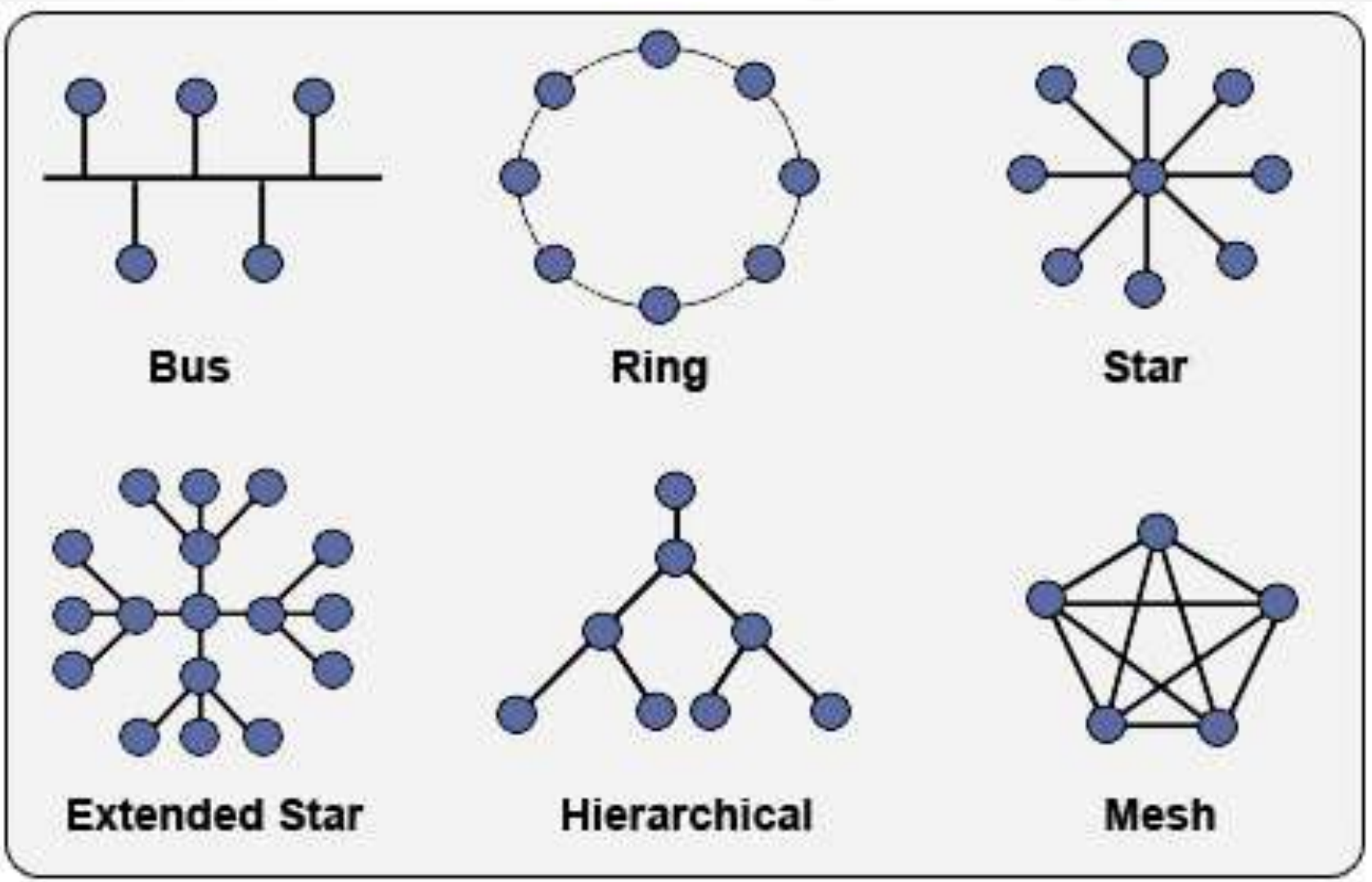
NETWORK TOPOLOGY

Topology

- Topology refers to the layout of connected devices on a network.
- Here, some logical layout of topology.
  - **Mesh**
  - **Star**
  - **Bus**
  - **Ring**
  - **Tree and Hybrid**

Network Topology



Mesh Topology

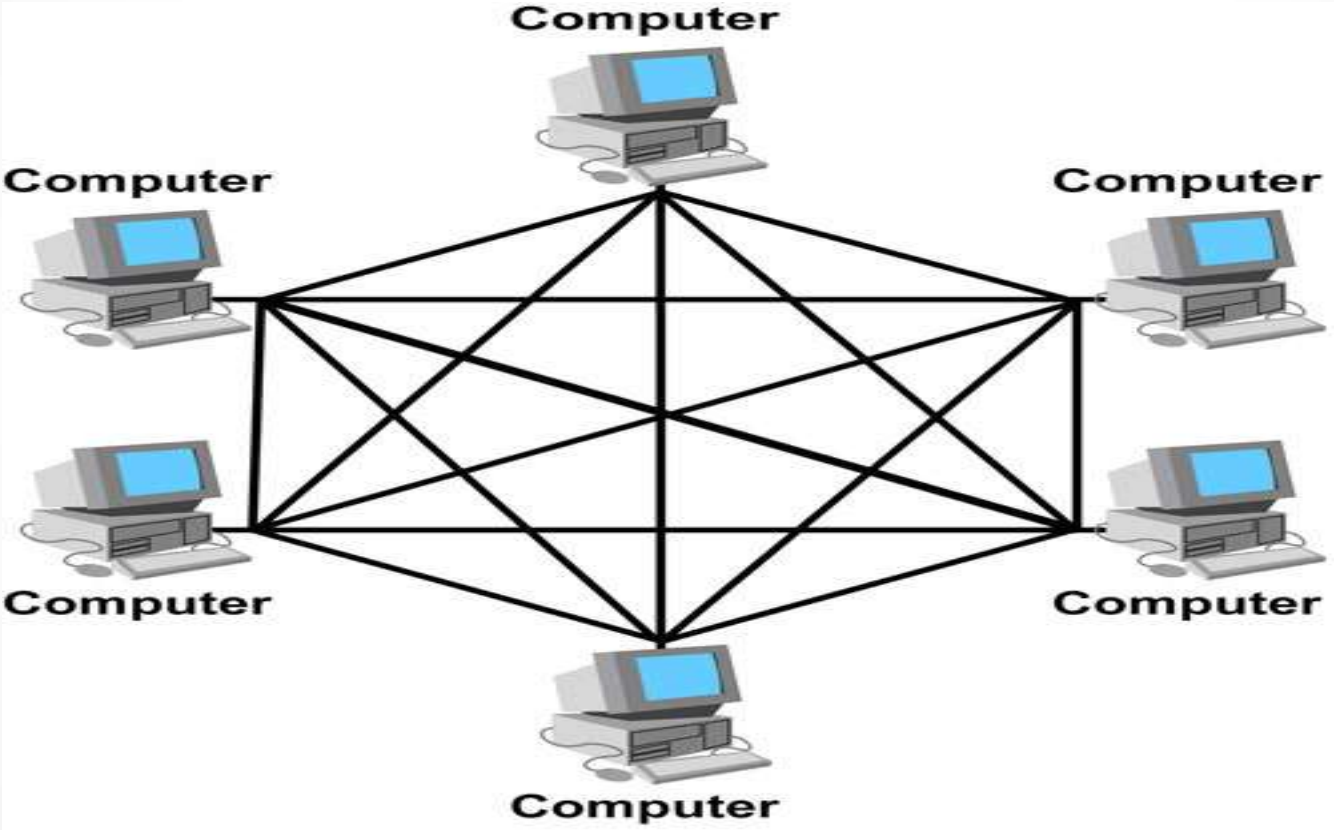
- Here every device has a point to point link to every other device.
- Node 1 node must be connected with n-1 nodes.
- A fully connected mesh can have n(n-1)/2 physical channels to link n devices.
- It must have n-1 I/O ports.

