Network topology

What is Network Topology ?

- **Network topology is the arrangement of the various elements like links, nodes, etc. of a computer network.**

- **Structure of a network, and may be represented physically or logically.**

Categories of network topologies:

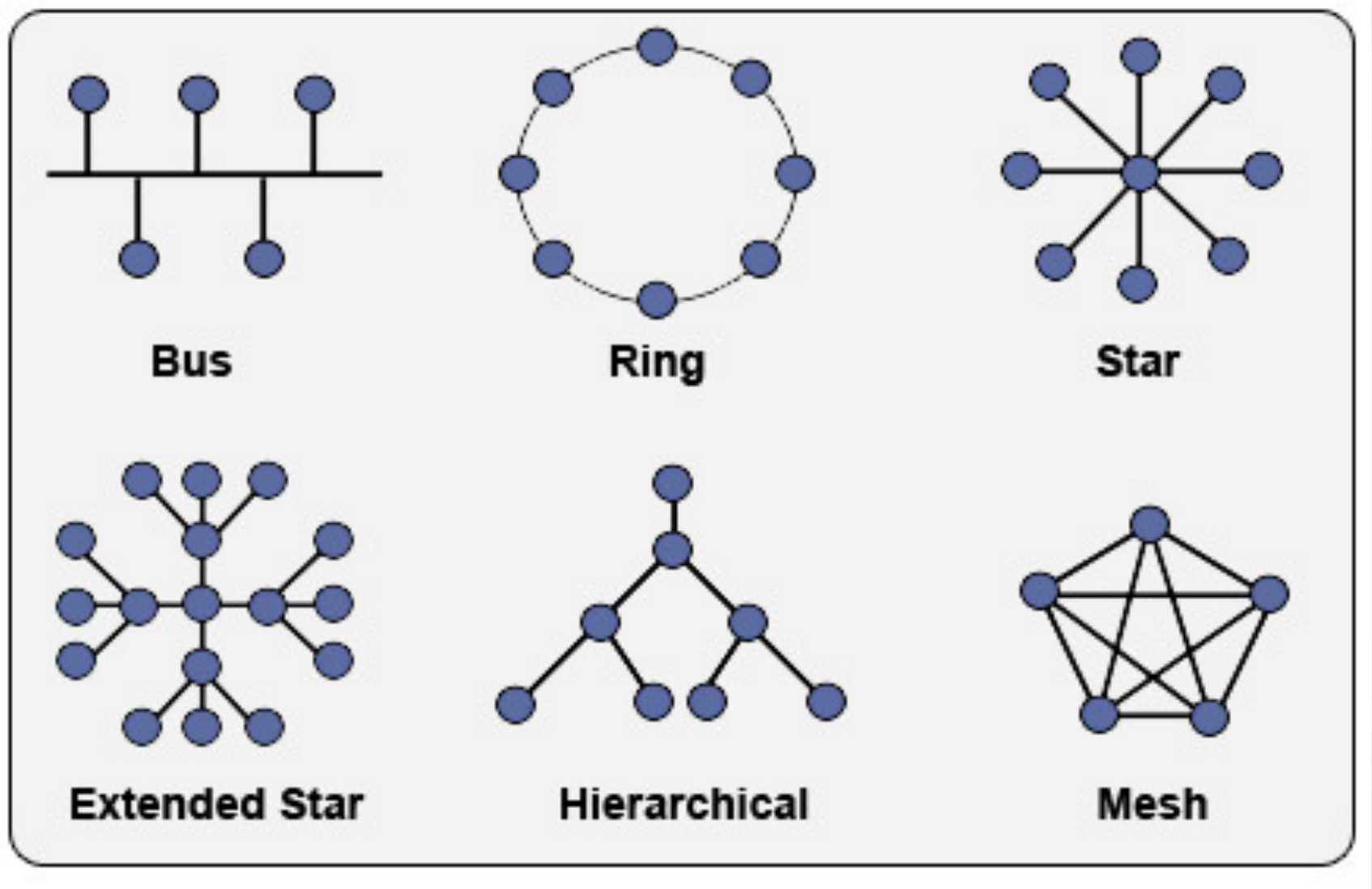
- **There are two basic categories of network topologies:**

