Network Topology:

- A Network Topology is the arrangement with which computer systems or network devices are connected to each other.

✓Mesh Topology

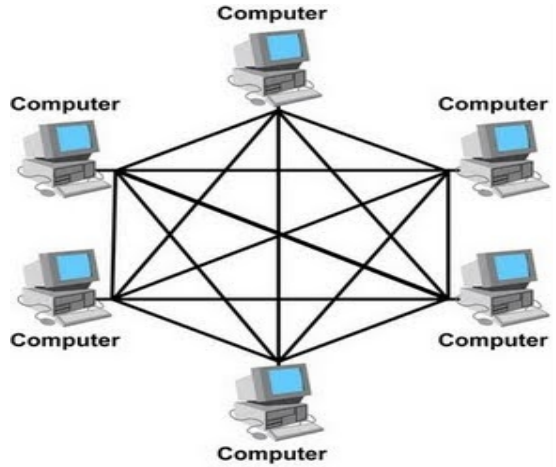
✓Star Topology

✓Bus Topology

✓Ring Topology

✓Tree Topology

Mesh Topology :



In mesh topology, every device is connected to another device via particular channel.

- If suppose, N number of devices are connected with each other in mesh topology, then total number of ports that is required by each device is N-1.
- If suppose, N number of devices are connected with each other in mesh topology, then total number of dedicated links required to connect them is N(N-1)/2.

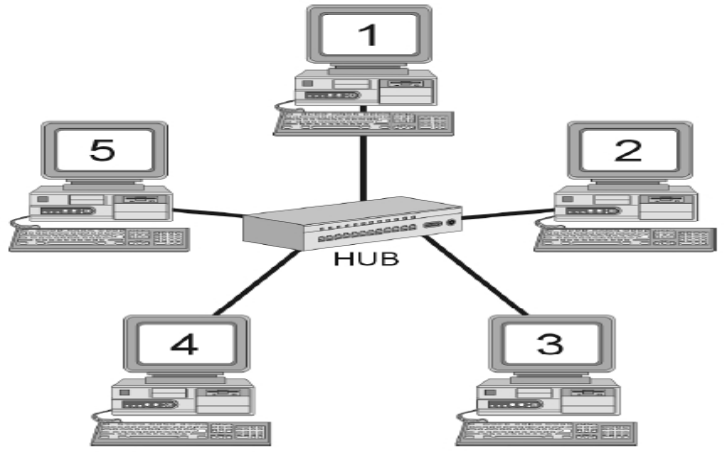
Advantages of this topology :

- It is robust.
- Fault is diagnosed easily. Data is reliable because data is transferred among the devices through dedicated channels or links.
- Provides security and privacy.

Problems with this topology :

- Installation and configuration is difficult.
- Cost of cables are high as bulk wiring is required, hence suitable for less number of devices.
- Cost of maintenance is high.

Star Topology :



- In star topology, all the devices are connected to a single hub through a cable. This hub is the central node and all others nodes are connected to the central node. The hub can be passive in nature i.e. not intelligent hub such as broadcasting devices, at the same time the hub can be intelligent known as active hubs. Active hubs have repeaters in them.

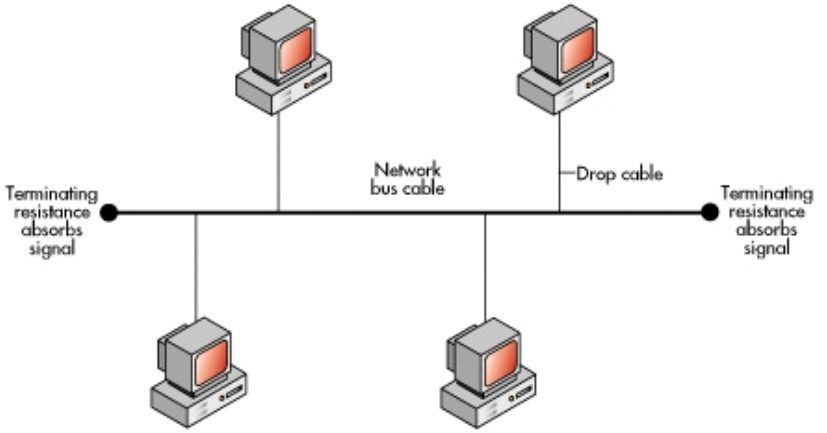
Advantages of this topology :

- If N devices are connected to each other in star topology, then the number of cables required to connect them is N. So, it is easy to set up.
- Each device require only 1 port i.e. to connect to the hub.

