

Networking Topology

Learning Objective:

- Understand the networking and the linking of device in various modes.
- Detail knowledge of various topology

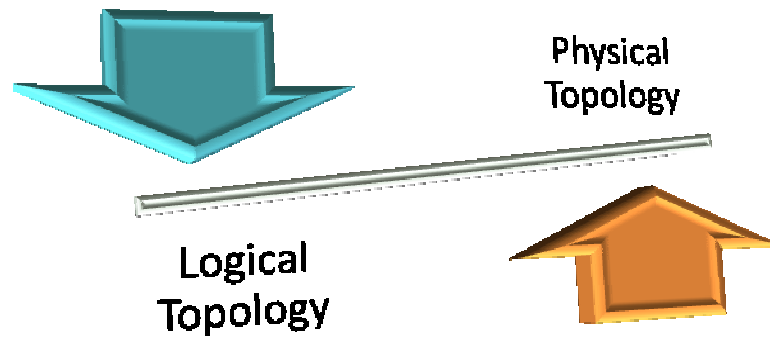
Introduction:

Networking is the need of every organization. Whether it is a small office or big cubical, school or college computer lab or satellite system, the use of networking is undeniable. You can use the networking structure to manage your own workstation at your place. You can even create your remote networking for a group task where you and your friends can use the same data flow simultaneously. You must have experienced it in your school where the system administrator crates a proper network in your computer lab.

Network Topology: detailed study

In a computer network, various elements like links, nodes etc. are arranged in a specific way. This arrangement is known as the Network Topology. Essentially, the term is further divided into two parts.





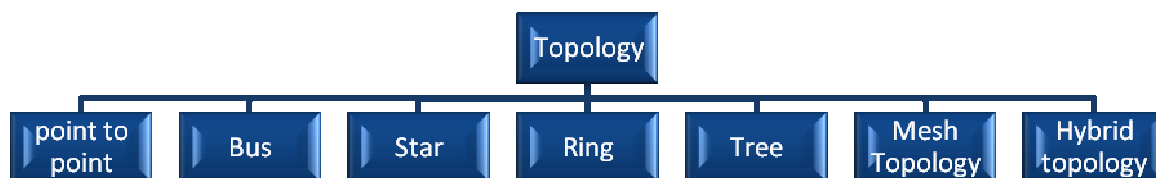
Physical Topology:

When the various component of network are placed or arranged physically for the networking, it is known as Physical topology. The process also includes device location and cable installation. It can be said that the physical topology is the geometric representation of all the links and nodes.

Logical Topology:

It is the illustration of the data flows in a network irrespective of its physical design. Logical topology also includes transmission rates, signal types, physical interconnection and distance between the nodes. Whatever be the signal types, the topology is always identical.

Categories of Topology:



Point to Point Topology:



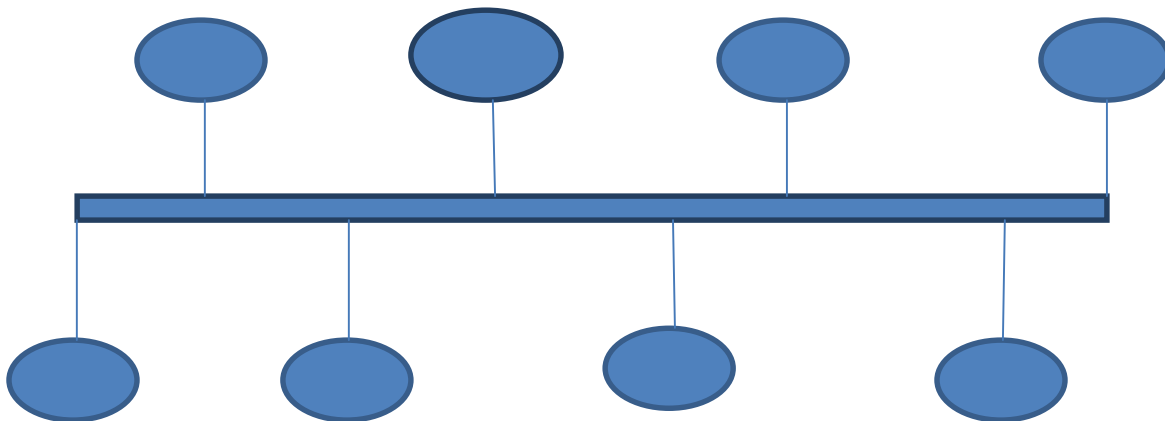
This is the simplest topology that provides dedicated link between two ends. The total capacity of the link is reserved for only these two devices. It is the basic or preliminary levels of the topology that always go proportional with the potential pairs. The point to point connection is also expressed as Metcalfe's law.