1. **Physical topologies.**
2. **Logical topologies.**

Simple Physical Topologies

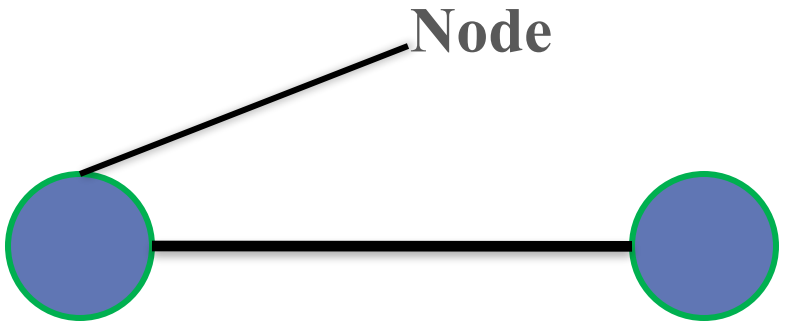
- **The study of network topology recognizes these basic topologies:**
  - **Point-to-point**
  - **Mesh**
  - **Star**
  - **Bus**
  - **Ring or circular**
  - **Tree**
  - **Hybrid**

Network Topology



Point-to-point topology

- **The simplest topology is a direct link between two endpoints.**

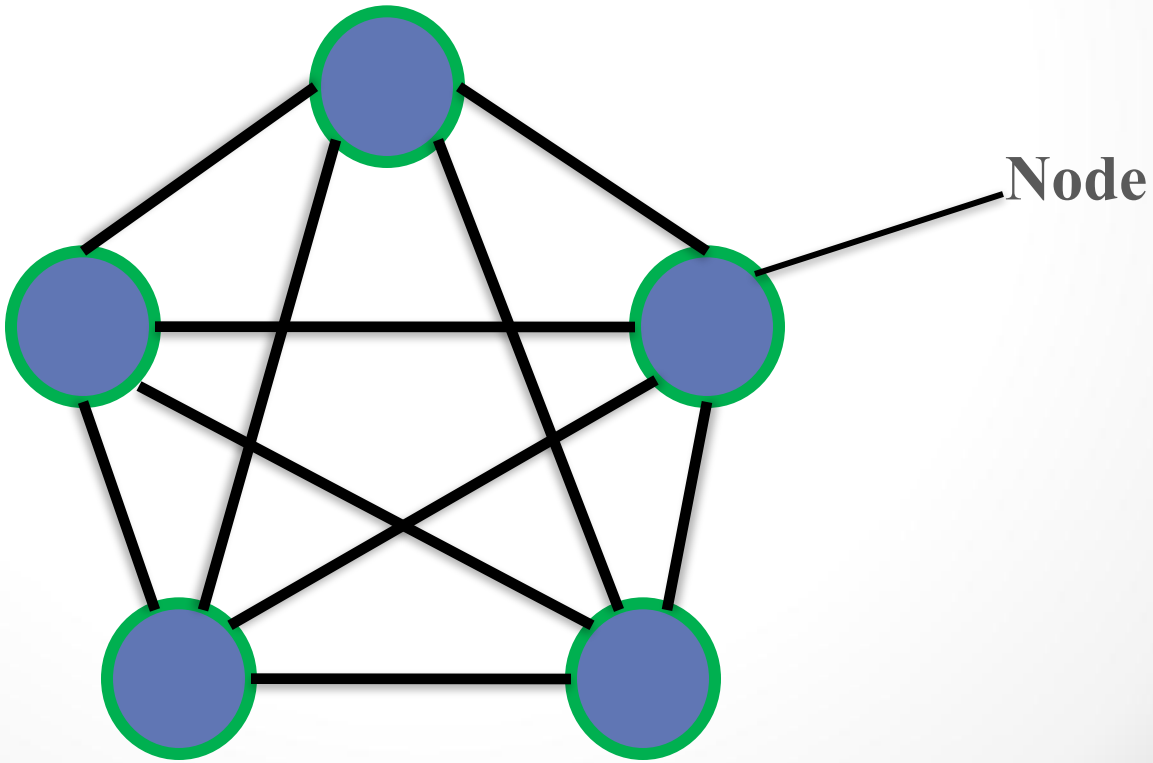


Mesh Topology

- **Every device has a point to point link to every other device.**
- **Two types of mesh topology :**
  - **Fully connected.**
  - **Partially connected.**