Mesh Topology

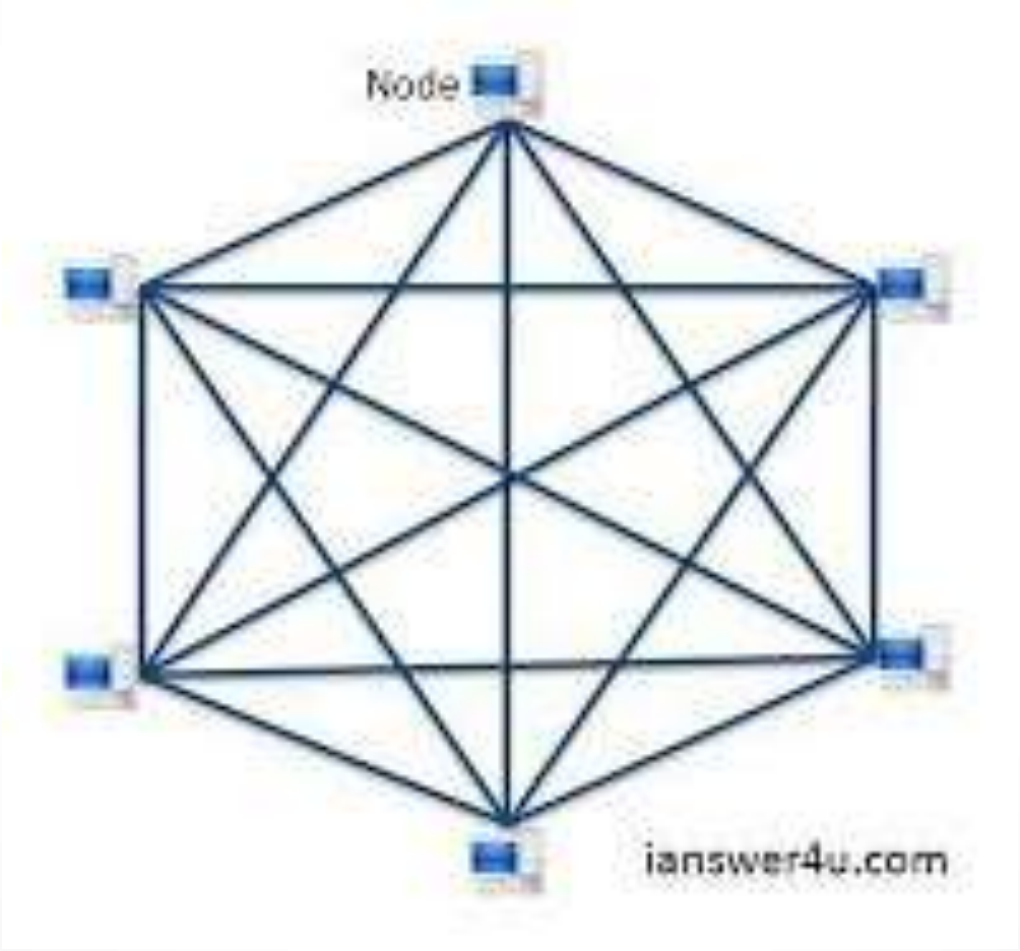
Advantages:

1. They use dedicated links so each link can only carry its own data load. So traffic problem can be avoided.
2. It is robust. If any one link get damaged it cannot affect others.
3. It gives privacy and security.(Message travels along a dedicated link)
4. Fault identification and fault isolation are easy.

Mesh Topology



Mesh Topology



Mesh Topology

- *Disadvantages:*

1. The amount of cabling and the number of I/O ports required are very large. Since every device is connected to each devices through dedicated links.
2. The sheer bulk of wiring is larger then the available space.
3. Hardware required to connected each device is highly expensive.