Examples: Kid's two way walkie-talkie, Television and remote control, are the easiest example to understand the point-to-point connection.

Bus Topology:

A bus topology describes the multiple point connection connected to a one long cable (backbone) to link every device in a single network while nodes are connected as drop lines and taps with the bus cable.



Properties of Bus topology:

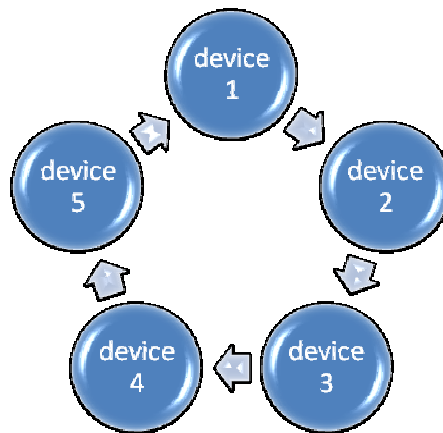
- Easy to install
- Ease node is connected to a single cable through interface connector.
- The single moves to both directions that come from the source until an intendant recipient is found.
- Inexpensive installation compared to other topologies but costly for network management.



- If the machine address and the intended address does not match for the data, the machine ignores the data. On the other hand, if the data and the machine address matches, the data is accepted.

Ring Topology:

It is a typical topology where each device is connected with only two devices from either side. A kind of specific two-way connection it dictates point-to-point topology. The workstation of the topology made as a closed loop connection where those devices that are not adjacent are indirectly connected to each other.



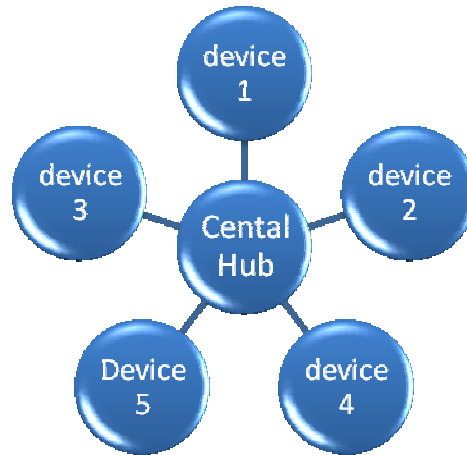
Properties of Ring Topology:

- It is not necessary that there must be a particular direction of the data flow in the ring topology. It can be unidirectional like clockwise or anticlockwise or bidirectional.
- The data travels in this topology from nodes to nodes.
- The failure of a single link can disrupt the whole network.
- Under heavy network load, it is better than the bus network.
- There is no requirement of a central node.
- It is easy to find the problem in a particular node and isolate it.
- Installation and configuration is very easy.
- Reconfiguration of faulty line is quick and does not require any individual rerouting.

Star Topology:

In this topology, every device needs only one link and one node to get connected with others. In a simpler word there is only one central hub that works as a conduit and transmits messages to other connected devices. The single central node offers a common connection point through which other nodes are connected. The central node (switch) acts as a server whereas peripherals act as clients.