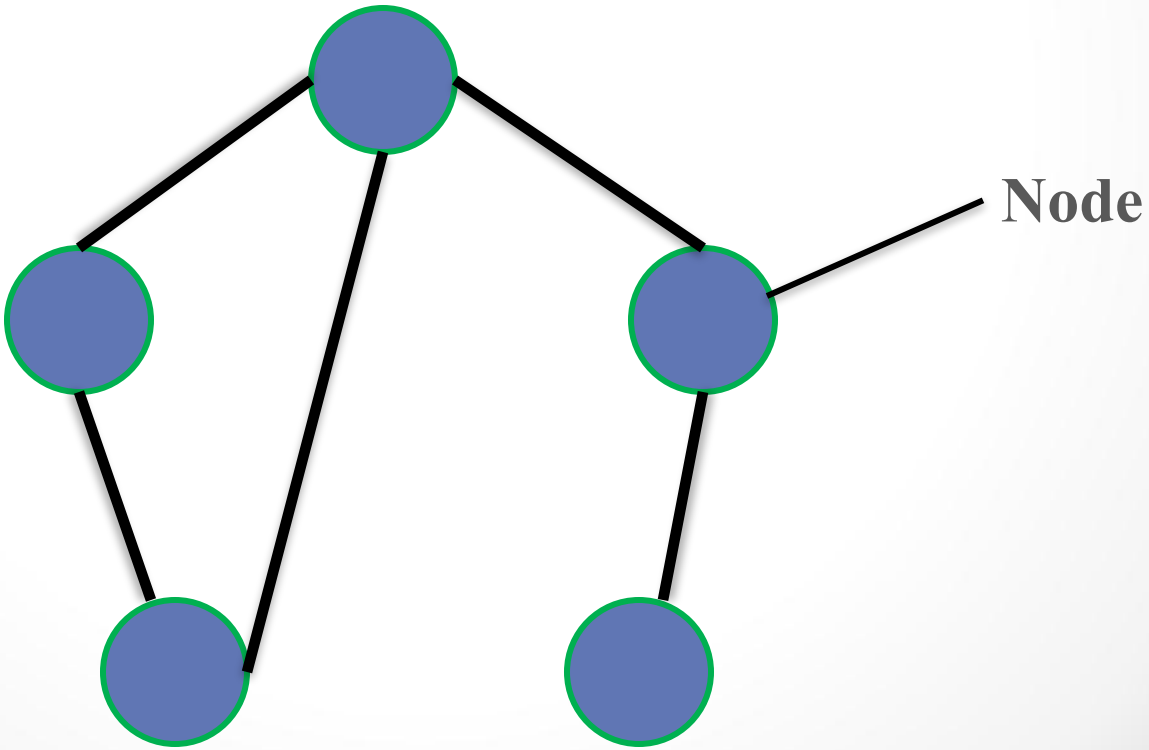
Mesh Topology

- **Fully connected: each of the nodes is connected to each other. In graph theory it known as a complete graph.**



Mesh Topology

- **Partially connected: some of the nodes of the network are connected to more than one other node in the network with a point-to-point link.**



Mesh Topology

- *Advantages:*

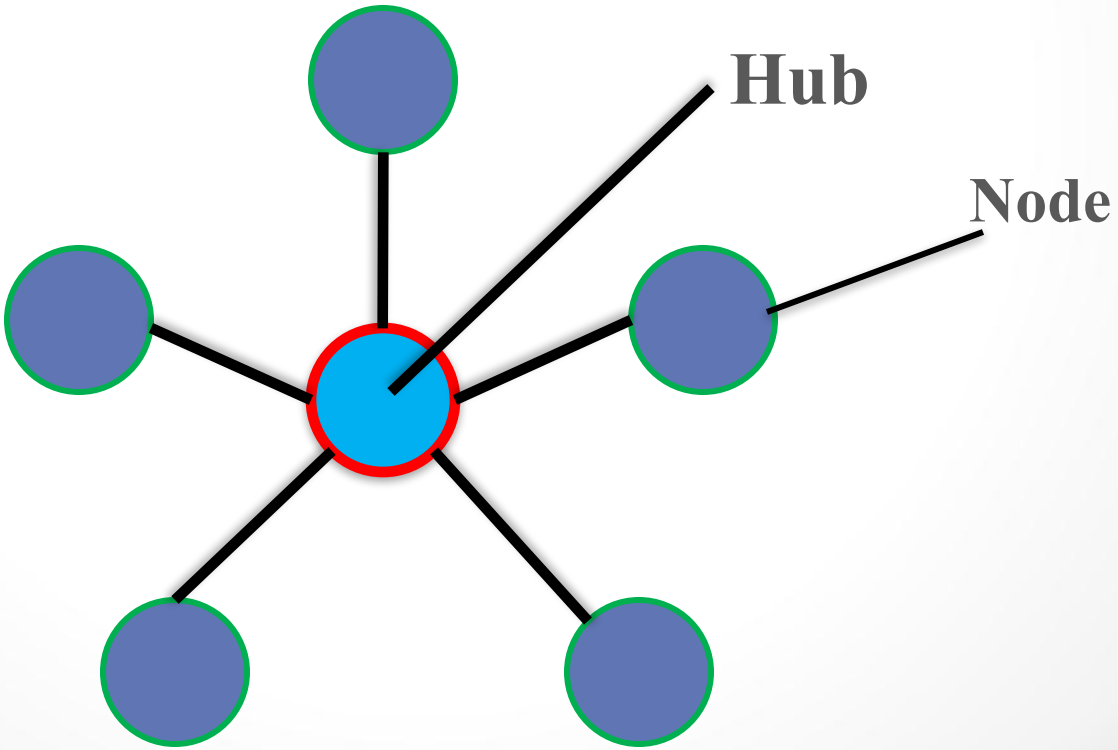
1. Data can be transmitted from different devices simultaneously.
2. Network can be easily expanded.
3. Message travels along dedicated link, mesh topology is more secure.

