



Network Topology

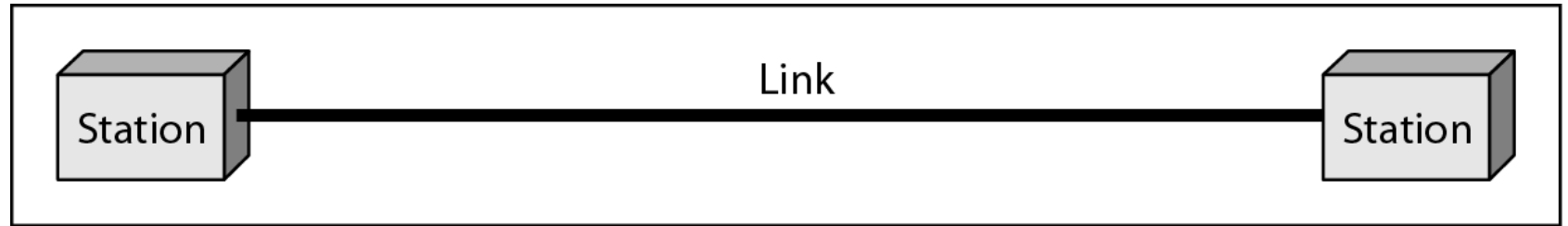
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Content

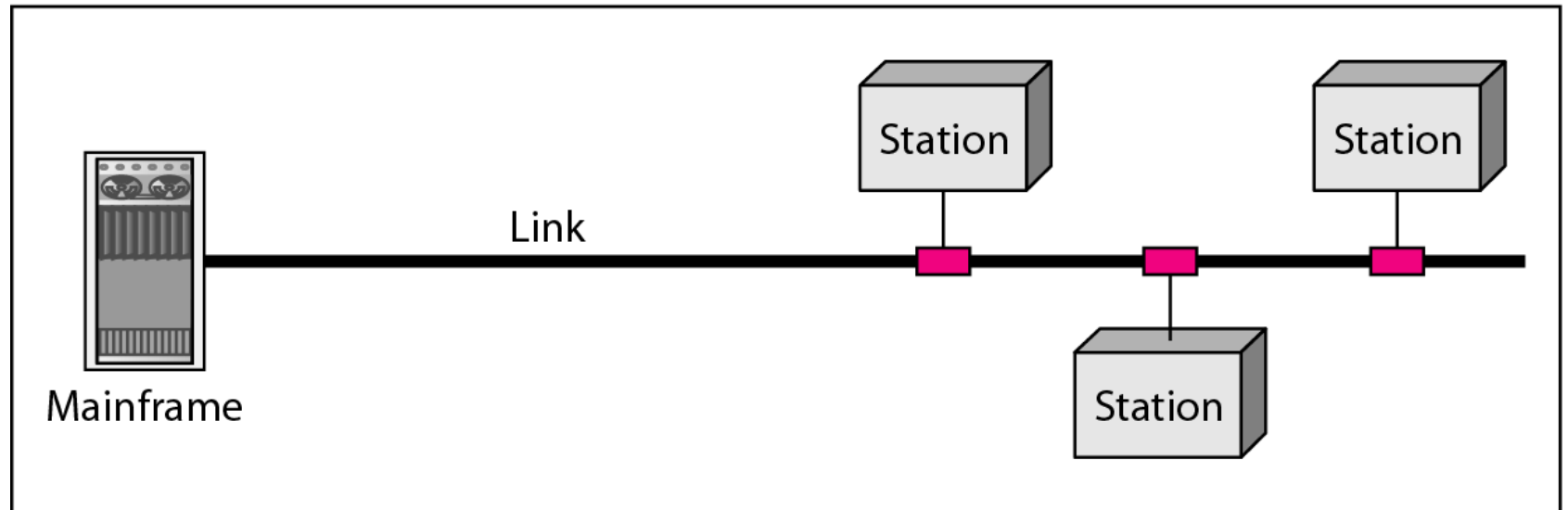
Network Topology

Types of connections

Types of connections: point-to-point and multipoint



a. Point-to-point



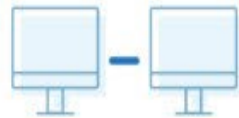
b. Multipoint

Network Topology

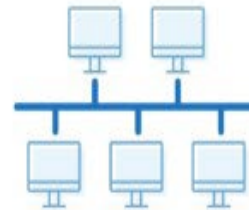
- ▮ Network Topology is the schematic description of a network arrangement. connecting various nodes(sender and receiver) through lines of connection of a network is the geometric representation of the relationship of all the links and linking devices (usually called nodes) to one another.
- ▮ *The topology of a network is the geometric representation of the relationship of all the links and linking devices (usually called **nodes**) to one another.*

