

Introduction

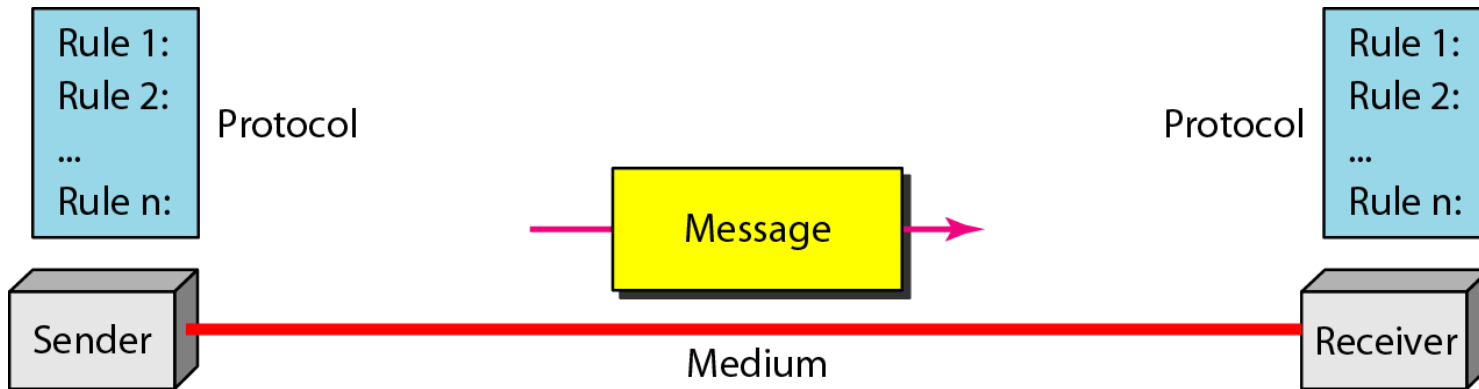
DATA COMMUNICATIONS

*The term **telecommunication** means communication at a distance. The word **data** refers to information presented in whatever form is agreed upon by the parties creating and using the data. **Data communications** are the exchange of data between two devices via some form of transmission medium such as a wire cable.*

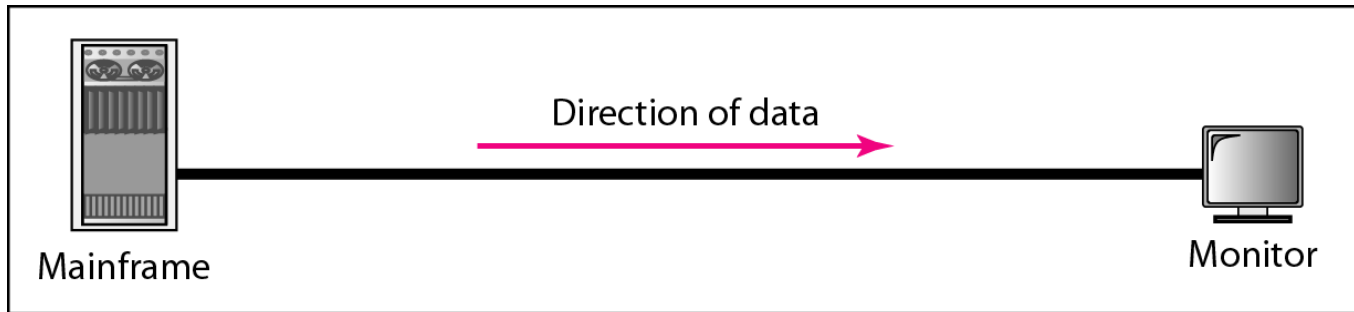
Topics discussed in this section:

- Components of a data communications system
- Data Flow

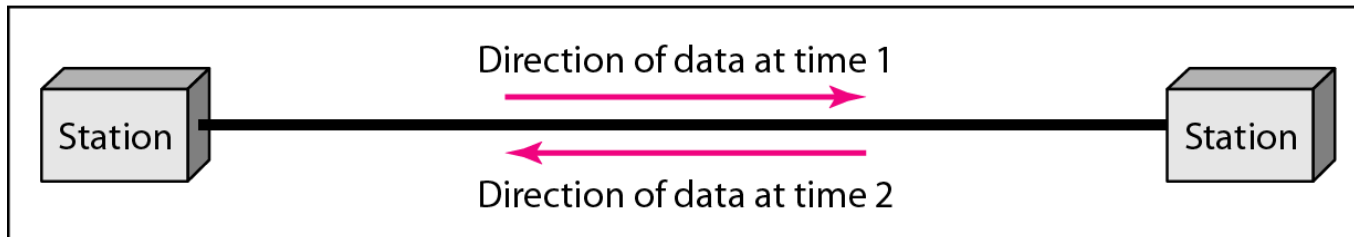
Components of a data communication system



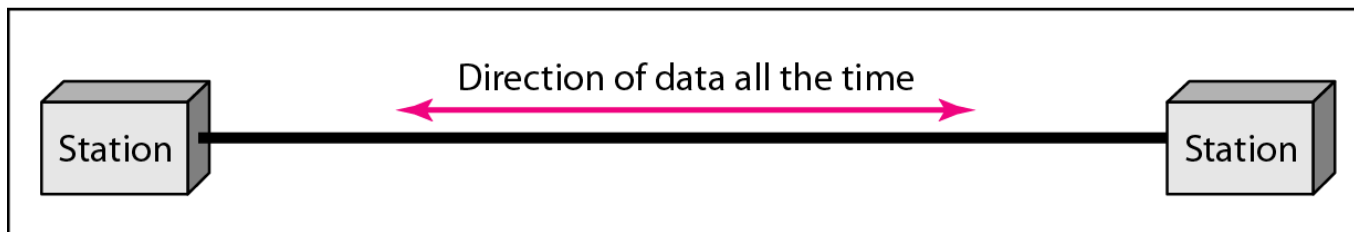
Data flow (simplex, half-duplex, and full-duplex)



a. Simplex



b. Half-duplex



c. Full-duplex

NETWORKS

*A **network** is a set of devices (often referred to as **nodes**) connected by communication **links**. A node can be a computer, printer, or any other device capable of sending and/or receiving data generated by other nodes on the network. A link can be a cable, air, optical fiber, or any medium which can transport a signal carrying information.*

Topics discussed in this section:

- Network Criteria
- Physical Structures
- Categories of Networks

Network Criteria

- **Performance**

- Depends on Network Elements
- Measured in terms of Delay and Throughput

- **Reliability**

- Failure rate of network components
- Measured in terms of availability/robustness

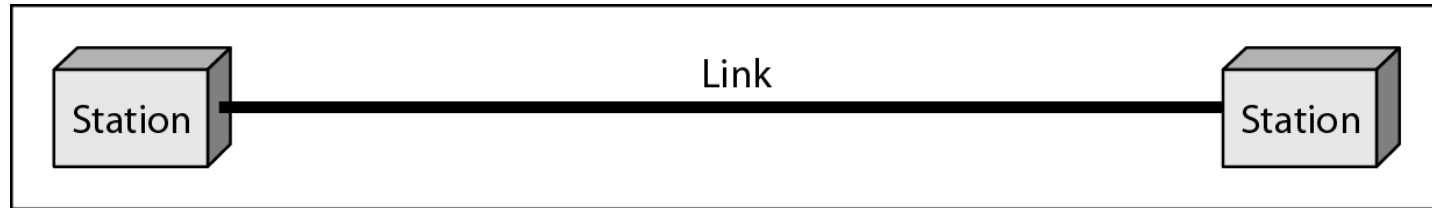
- **Security**

- Data protection against corruption/loss of data due to:
 - Errors
 - Malicious users