- *Disadvantages:*

1. It is quite expensive since a higher length of cable is required.
2. Set-up and maintenance of this topology is very difficult.

Star Topology

- **Here each device has a dedicated point-to-point link to the central controller called “Hub”.**
- **There is no direct traffic between devices.**



Star Topology

- *Advantages:*

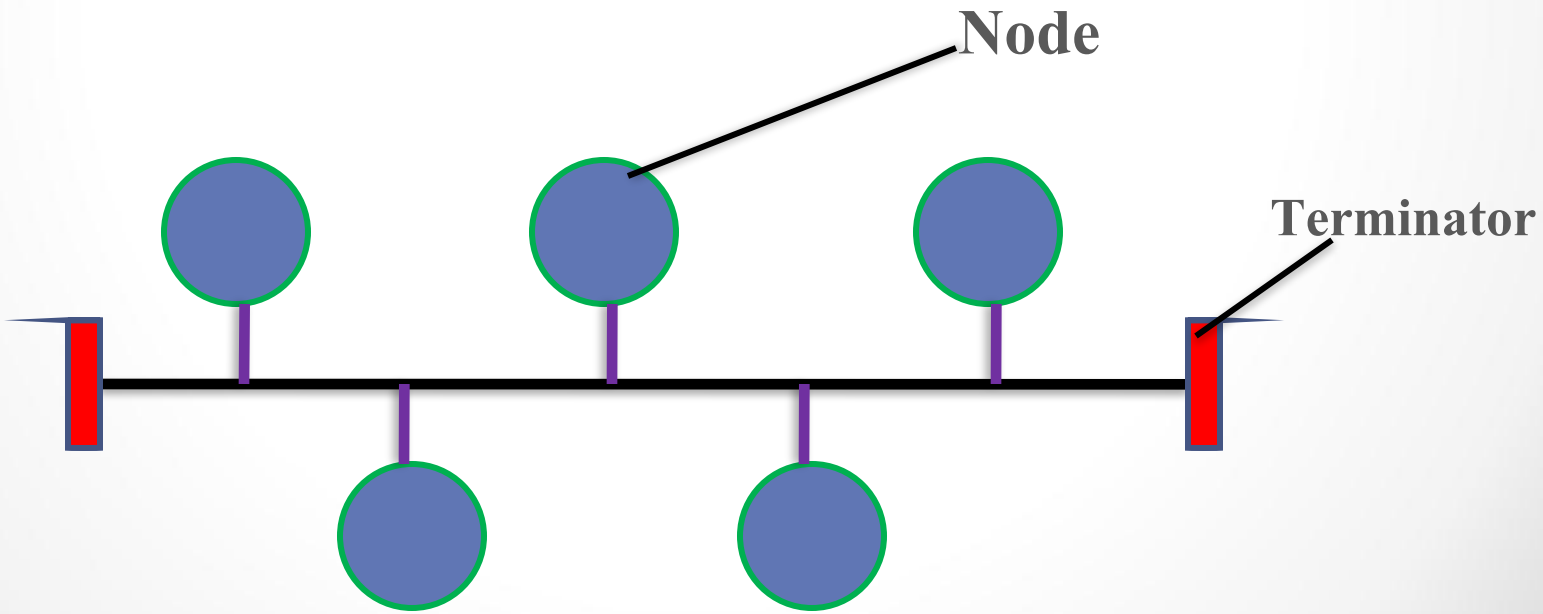
1. Good options for modern network.
2. Low start-up cost.
3. Easy to mange.

- *Disadvantages:*

1. Too much dependency on central device has its own drawbacks. If it fails whole network goes down.
2. Difficult to expand.

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.
- Devices share responsibility for getting data from one point to another.