Mesh Topology

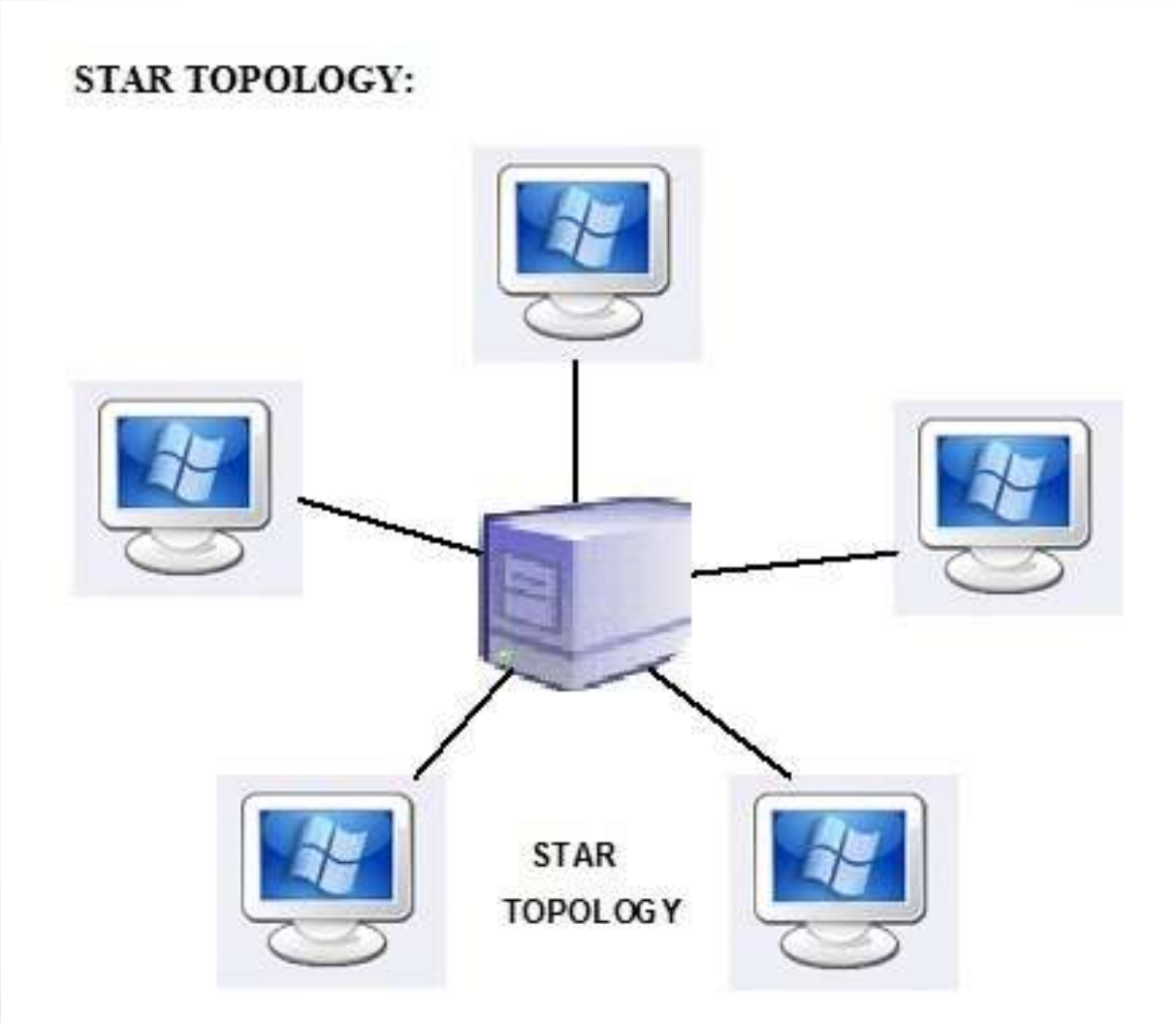
- *Applications:*

1. Telephone Regional office.
2. WAN.(Wide Area Network).

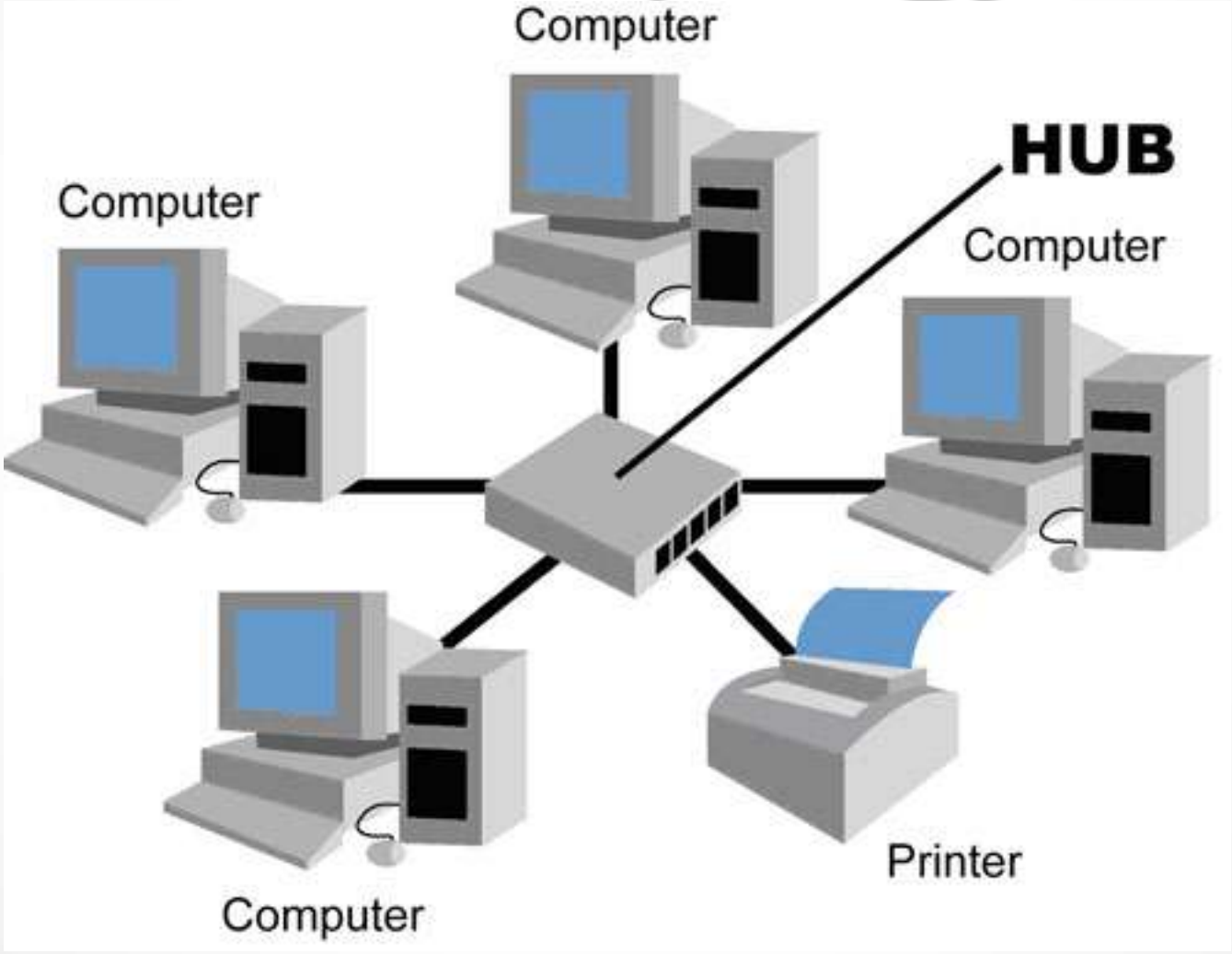
Star Topology

- Here each device has a dedicated point-to-point link to the central controller called "Hub"(Act as a Exchange).
- There is no direct traffic between devices.
- The transmission are occurred only through the central "hub".
- When device 1 wants to send data to device 2; First sends the data to hub. Which then relays the data to the other connected device.

Star Topology



Star Topology



Star Topology

- *Advantages:*

1. Less expensive then mesh since each device is connected only to the hub.
2. Installation and configuration are easy.
3. Less cabling is need then mesh.
4. Robustness.(if one link fails, only that links is affected. All other links remain active)
5. Easy to fault identification & to remove parts.
6. No distruptions to the network then connecting(or) removing devices.

Star Topology

- *Disadvantages:*

1. Even it requires less cabling then mesh when compared with other topologies it still large.(Ring or bus).
2. Dependency(whole n/w dependent on one single point(hub). When it goes down. The whole system is dead.