Problems with this topology :

- If the concentrator (hub) on which the whole topology relies fails, the whole system will crash down.
- Cost of installation is high.
- Performance is based on the single concentrator i.e. hub.

Bus Topology :



- Bus topology is a network type in which every computer and network device is connected to single cable. It transmits the data from one end to another in single direction. No bi-directional feature is in bus topology.

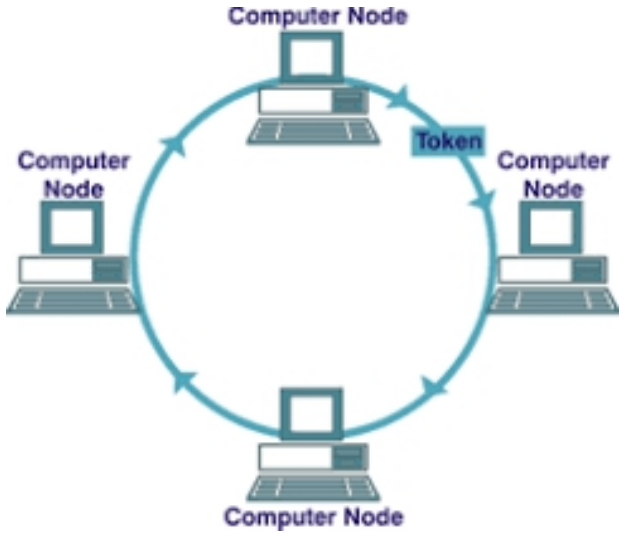
Advantages of this topology :

- If N devices are connected to each other in bus topology, then the number of cables required to connect them is 1 which is known as backbone cable and N drop lines are required.
- Cost of the cable is less as compared to other topology, but it is used to built small networks.

Problems with this topology :

- If the common cable fails, then the whole system will crash down.
- If the network traffic is heavy, it increases collisions in the network. To avoid this, various protocols are used in MAC layer known as Pure Aloha, Slotted Aloha, CSMA/CD etc.

Ring Topology :



- In this topology, it forms a ring connecting devices with its exactly two neighboring devices.
- A number of repeaters are used for Ring topology with a large number of nodes, because if someone wants to send some data to the last node in the ring topology with N nodes, then the data will have to pass through N-1 nodes to reach the Nth node. Hence to prevent data loss repeaters are used in the network.
- The transmission is unidirectional, but it can be made bidirectional by having 2 connections between each Network Node, it is called Dual Ring Topology.

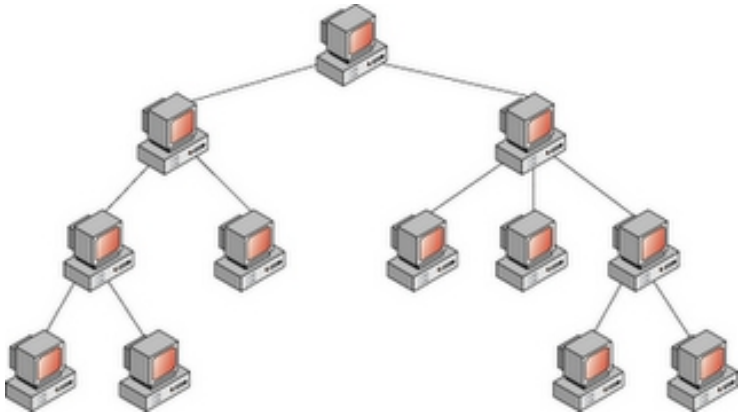
Advantages of this topology :

- The possibility of collision is minimum in this type of topology.
- Cheap to install and expand.