Bus Topology

- *Advantages:*

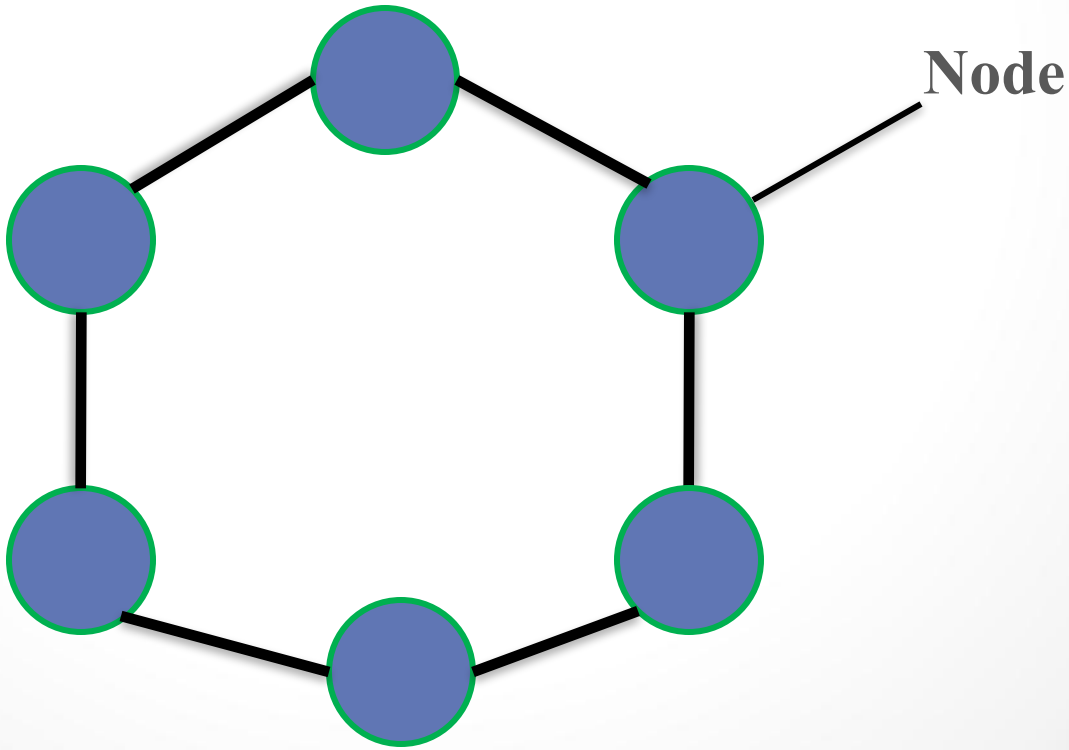
1. Works well for small networks.
2. Easy to add to it.
3. Relatively inexpensive to implement.