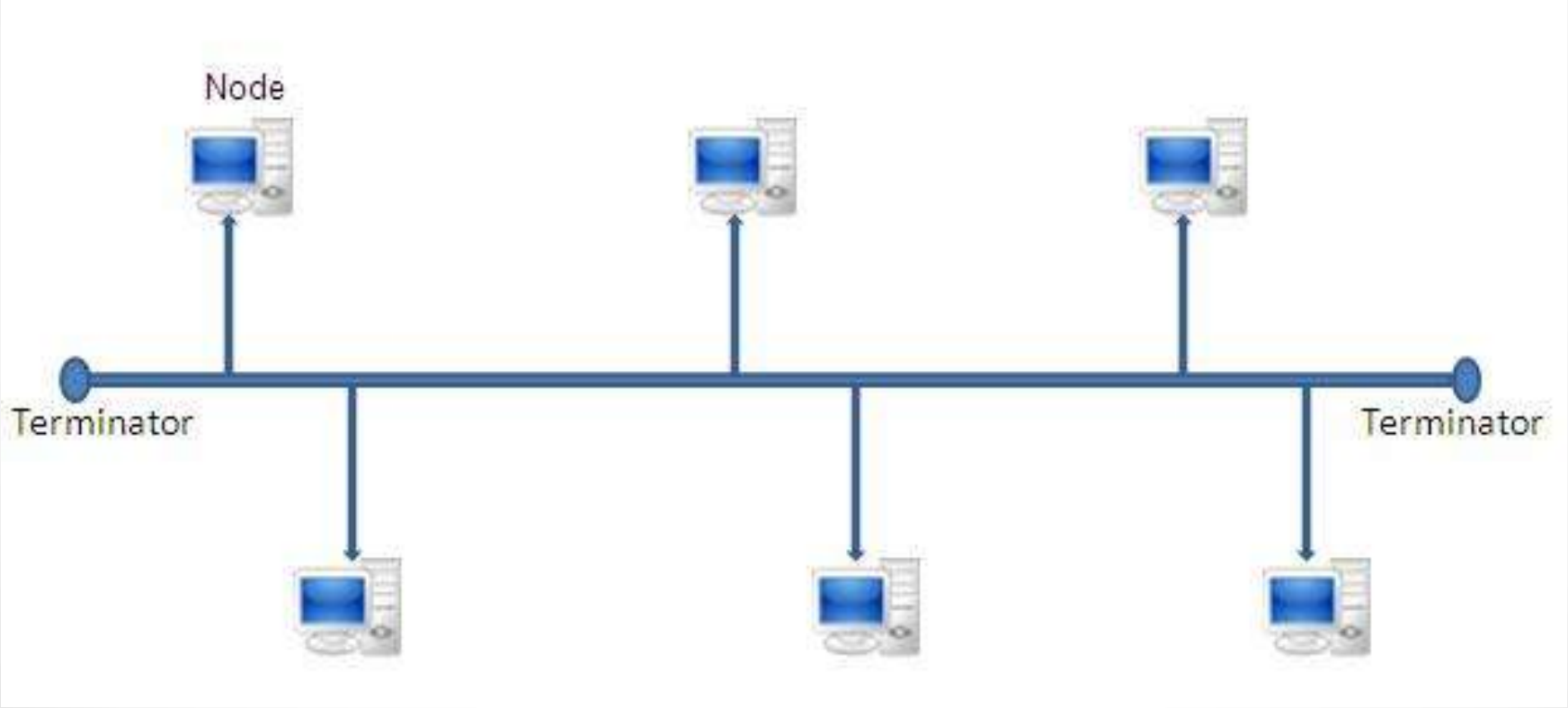
Applications

- Star topology used in Local Area Networks(LANs).
- High speed LAN often used STAR.

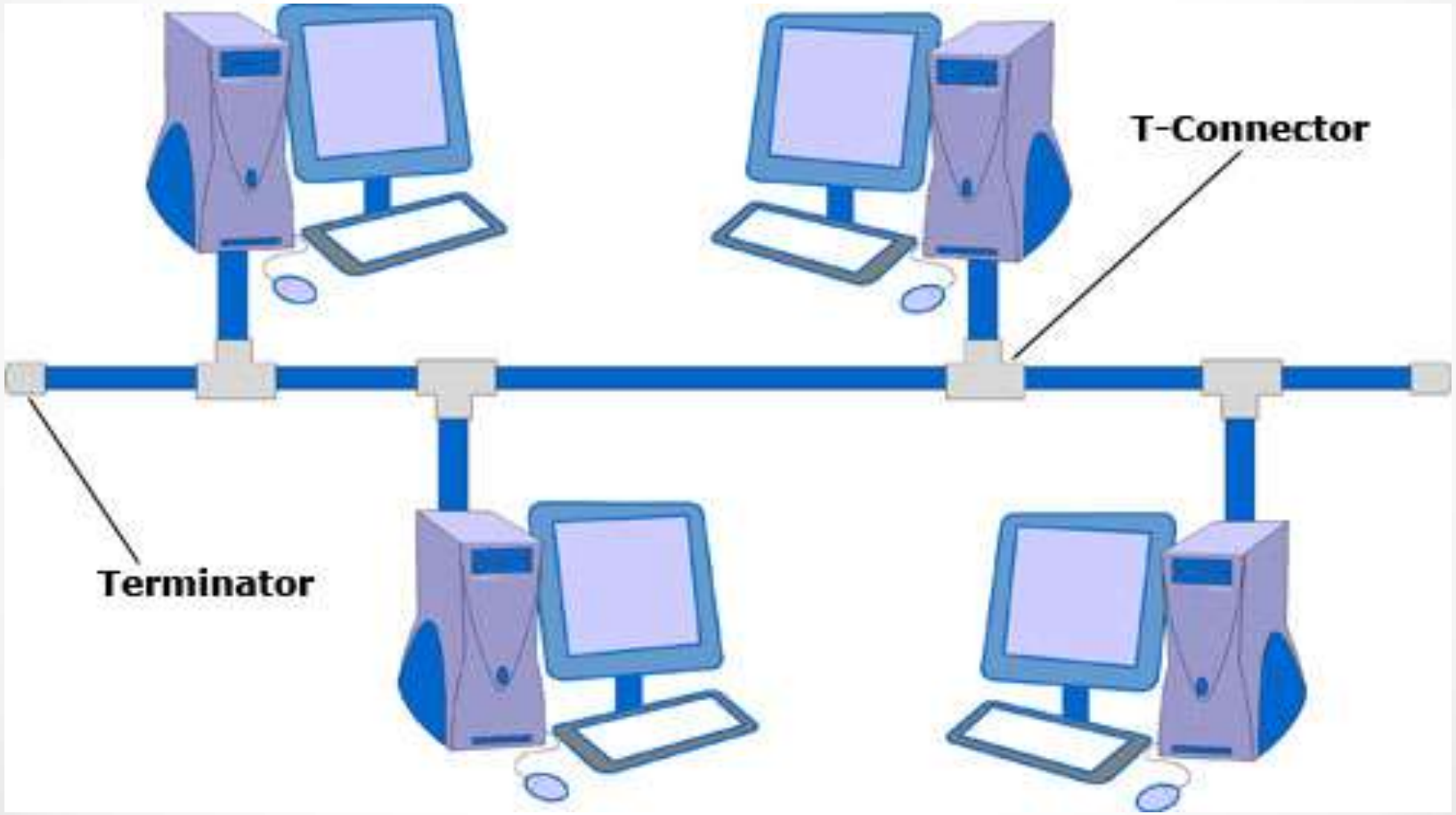
Bus Topology

- A bus topology is multipoint.
- Here one long cable act as a backbone to link all the devices are connected to the backbone by drop lines and taps.
- Drop line- is the connection b/w the devices and the cable.
- Tap- is the splitter that cut the main link.
- This allows only one device to transmit at a time.