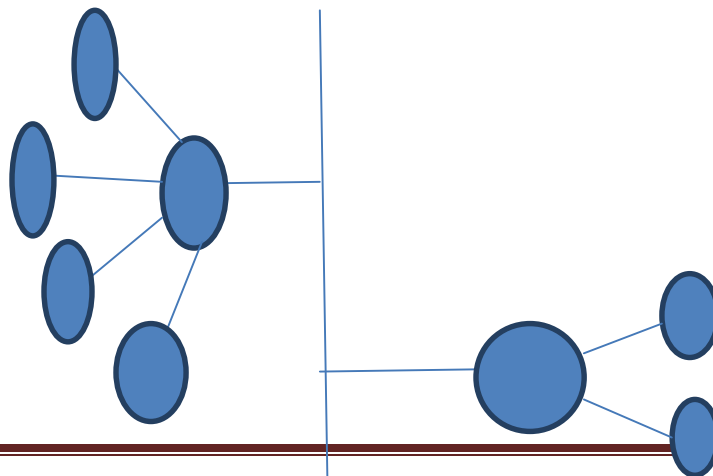


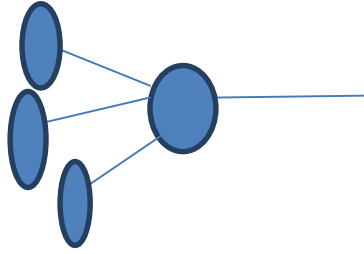
Properties of a Star Topology:

- Expensive installation as there are lot of cables needed.
- If the central hub crashes, all devices will stop working.
- However, if one computer or one connection breaks, the whole hub will not get affected. Therefore, it is a reliable network.

Tree Topology:

Tree topology is a combination of star and bus topology. It acts as a hierarchical network where star topology helps to construct a local area network and bus topology provides the serial connection of the computers. It works by connecting multiple star topologies with central hub to one point with main hub.



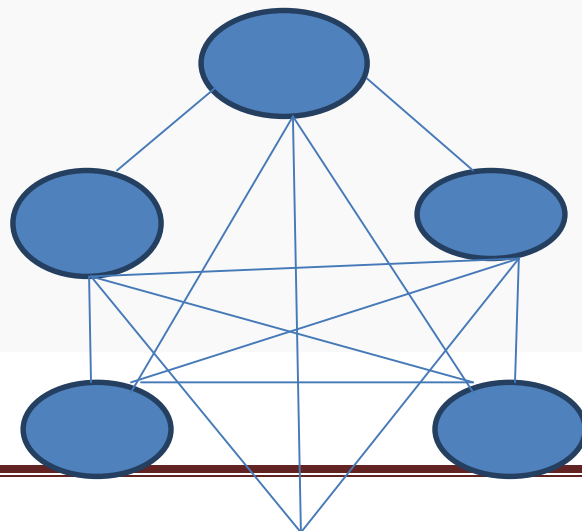


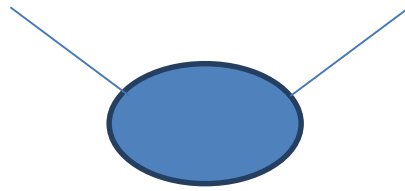
Properties:

- Tree topology is the best alternatives for the bus and star topology when there is the problem of scalability.
- It is easy to expand the network as per the need.
- As the whole network is divided into segments, the management and maintenance is very easy.
- If there is any error, it can be detected easily.
- Every star topology is connected with the central hub point-to-point.
- In case of any problem with one segment, other segments are safe.
- If the bus topology crashed, the entire network will get affected.
- If the structure becomes complicated or numerous segments are connected, the maintenance can be tough.
- Costly installation.

Mesh Topology:

In this topology, many network devices are connected without a specific pattern. Each device in the network works as an independent node where the data transmission is random. Internet is the best example of mesh topology where wireless network is needed.