- *Disadvantages:*

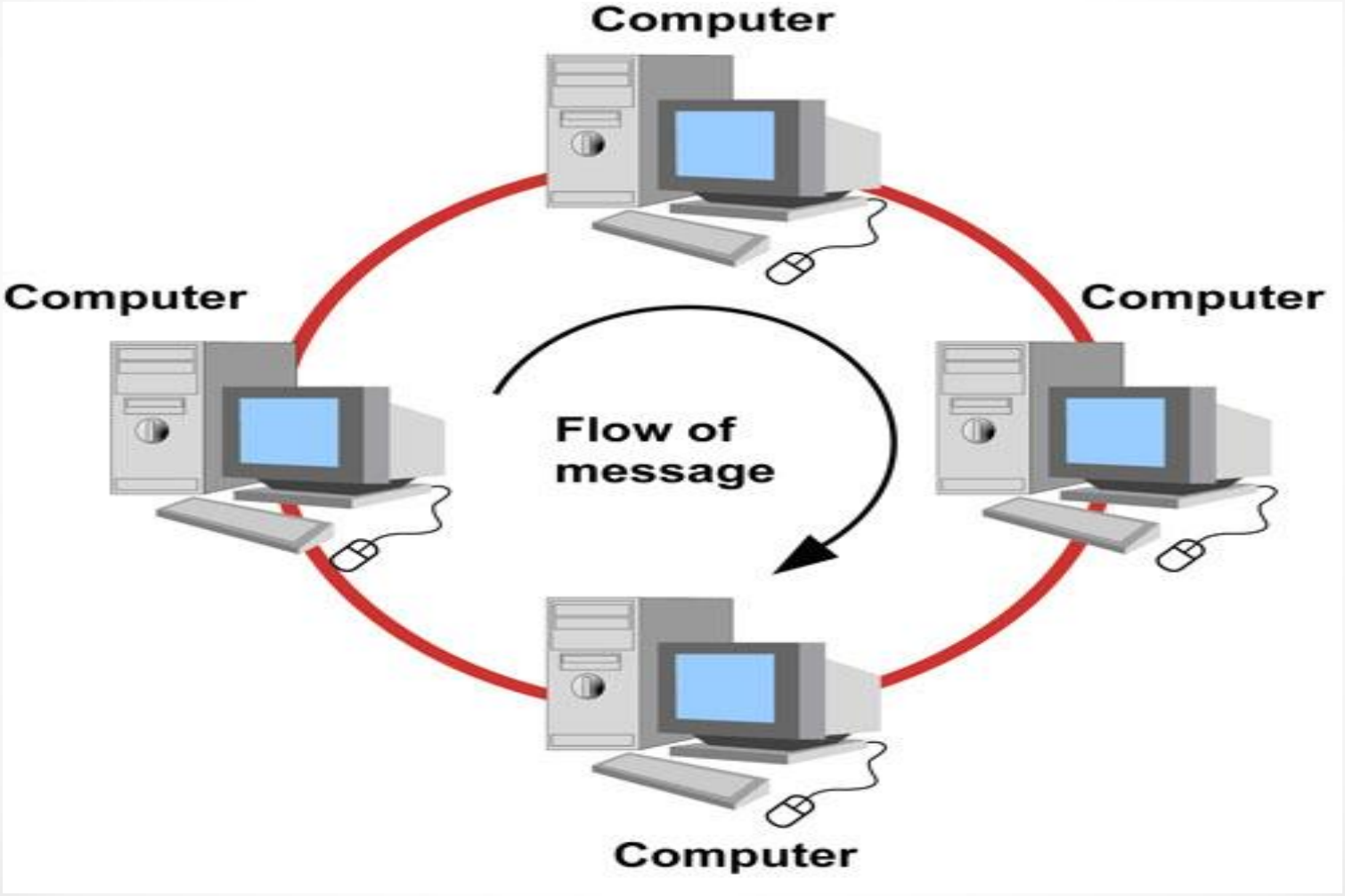
1. Difficult to administer/troubleshoot.
2. Limited cable length
3. Maintenance costs higher in the long run.

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.**



Ring Topology



Ring Topology

- *Advantages:*

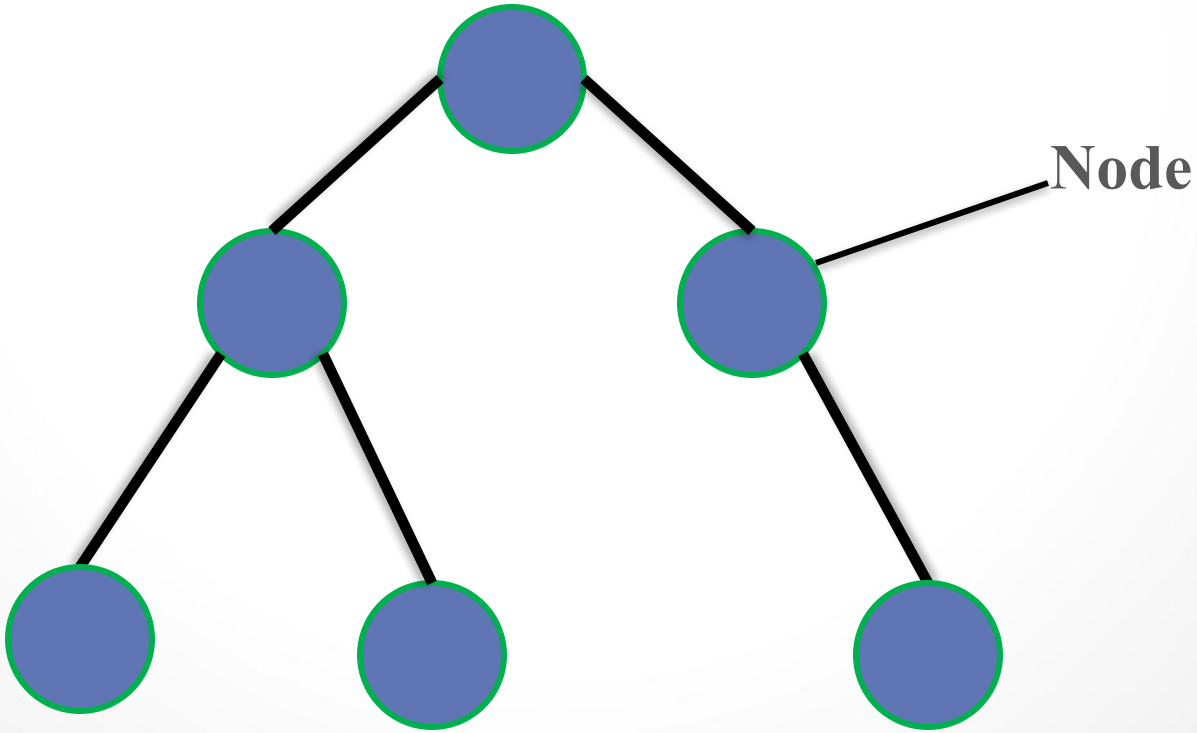
1. Easy to install.
2. Handles high volume networks traffic.
3. Short cable length.