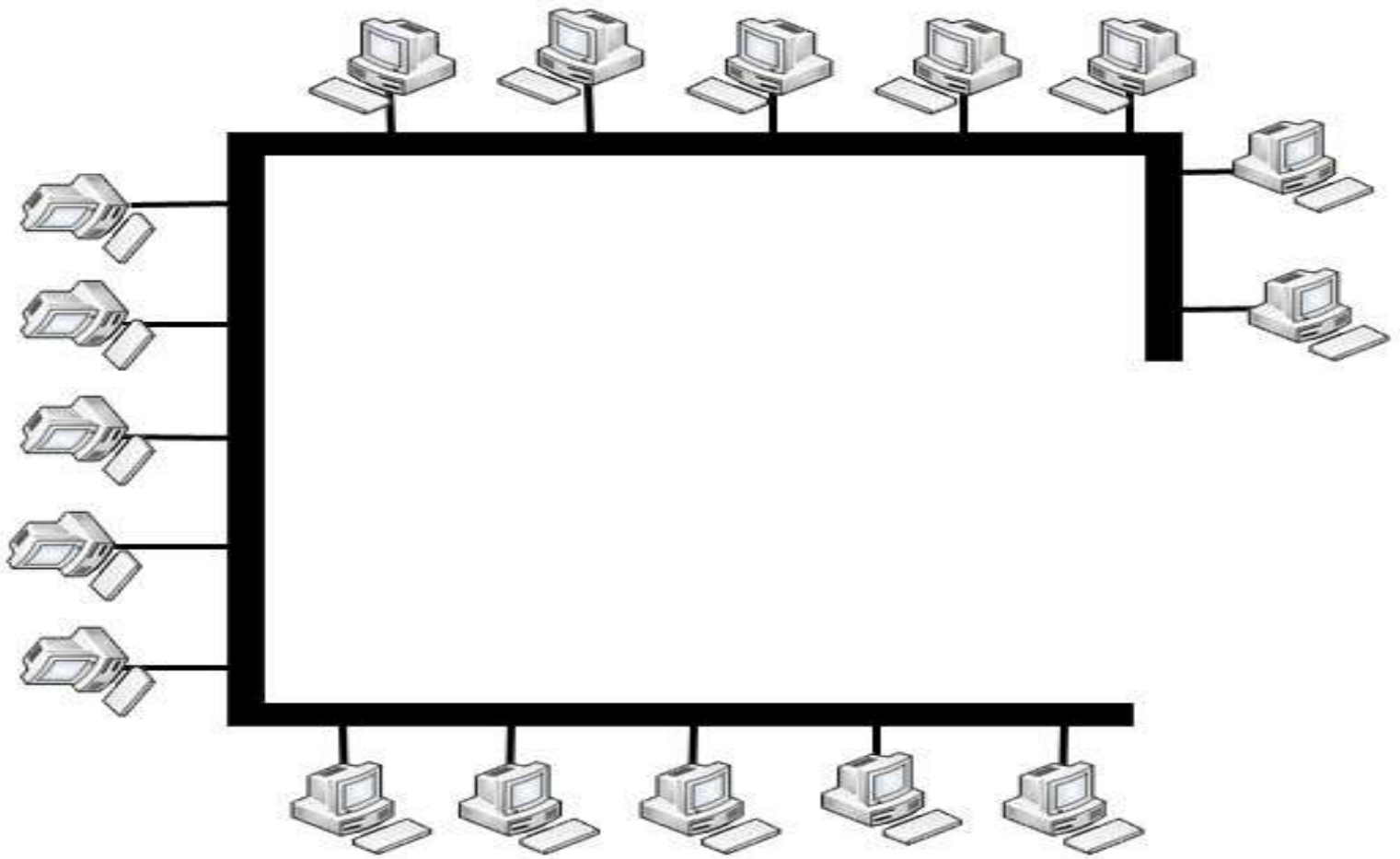
Bus Topology



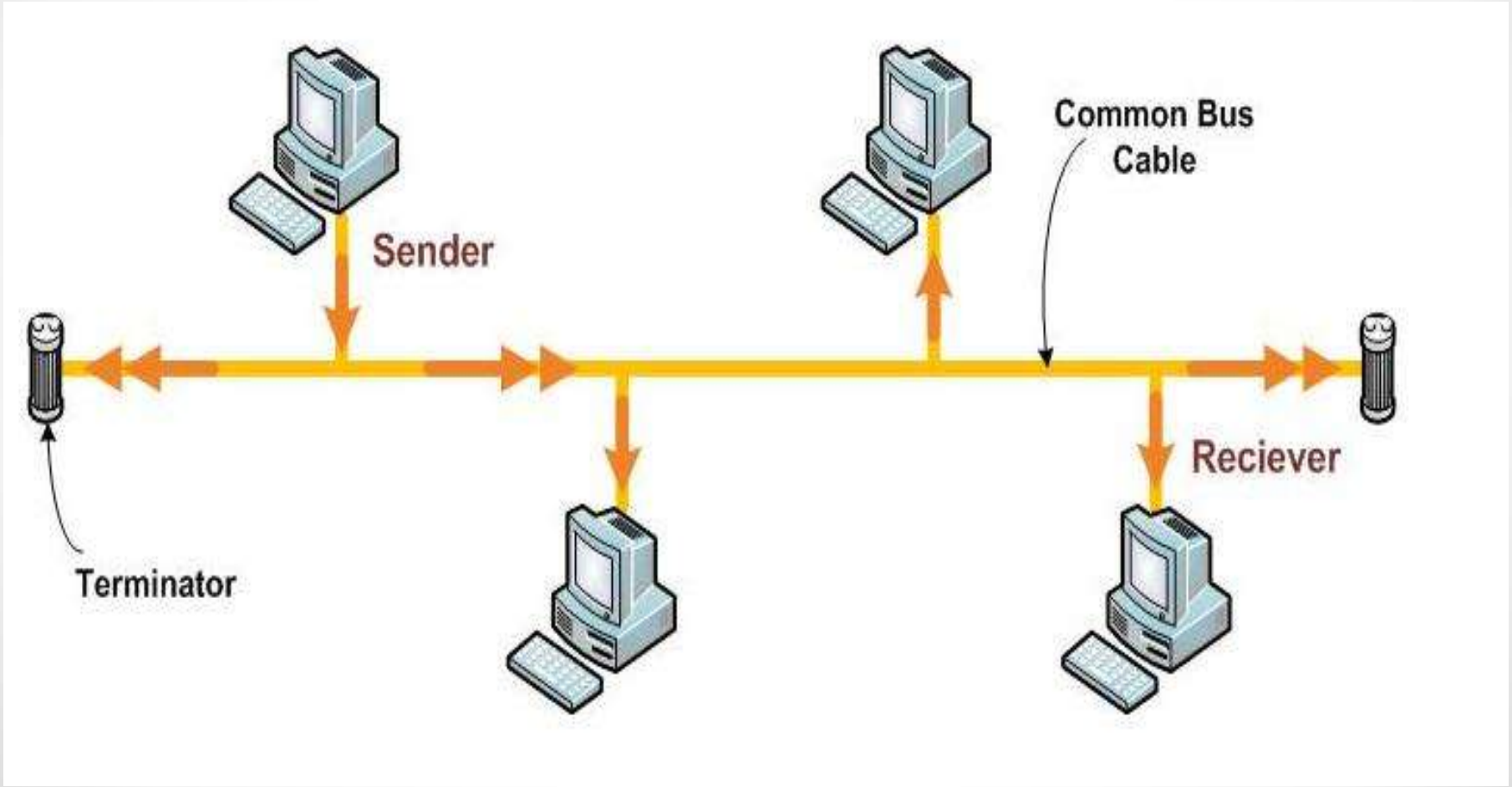
Bus Topology



Bus Topology



Bus Topology



Bus Topology

- A device want to communicate with other device on the n/ws sends a broadcast message onto the wire all other devices see.
- But only the intended devices accepts and process the message.