Types of Topology

1 Point to point



2 Bus



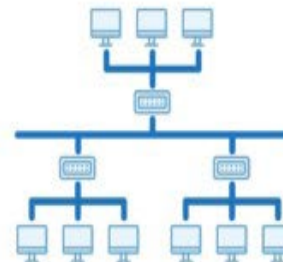
3 Ring



4 Star



5 Tree



6 Mesh

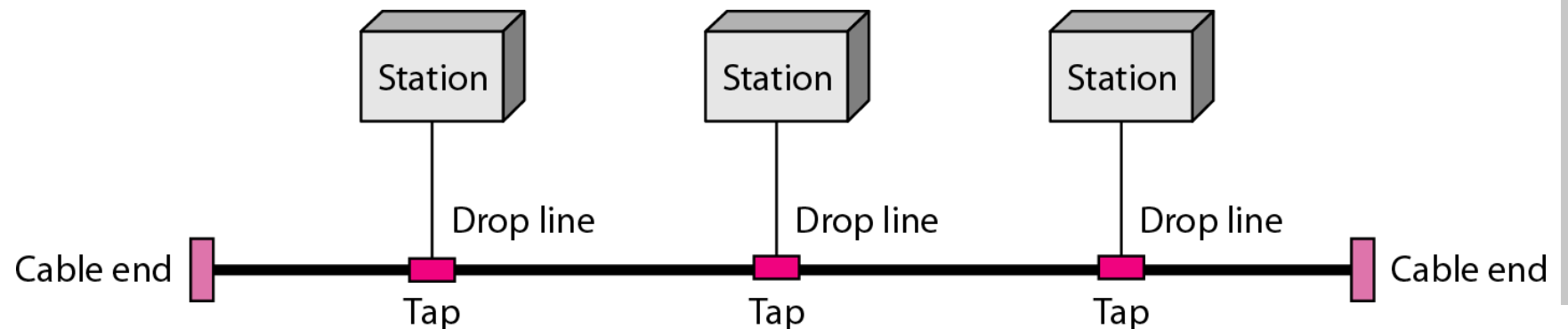


7 Hybrid



BUS Topology

- Bus topology is a network type in which every computer and network device is connected to single cable. When it has exactly two endpoints, then it is called **Linear Bus topology**.
- A **bus topology is multipoint**. One long cable acts as a **backbone to link all** the devices in a network
- A bus topology with shared backbone cable.
- The nodes are connected to the channel via drop lines.
- It transmits the data from one end to another in single direction.
- No bi-directional feature is in bus topology.



BUS Topology

Advantages

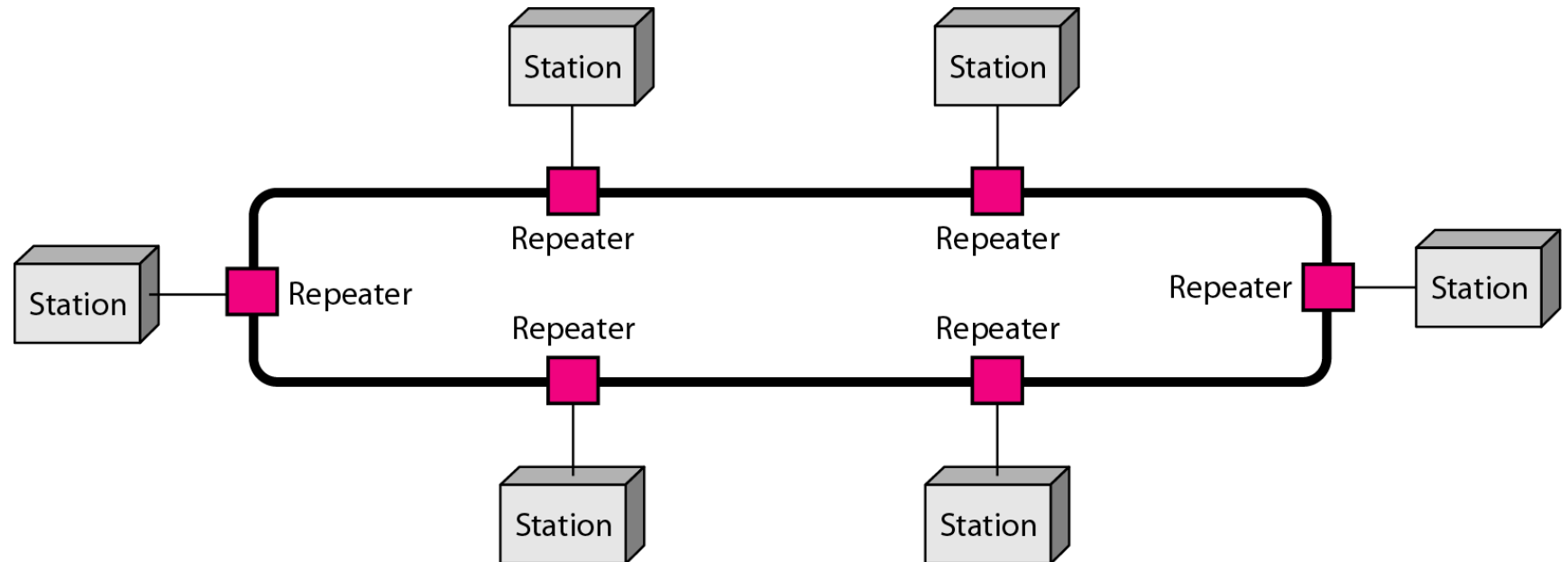
- ▮ If N devices are connected to each other in bus topology, then the number of cables required to connect them is 1, which is known as **backbone cable** and N drop lines are required.
- ▮ Cost of the cable is less as compared to other topology, but it is used to build small networks.