- *Disadvantages:*

1. Network is highly dependent on the wire which connects different components.
2. Break in a single ring can break entire network.

Tree Topology

- **Tree topology is one of the most common network setups that is similar to a bus topology and a star topology.**
- **Here nodes are linked in a stage or phase.**



Tree Topology

- *Advantages:*

1. The tree topology is useful in cases where a star or bus cannot be implemented individually.
2. The network can be expanded by the addition of secondary nodes.
3. Short cable length.

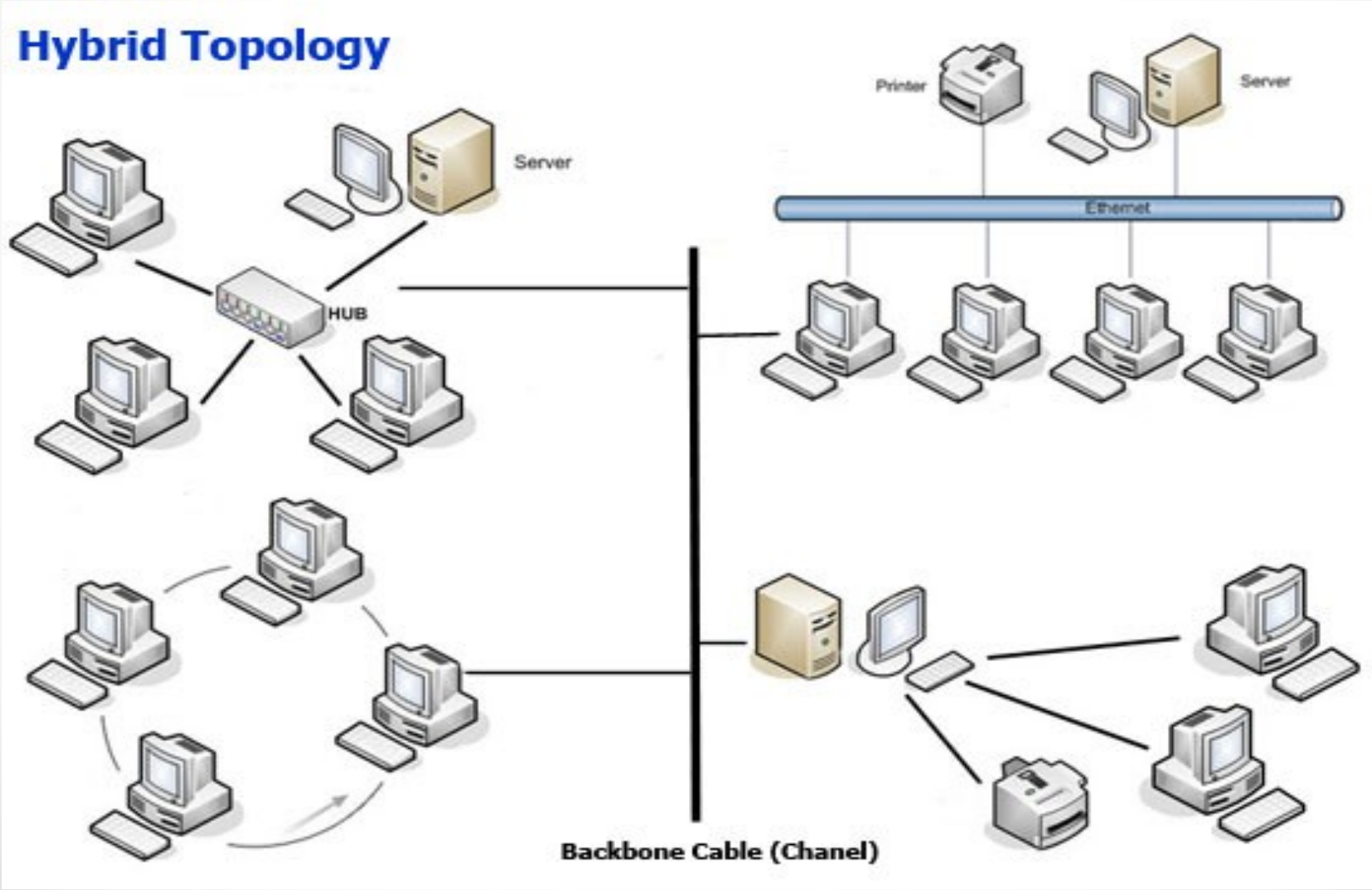
- *Disadvantages:*