Bus Topology

- *Advantages:*

1. Ease of installation
2. Less cabling

Disadvantages:

1. Difficult reconfiguration and fault isolation.
2. Difficult to add new devices.
3. Signal reflection at top can degradation in quality.
4. If any fault in backbone can stops all transmission.

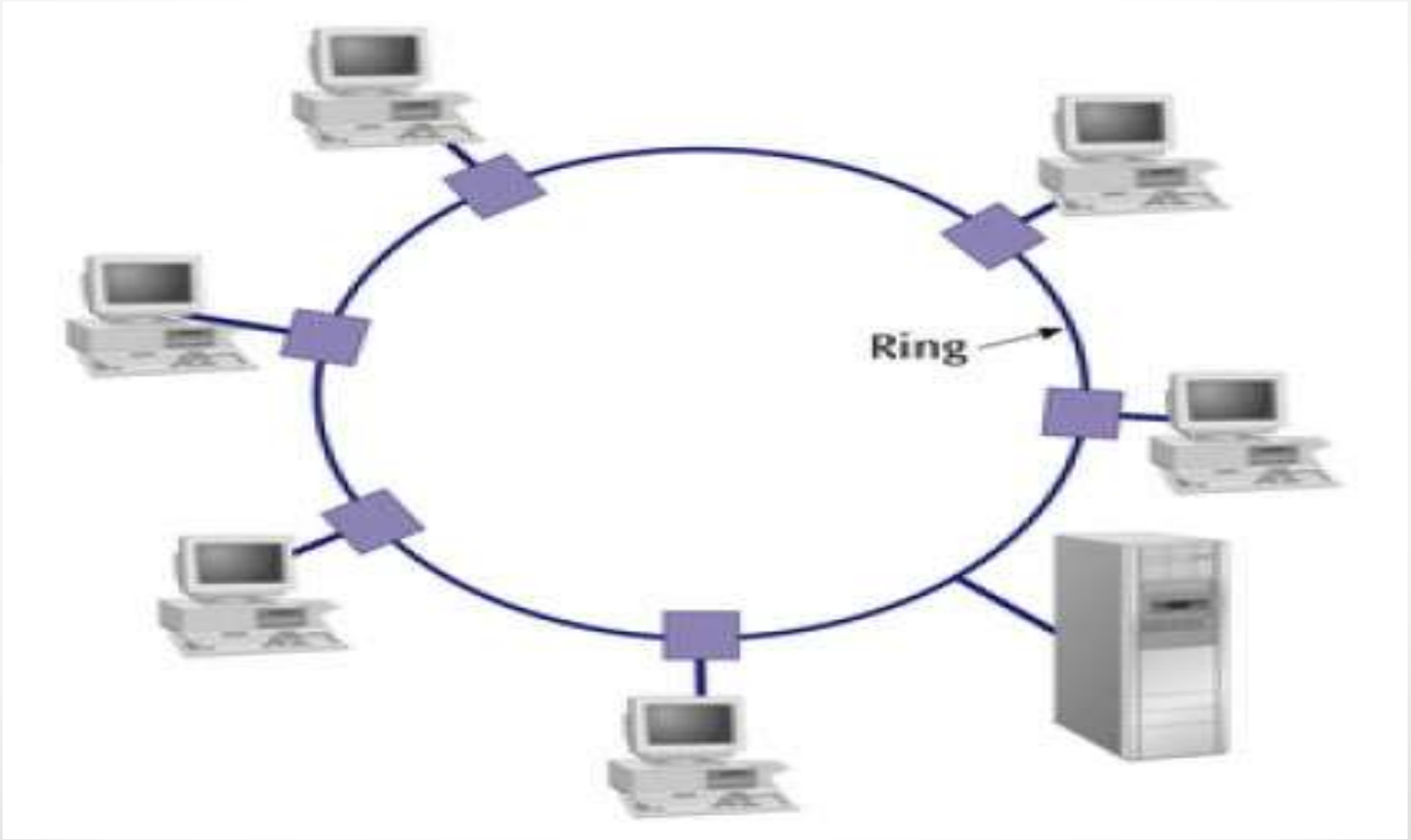
Bus Topology

- *Applications:*
- Most computer motherboard.