Problems with this topology :

- Troubleshooting is difficult in this topology.
- Addition of stations in between or removal of stations can disturb the whole topology.

Tree Topology :



- This topology is the variation of Star topology. This topology have hierarchical flow of data.

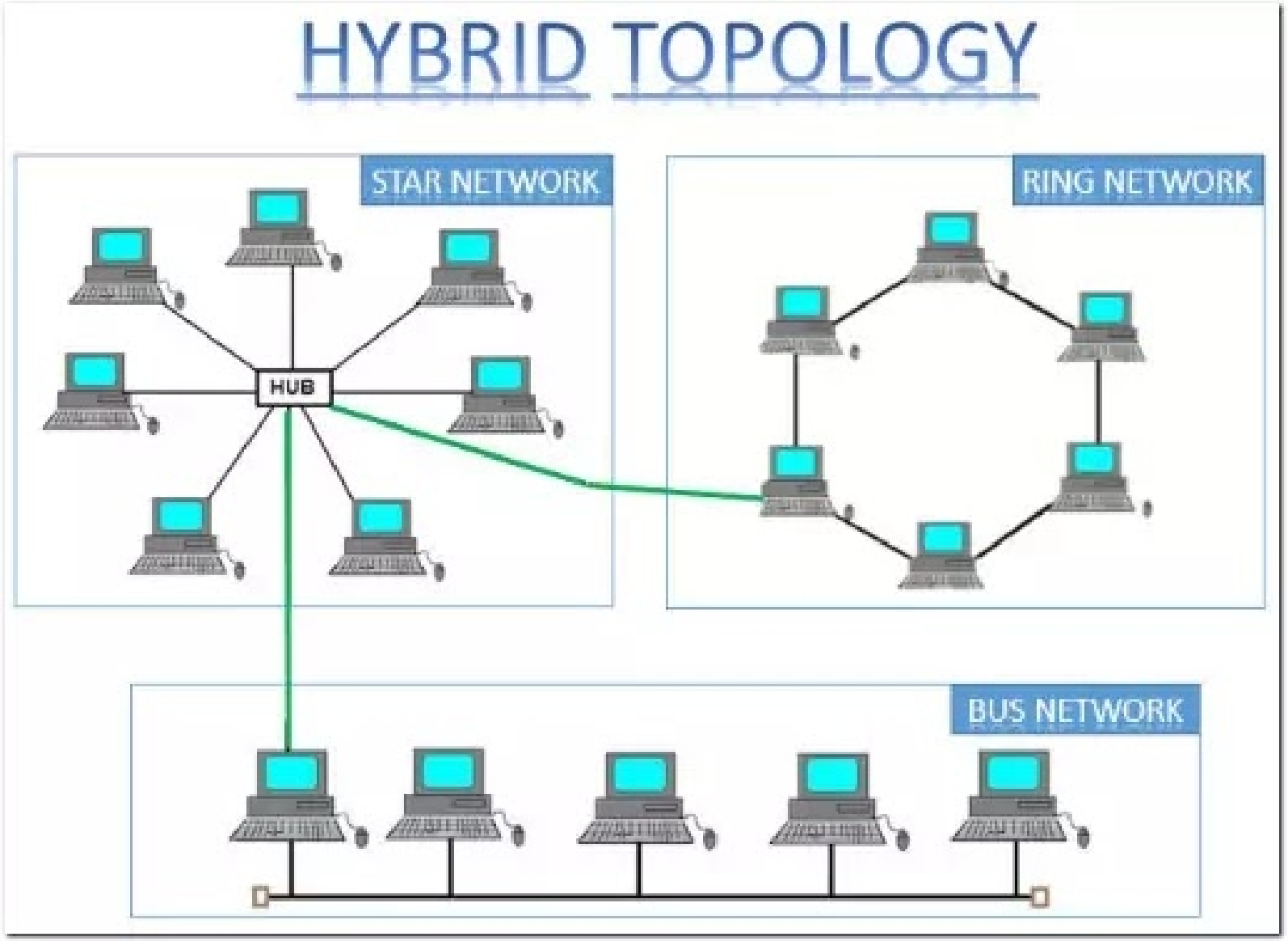
Advantages of this topology :

- It allows more devices to be attached to a single central hub thus it increases the distance that is travel by the signal to come to the devices.
- It allows the network to get isolate and also prioritize from different computers.

