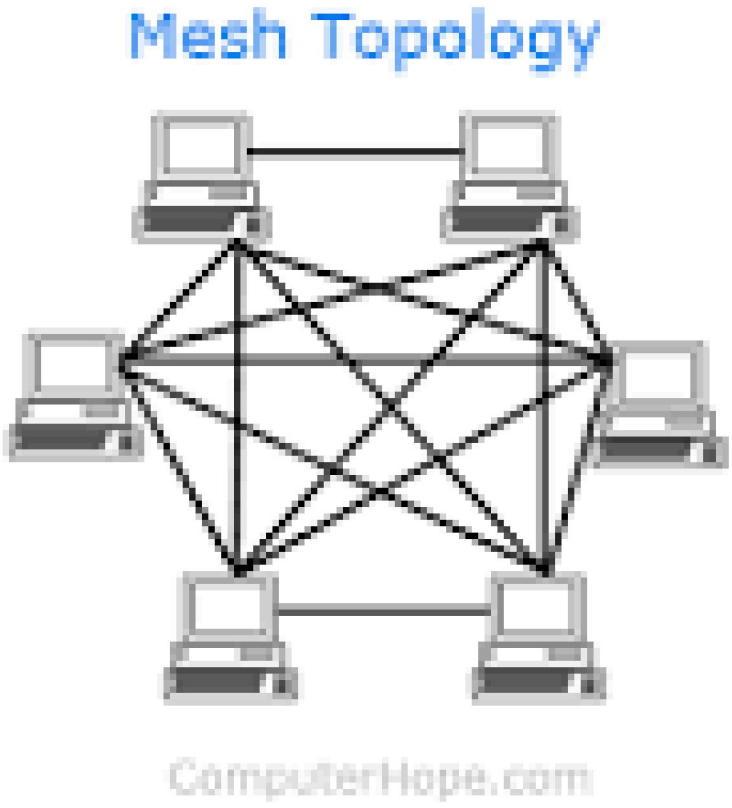
Mesh systems usually rely on a *routing table*, which tells every node (a) how to communicate with the access point, and (b) how a node should direct traffic that is trying to go somewhere. The routing table assumes that there is not direct communication anywhere in the network except by nodes that have a route to the access point. It's like a big game of telephone—if you don't know the route, then you send the message to someone that has the route established. Routing tables are comprised of:

1. Source identifier
2. Destination identifier
3. Source sequence number
4. Destination sequence number
5. Broadcast identifier
6. Time to live

(These are fairly technical topics, and we won't cover them in much detail here.)

Mesh networks operate in two ways: by either *routing* the data or *flooding* the data. When you're *routing* a message in a mesh network, it propagates along a predefined path, hopping from node to node until it reaches its destination. In order to establish these routes and ensure that the paths are available, the network needs to be continuously connected and configuring itself. In other words, it has to constantly work to find broken paths and create self-healing algorithms to build route tables. Because there's a lot of layer two (MAC) traffic flowing on the network to establish this route, mesh networks can be less efficient than star networks (which we'll cover in a moment).

A simpler mesh network takes a *flood* approach, where the data flows continuously throughout the network. If a module sees data with its address, it simply grabs it. This works because of the time to live, or TTL, value where messages are allowed to propagate through the mesh for only a fixed number of hops before they are removed.