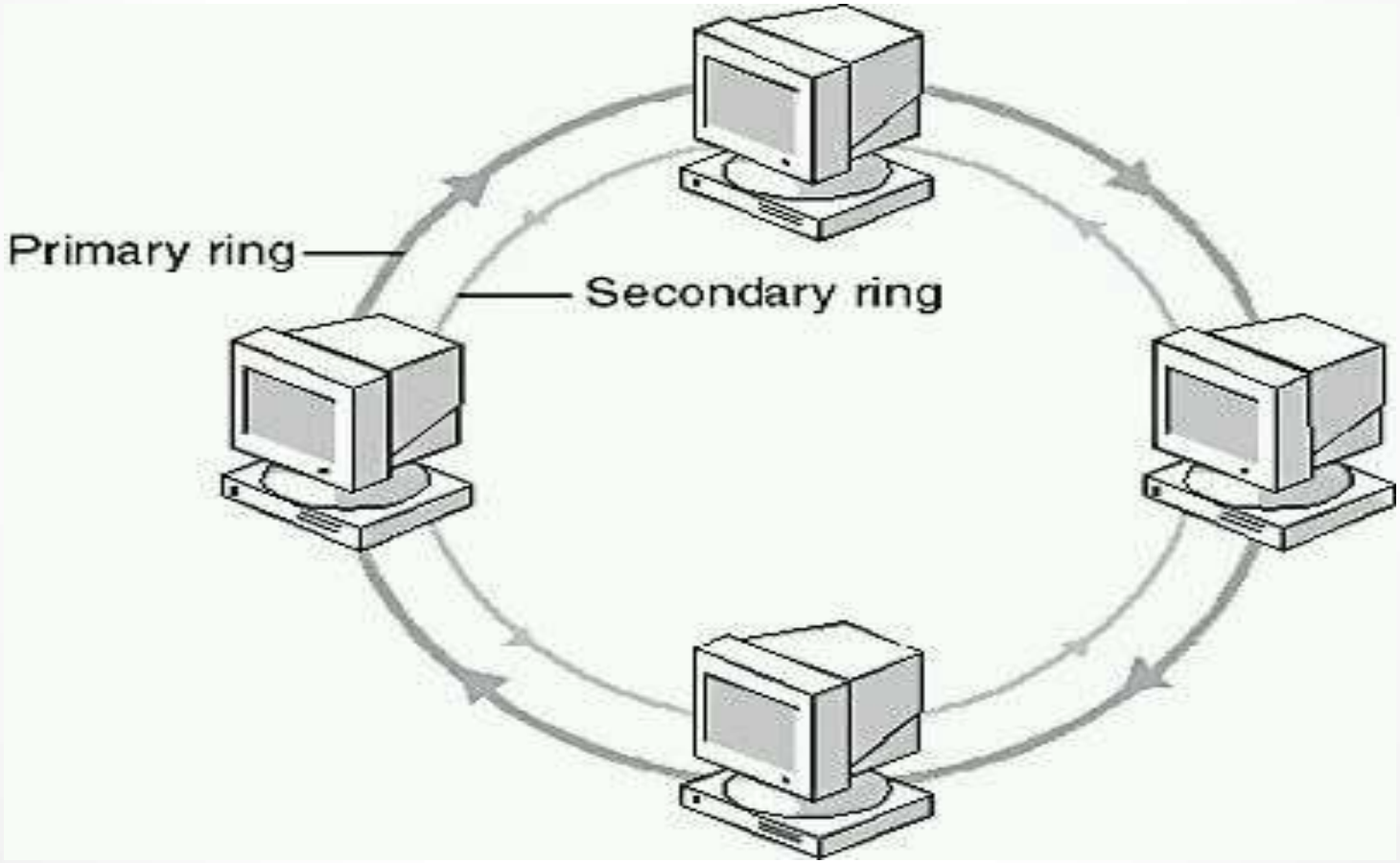
Ring Topology

- Here each device has a dedicated connection with two devices on either side.
- The signal is passed in one direction from device to device until it reaches the destination and each device have repeater.
- When one device received signals instead of intended another device, its repeater then regenerates the data and passes them along.
- To add or delete a device requires changing only two connections.

Ring Topology



Ring Topology



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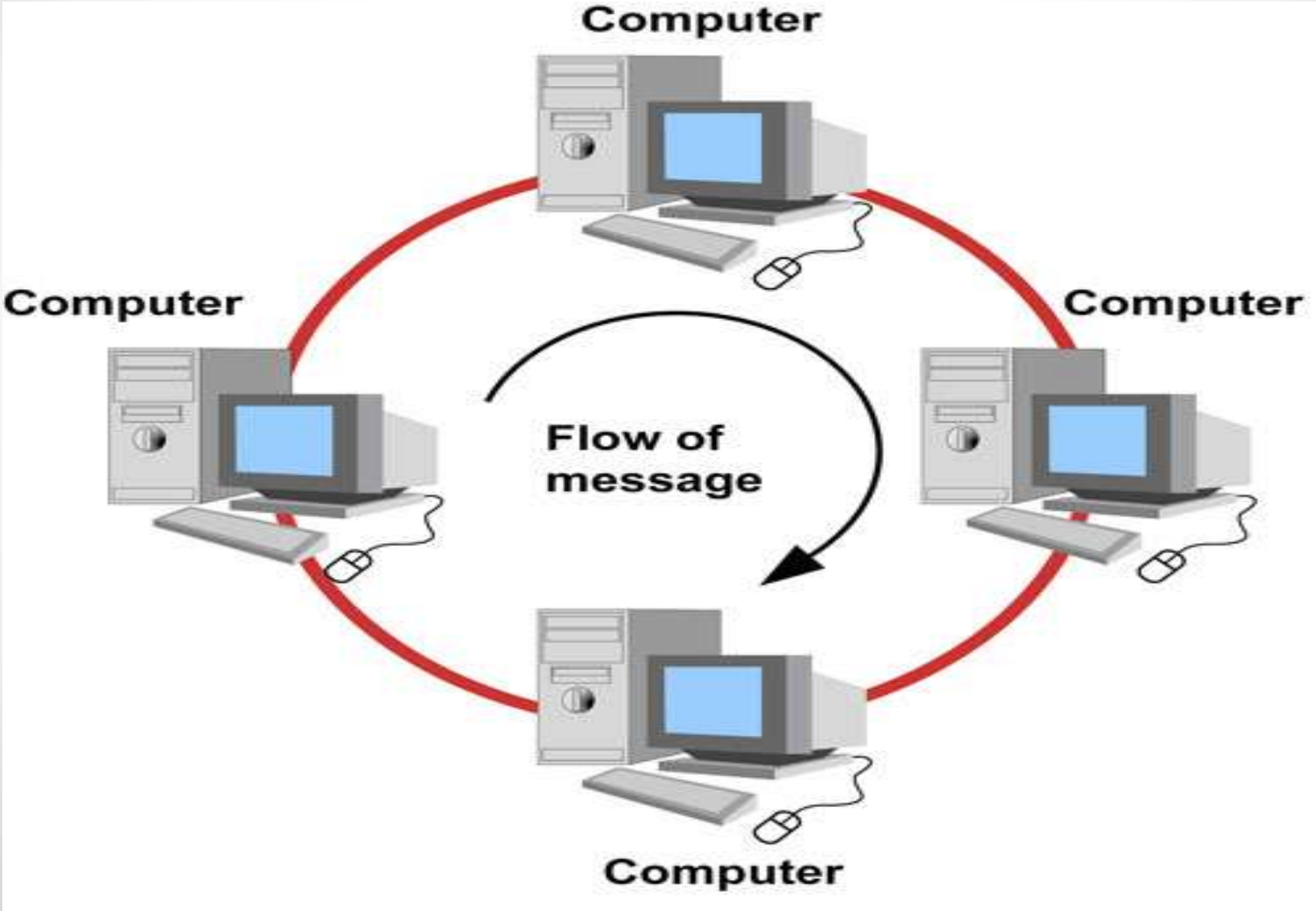


Ring Topology

- *Advantages:*

1. Easy to install.
2. Easy to reconfigure.
3. Fault identification is easy.

Disadvantages:

1. Unidirectional traffic.
2. Break in a single ring can break entire network.

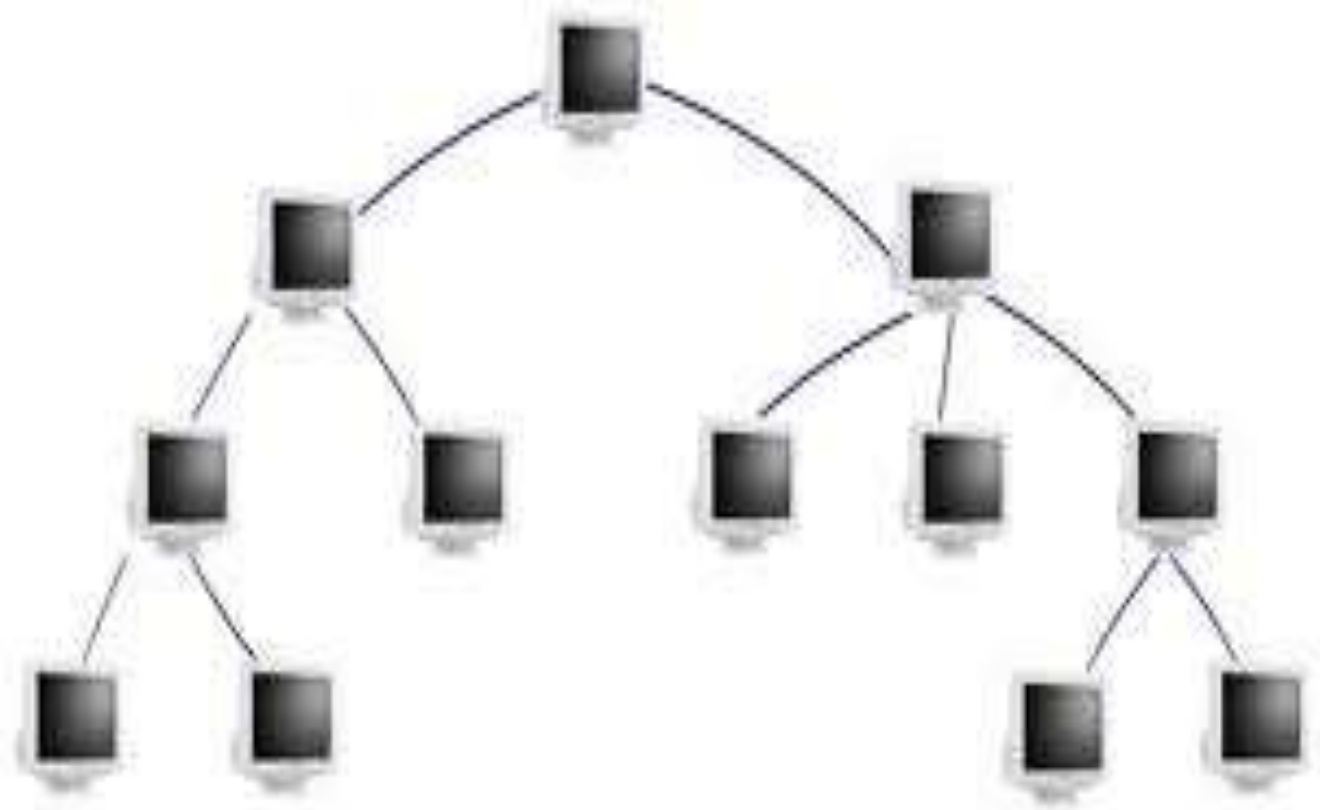
Ring Topology

- *Applications:*
- Ring topologies are found in some office buildings or school campuses.
- Today high speed LANs made this topology less popular.

Tree Topology

- Alternatively referred to as a star bus topology.
- Tree topology is one of the most common network setups that is similar to a bus topology and a star topology.
- A tree topology connects multiple star networks to other star networks. Below is a visual example of a simple computer setup on a network using the star topology.

Tree Topology

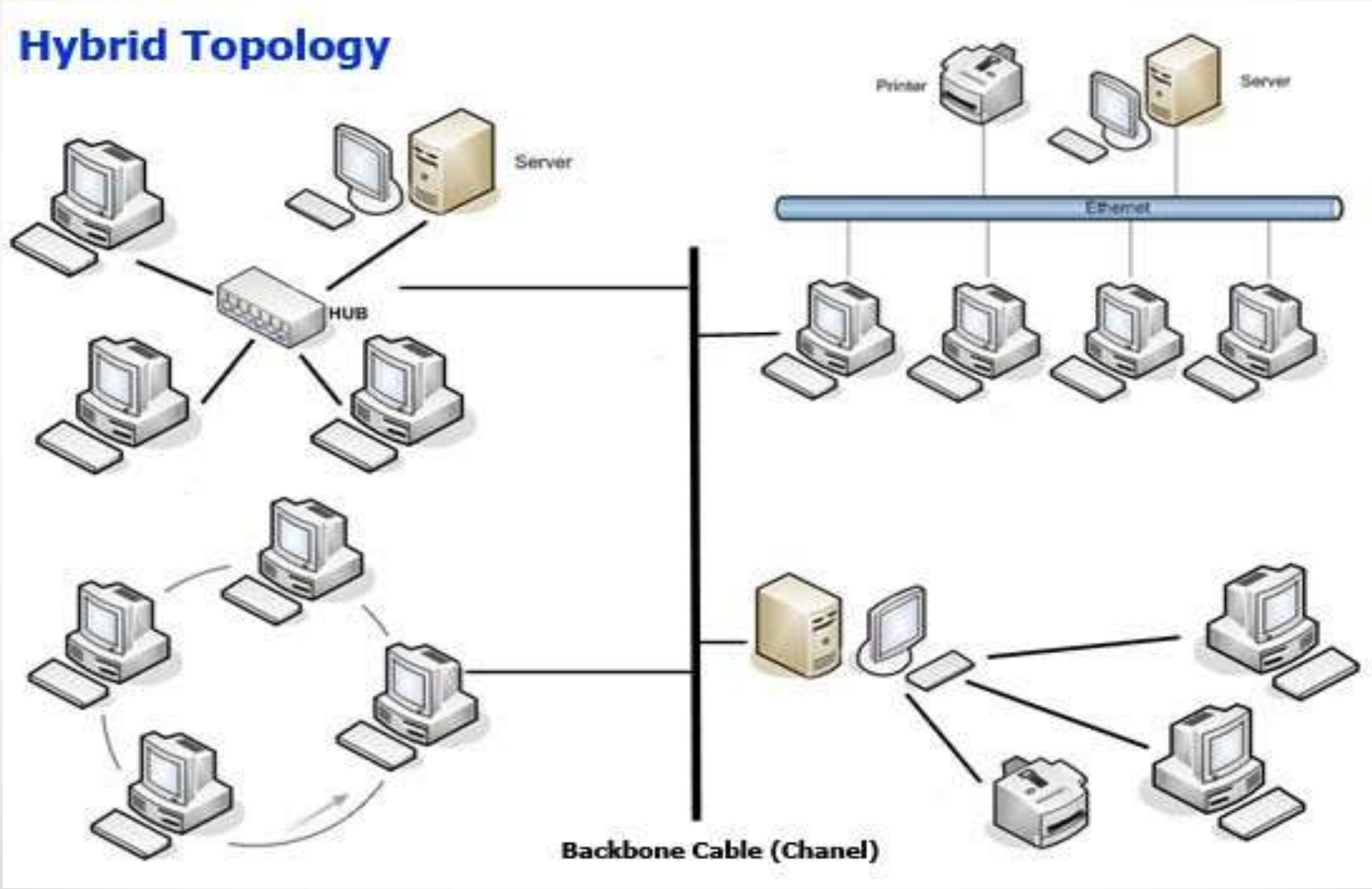


Digram - Tree Topology

Hybrid Topology

- A network which contain all type of physical structure and connected under a single backbone channel.

Hybrid Topology



Considerations for choosing topology

- Money-Bus n/w may be the least expensive way to install a n/w.
- Length-of cable needed- the linear bus n/w uses shorter lengths of cable.
- Future growth-with star topology, expending a n/w is easily done by adding another devices.
- Cable type-most common used cable in commercial organization is twisted pair. Which often used with star topologies.

- Full mesh topology is theoretically the best since every device is connected to every other device.(thus maximizing speed and security. however, it quite expensive to install)
- Next best would be tree topology, which is basically a connection of star.