Problems with this topology :

- If the central hub gets fails the entire system fails.
- The cost is high because of cabling.

HYBRID TOPOLOGY

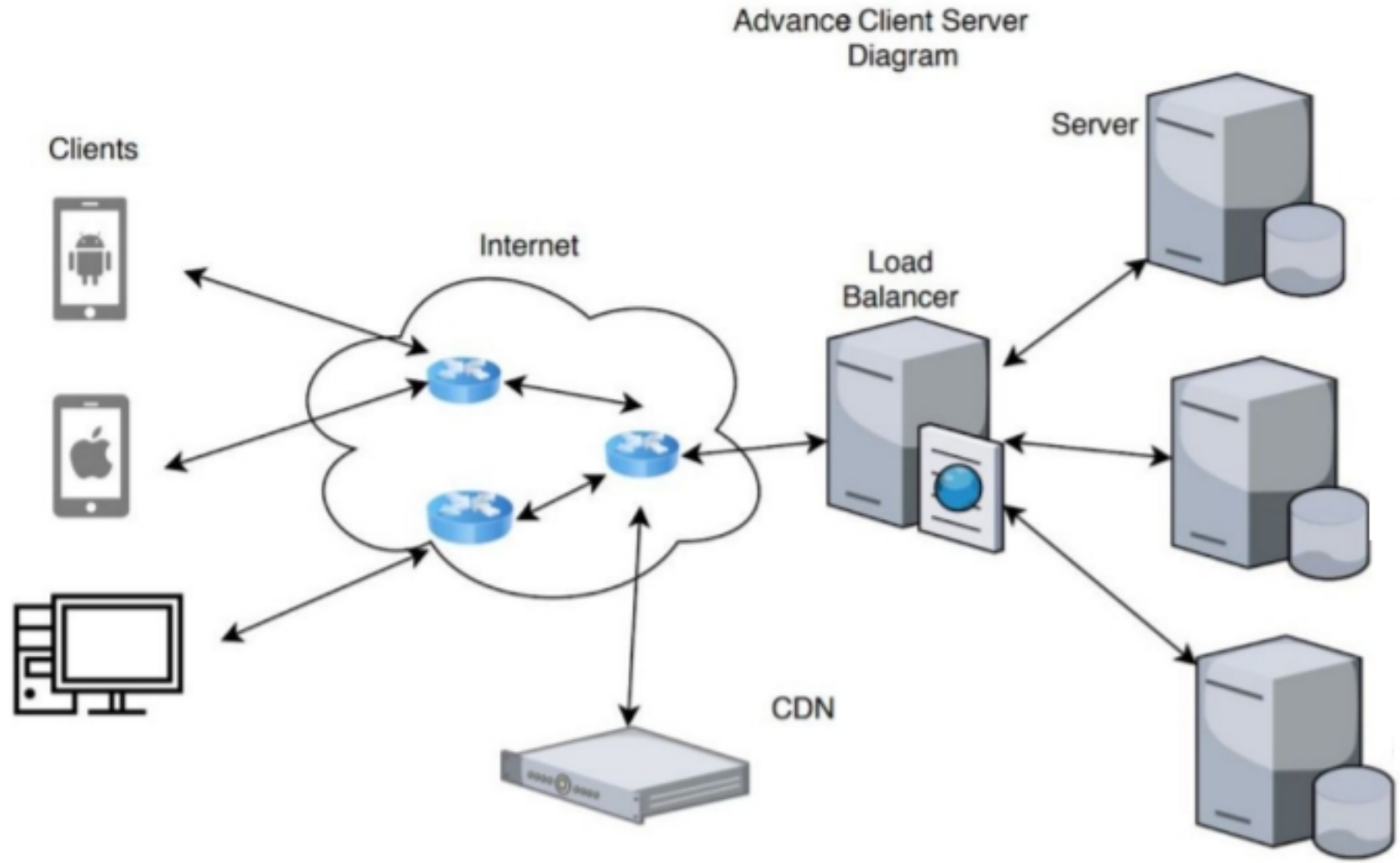


Overview of different types of Application architectures:

- An **applications architecture** describes the behavior of applications used in a business, focused on how they interact with each other and with users. It is focused on the data consumed and produced by applications rather than their internal structure.
- Client-Server
- Peer-to-Peer
- Hybrid

Client-Server:

- The **Client-server model** is a distributed application structure that partitions task or workload between the providers of a resource or service, called servers, and service requesters called clients. In the client-server architecture, when the client computer sends a request for data to the server through the internet, the server accepts the requested process and deliver the data packets requested back to the client.
- **Client**: When we talk the word Client, it mean to talk of a person or an organization using a particular service. Similarly in the digital world a Client is a computer (Host) i.e. capable of receiving information or using a particular service from the service providers (Servers).
- **Servers**: Similarly, when we talk the word Servers, It mean a person or medium that serves something. Similarly in this digital world a Server is a remote computer which provides information (data) or access to particular services.

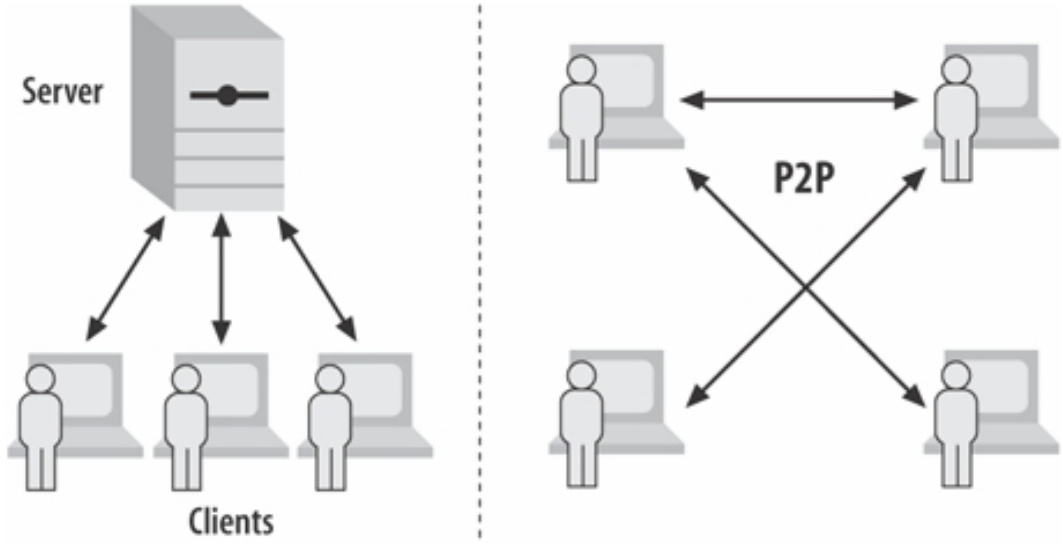

Advance Client Server
Diagram
Clients
Internet
Load
Balancer
Server
CDN

1. Client requests data from server
2. Load balancer routes the request to the appropriate server
3. Server processes the request client
4. Server queries appropriate database for some data
5. Database returns the queried data back to the server
6. The server processes the data and sends the data back to the client
7. This process repeats

Examples: Email, the World Wide Web etc.

Peer-to-Peer:

- Peer-to-peer architecture (P2P architecture) is a commonly used computer networking architecture in which each workstation, or node, has the same capabilities and responsibilities. It is often compared and contrasted to the classic client/server architecture, in which some computers are dedicated to serving others.
- **Example**: some online gaming platforms use P2P for downloading games between users



Comparison between Client-Server based and P2P architecture

Hybrid:

- Combination of Client-Server and P2P architectures is called as hybrid architecture.
- **Example**: TinkerCAD, AutoCAD360