Computer Networks – Fall 2020
Momina Atif Dar
P18-0030

Types of Topologies

Bus:

In Bus topology all the nodes are connected to the main node with a single cable.

Advantages:

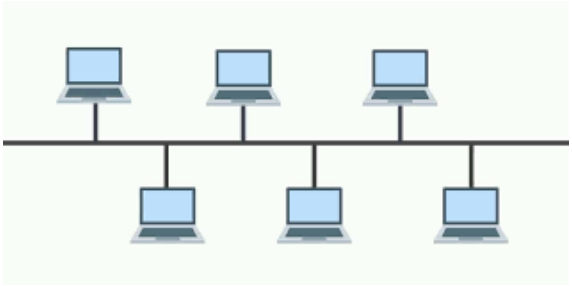
1. Works well for small network as signals remain somewhat strong when they reach the last node.
2. Less cable is used as compared to star topology
3. Easy to construct

Disadvantages:

1. Over large distance, signals can get weak and may not reach the last node(s).
2. If main cable is damaged, all the nodes stop functioning.
3. Data sent for one node is visible to other nodes following it as well

Examples:

1. Two floors can be connected with a single cable.
2. Printer or scanner can be added in home or office network.
3. Main node can act as server and other nodes as clients, data can be sent from server to all the clients at once.



Ring:

In Ring topology all the nodes are connected in a circular fashion and form a ring. Each node is connected to two other nodes. Data in ring topology can travel either in one direction or both directions. When data is received by respective node, empty data packet is sent from that node onward until it reaches the source node, this is to ensure that the data is received successfully.

Advantages:

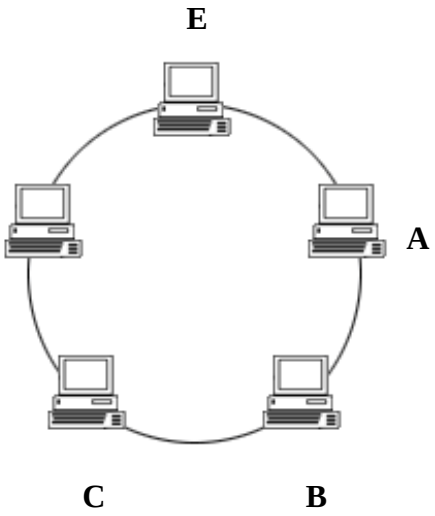
1. As all the data can flow in one direction, this reduces the chance of data/packet collision.
2. Data can transfer at higher speed.
3. More nodes can be added without negatively effecting the performance.

Disadvantages:

1. If one node goes down, the whole network goes down as the ‘ring’ will be disturbed.
2. Difficult to troubleshoot if a problem occurs.
3. As in the diagram below, if A has to send data to C it has to go through B but if B is busy so A would have to take alternate route which is a longer route. This decreases efficiency of ring topology.

Examples:

1. Used mostly in educational institutes or commercial organizations.
2. Used in the form of Synchronous Optical Networking.



Star:

In Star topology there is a main node to which all other nodes are connected. The main node is called a hub or switch. This is the best choice when it comes to small networks.

Advantages:

1. If one node goes down, the rest of the nodes are not impacted.
2. If another node is added it doesn’t negatively effect network itself.
3. Setting up star topology and troubleshooting problems is not a tough issue.

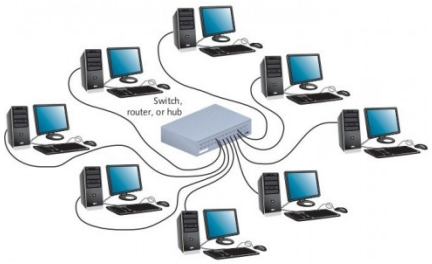
Disadvantages:

1. May be expensive to implement because more cable than bus topology is used.
2. If hub goes down, the whole network goes down with it.

3. Leaving it to one main node i.e. hub for successful running of network is not a wise choice as it should be protected from adversaries at all costs and it should always be running.

Examples:

1. Used mostly in homes (LAN).
2. Used in educational institutions' computer labs.



Mesh:

In Mesh topology, a node is connected to all the other nodes in network. There are two types of Mesh topology:

a) Full Mesh

In Full Mesh, all the nodes are connected to every other node.

b) Partially-connected Mesh

In Partially-connected Mesh, at least two nodes are connected to multiple other nodes.

Advantages:

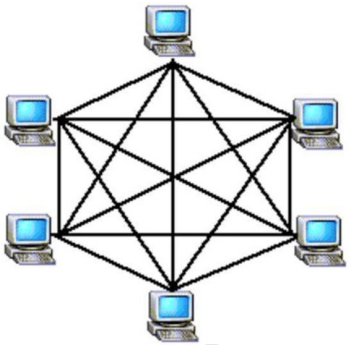
1. If one node fails, other nodes operate normally.
2. Easy handle of high traffic as more data can be transmitted simultaneously by different nodes.
3. If more nodes are added, the data transmission is not negatively effected.

Disadvantages:

1. More cable is used than star or bus topology so expensive implementation.
2. High maintenance

Examples:

1. Was once used military applications.
2. Smart buildings/Home automation



Tree:

In Tree topology network is constructed in a way that it resembles the branches of a tree. It works on parent and child hierarchy. It has the characteristics of both star and bus topologies.

Advantages:

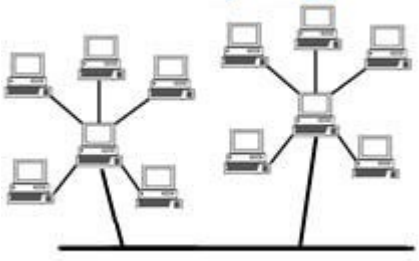
1. If more nodes are to be added, it doesn't negatively effect the Tree topology.
2. Easy to maintain.
3. Troubleshooting problems is easier.

Disadvantages:

1. Costly to install.
2. It's cable-intensive.
3. If root of star topology fails, the nodes of that particular 'parent' stop functioning.
4. If main cable stops functioning, all the star topologies i.e. all parents and their children, stop functioning.

Examples:

1. Used to organize computers in corporate networks.
2. Used for storing information in Databases.
3. Used in binary trees, computer programming



Hybrid:

In Hybrid topology, different type of network topologies are used. They can be a mix of Bus, Mesh, Ring, Star and Tree topology. There are two types of Hybrid topologies:

a) Star-Ring Hybrid topology:

It is a combination of Star and Ring topologies. Two or more Star topologies and connected through a ring topology.

b) Star-Bus Hybrid topology:

It is a combination of Star and Bus topologies. Two or more Star topologies are connected in a linear fashion just like in Bus topology.

Advantages:

1. Users can implement it according to their needs, it depends on number of computers, location, performance.
2. Easy troubleshooting.
3. Easy to expand network.

Disadvantages:

1. Expansion of network is costly.
2. As network expands, complexity increases.

Examples:

1. Used in different departments of offices or even sub-departments.
2. Used in homes in case of multi-floors.
3. Used in banks.