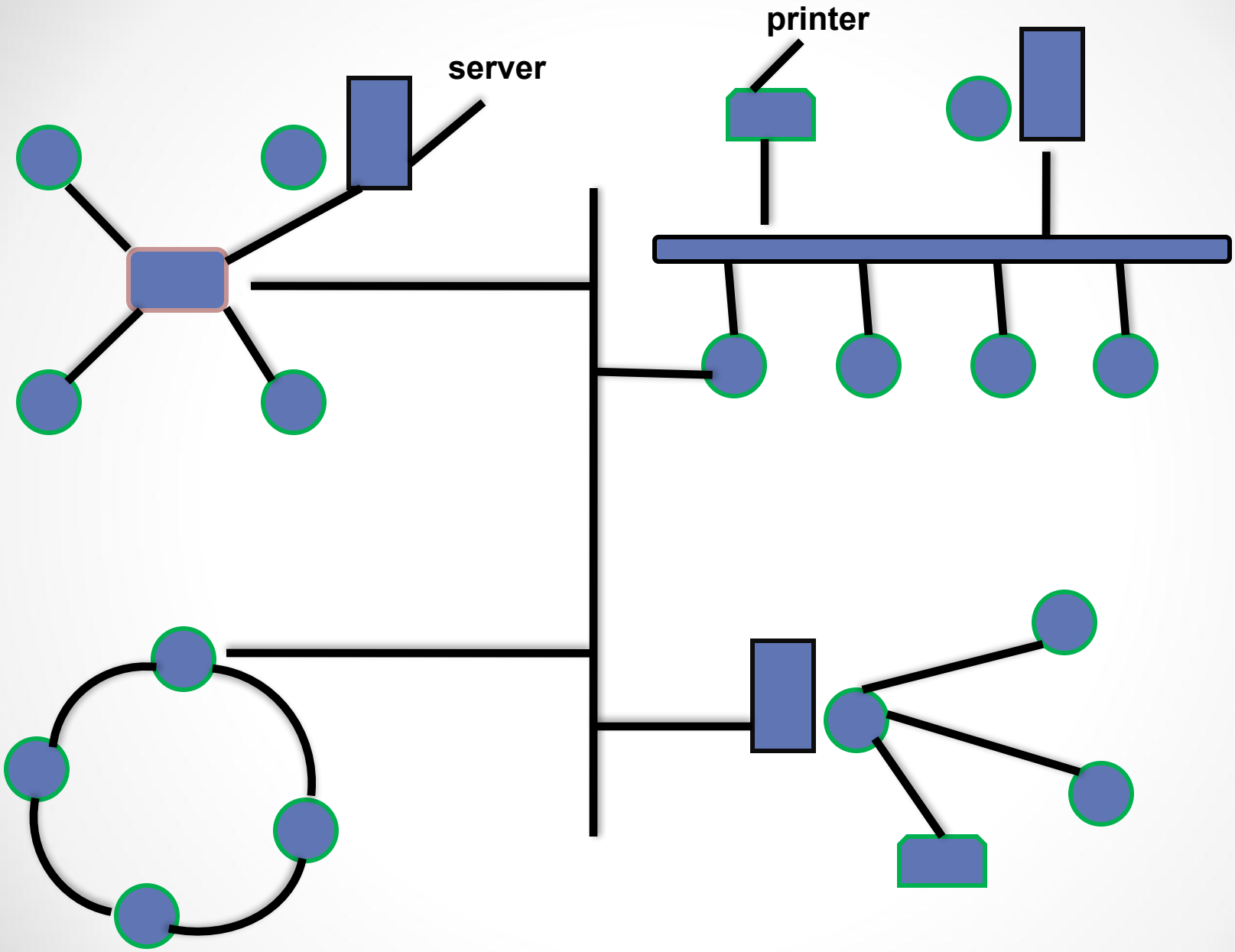
1. Multiple segments are connected to a central bus, the network depends heavily on the bus. Its failure the entire network will be down.

Hybrid Topology

- **A network which contain all type of physical structure and connected under a single backbone channel.**
- **Hybrid networks use a combination of any two or more topologies (e.g., bus, star, ring, etc.)**

Hybrid Topology

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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.
- Next best would be tree topology, which is basically a connection of star.