Disadvantages

- ▮ Cables fail then whole network fails.
- ▮ If network traffic is heavy or nodes are more, the performance of the network decreases.
- ▮ Cable has a limited length.
- ▮ It is slower than the ring topology.
- ▮ 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 a device with its exactly two neighboring devices.
- ▮ A ring topology is a **network** configuration in which device connections create a circular **data** path.
- ▮ Each networked device is connected to two others, like points on a circle. Together, devices in a ring topology are referred to as a ring network.



Ring Topology

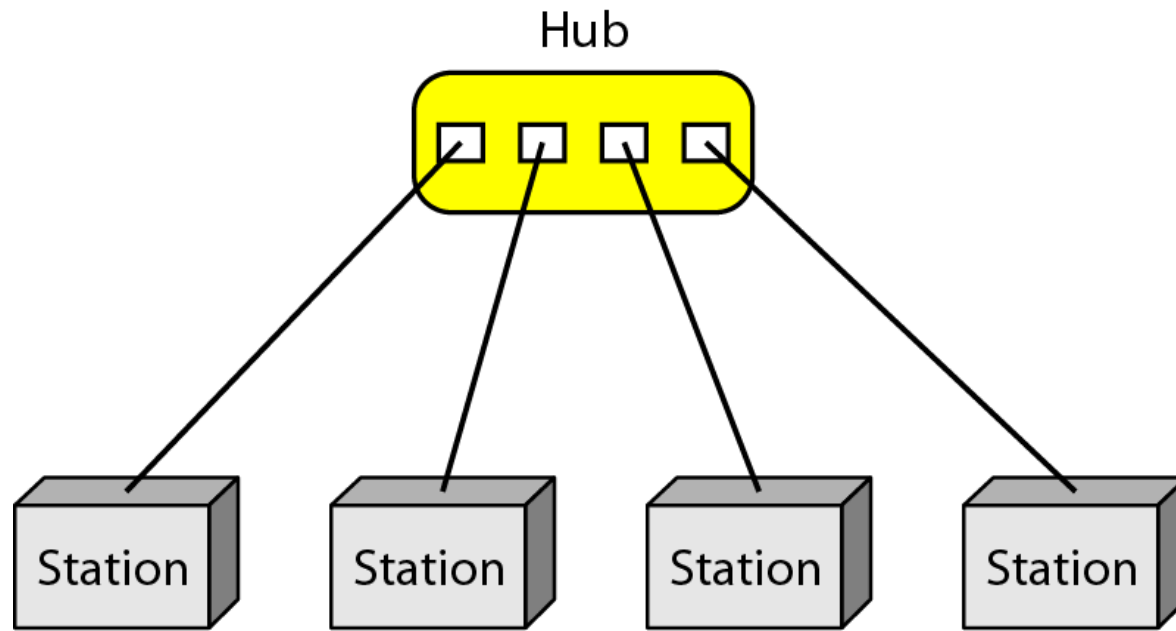
- ▮ In a ring network, packets of data travel from one device to the next until they reach their destination.
- ▮ Most ring topologies allow packets to travel only in one direction, called a **unidirectional** ring network.
- ▮ Others permit data to move in either direction, called **bidirectional**.