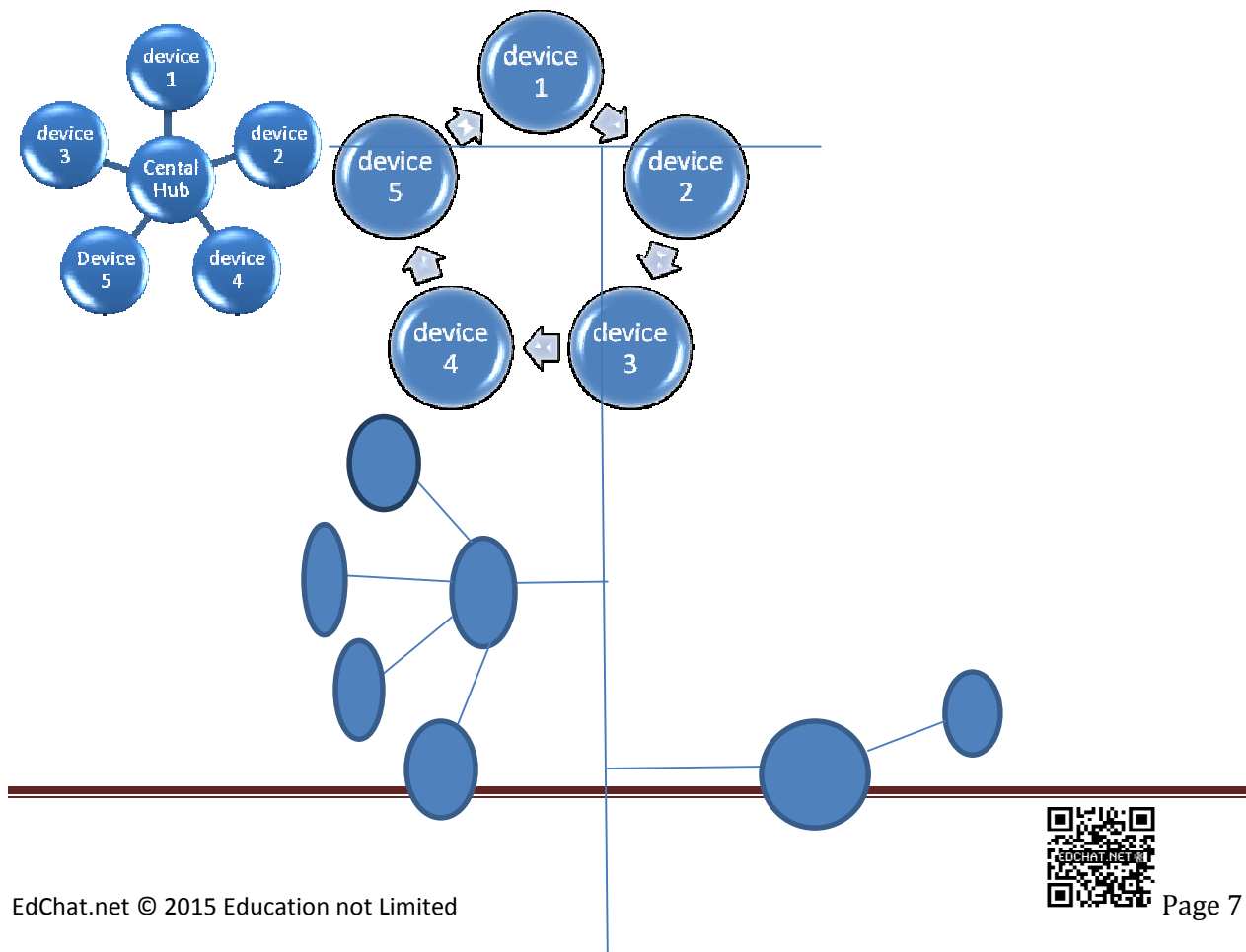


Properties:

- It is very effective when there is high traffic.
- A reliable topology because even though one device broke down, the others will not get effected.
- A rapid growth in network is possible.
- Costly installation.
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Hybrid Topology:

As name suggest, it is the blend of two or more different basic topologies. According to the requirement, this network is created.





Properties:

- A very reliable network, as fault detection and correction is easy. The faulty part can easily be isolated without affecting to the rest of the network.
- Easily scalable. Any time a new component can be added without disturbing the whole architecture.
- Hybrid topology is designed as per the need of the organization. That makes it very flexible and easy to maintain.
- A very effective network as it can be designed with the combination on two or more different topologies. This provides the possibility to maximize the strength and neutralize the weakness of token or nodes.
- The design is complex so it's not easy to architect smoothly.
- The installation is highly costly and need intelligent work to install.
- The topology is optimal for a large scale only and requires many cables, network devices etc.