5. Tree Topology

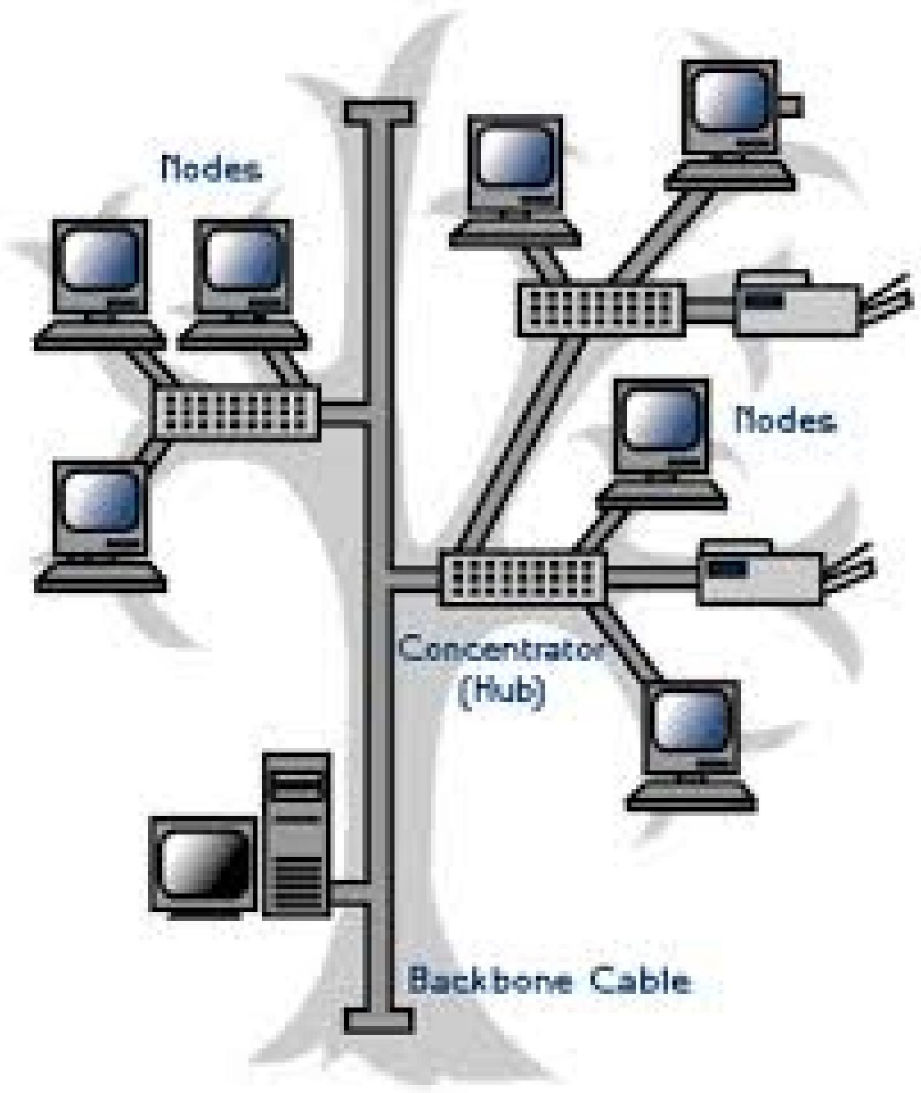
A tree topology is a combination of a star network topology and a bus topology. In tree topology, nodes of the underlying bus network topology are replaced with a complete star topology.

There are certain special cases where tree topology is more effective:

- Communication between two networks
- A network structure which requires a root node, intermediate parents node, and leaf nodes (just like we see in an n-tree) or a network structure which exhibits three level of hierarchy because two level of hierarchy is already displayed in the star topology.

Advantages of tree topology:

- Scalable as leaf nodes can accommodate more nodes in the hierarchical chain.
- A point to point wiring to the central hub at each intermediate node of a tree topology represents a node in the bus topology
- Other hierarchical networks are not affected if one of them gets damaged
- Easier maintenance and fault finding



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References:
[1]. Abraham Silberschatz, Henry F. Korth, S. Sudarshan – Database System Concept 6th Edition, Tata McGrawHill Education. Andrews Tananbaum: Computers Networks, PHI
[2]. Duglass Comer: Internet & Introduction Prentice Forouzan, Data Communication and Networking 5th Edition, Tata McGraw-Hill.
[3]. James Martin: Telecommunication and Compute Michel and Miller: Introduction to Digital Data Communication.

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