Disadvantages

- ▮ The major disadvantage of a ring topology is that if any individual connection in the ring is broken, the entire network is affected.
- ▮ Adding or deleting the computers disturbs the network activity.
- ▮ Data traffic issues, since all the data is circulating in a ring.

Star Topology

- ▮ In this type of topology all the computers are connected to a single hub through a **cable**. This hub is the central node and all other nodes are connected to the central node.
- ▮ Every node has its own dedicated connection to the hub.
- ▮ If one link fails, only that link is affected. All other links remain active.
- ▮ This factor also lends itself to easy fault identification and fault isolation.
- ▮ As long as the hub is working, it can be used to monitor link problems and bypass defective links.



Star Topology

▮ **Advantages:**

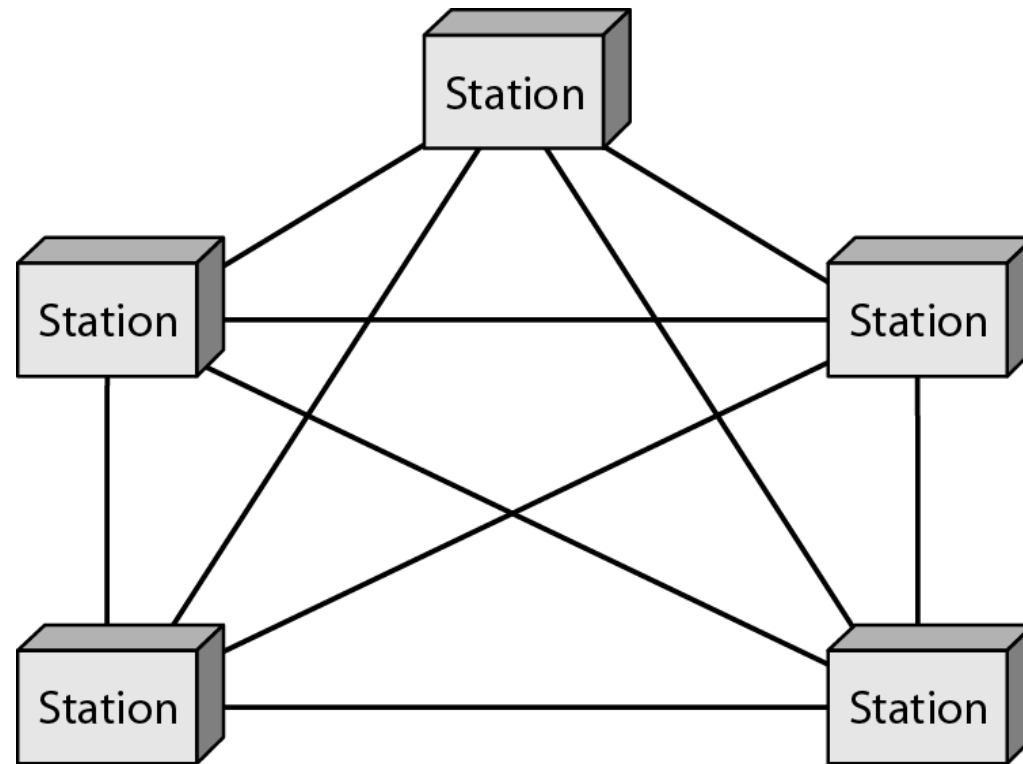
- ▮ If N devices are connected to each other in star topology, then the number of cables required to connect them is N . So, it is easy to set up.
- ▮ Each device requires only 1 port i.e. to connect to the hub.

▮ **Disadvantages:**

- ▮ 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.

Mesh Topology

- Every device has a dedicated **point-to-point** link to every other device. The term **dedicated** means that the **link carries traffic only between the two devices it connects**.



Mesh Topology

- ▮ **To find the number of physical links in a fully connected mesh network with n nodes??**
- ▮ we first consider that each node must be connected to every other node.

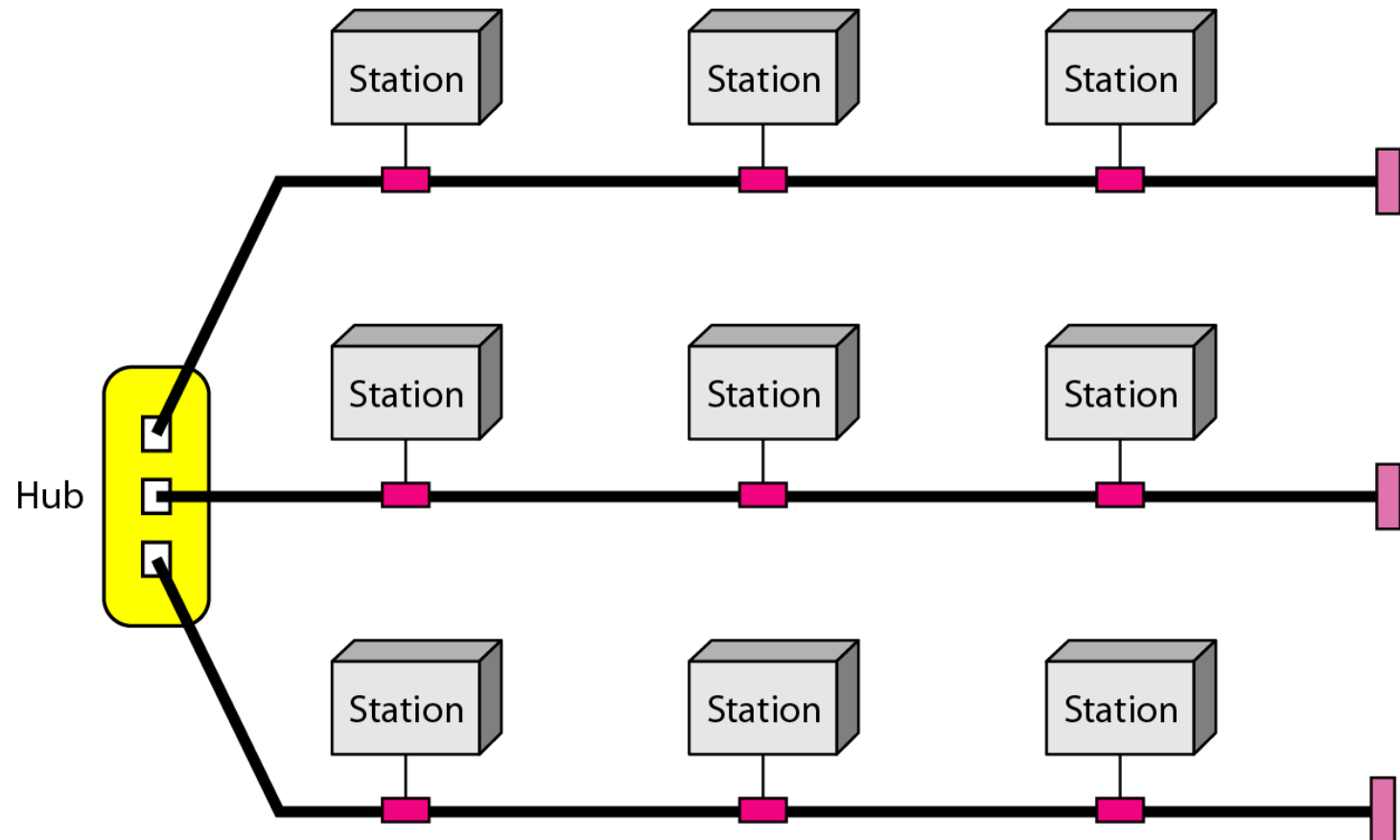
Node 1 must be connected to $n - 1$ nodes,
node 2 must be connected to $n - 1$ nodes, and
finally node n must be connected to $n - 1$ nodes.
- ▮ **We need $n(n - 1)$ physical links.**
- ▮ However, if each physical link allows communication in both directions (duplex mode),
- ▮ we can divide the number of links by 2.
- ▮ In other words, we can say that in a mesh topology, we need **$n(n - 1) / 2$ duplex-mode links.**

Mesh Topology

- ▮ Types of Mesh Topology
- ▮ **Partial Mesh Topology** : In this topology some of the systems are connected in the same fashion as mesh topology but some devices are only connected to two or three devices.
- ▮ **Full Mesh Topology** : Each and every nodes or devices are connected to each other.

Hybrid Topology

- ▮ This topology is a collection of two or more topologies.
- ▮ This is a scalable topology which can be expanded easily.
- ▮ It is reliable one but at the same it is a costly topology.



Tree Topology

- ▮ A tree topology is a combination of a star network topology and a bus topology.
- ▮ A **tree topology** is a special type of structure in which many connected elements are arranged like the branches of a tree. For example, tree topologies are frequently used to organize the computers in a corporate **network**, or the information in a **database**.



Tree Topology

- ▮ **There are certain special cases where tree topology is more effective:**
- ▮ Communication between two networks
- ▮ A network structure which requires a root node, intermediate parents node, and leaf nodes (just like we see in an n-tree) or a network structure which exhibits three level of hierarchy because two level of hierarchy is already displayed in the star topology.



Thank You!