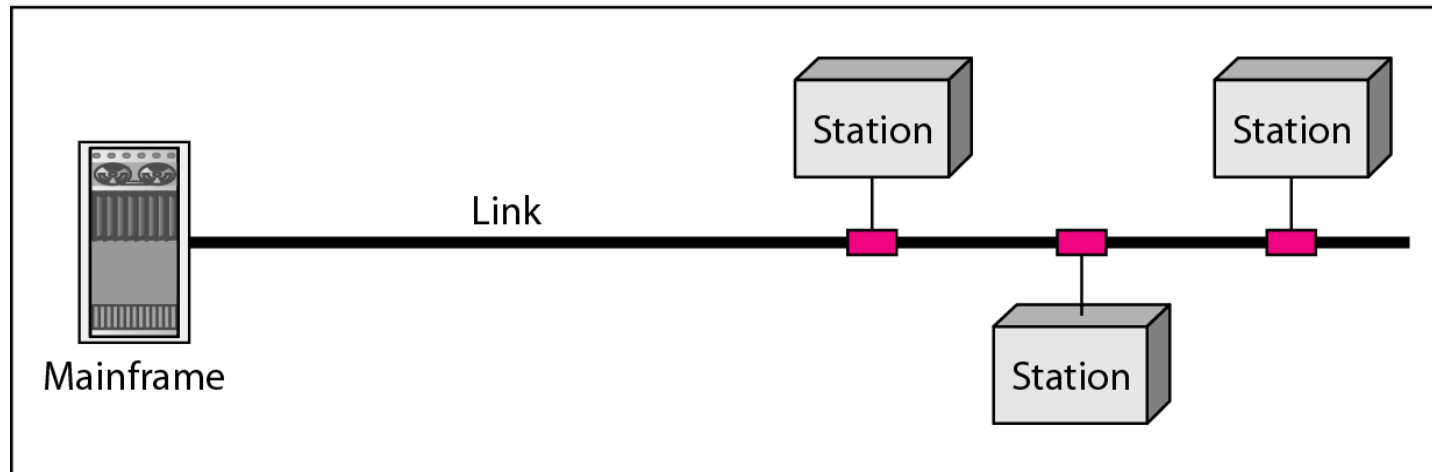
Physical Structures

- **Type of Connection**
 - **Point to Point - single transmitter and receiver**
 - **Multipoint - multiple recipients of single transmission**
- **Physical Topology**
 - **Connection of devices**
 - **Type of transmission - unicast, mulitcast, broadcast**

Types of connections: point-to-point and multipoint

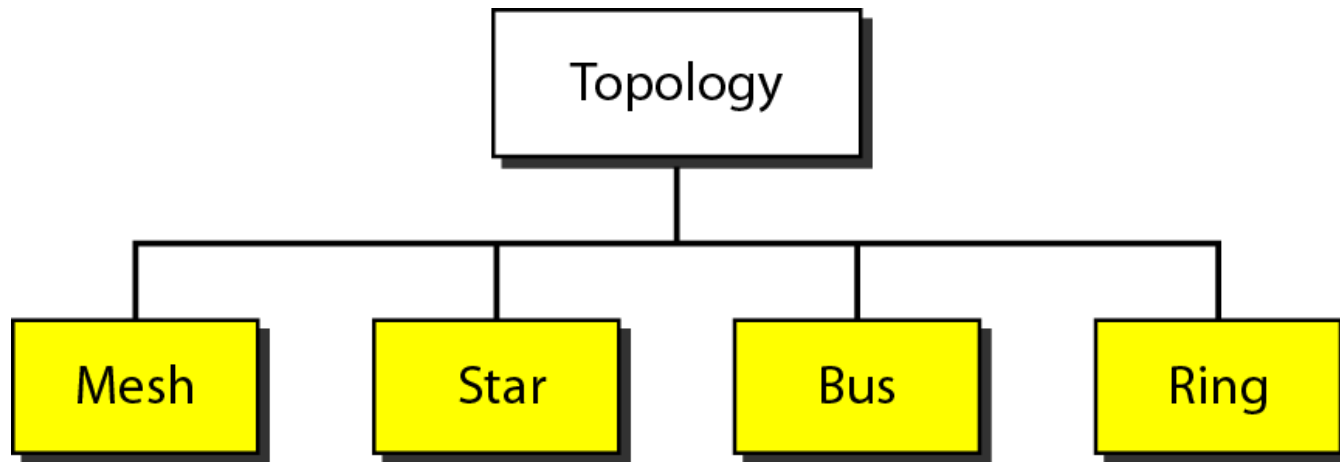


a. Point-to-point

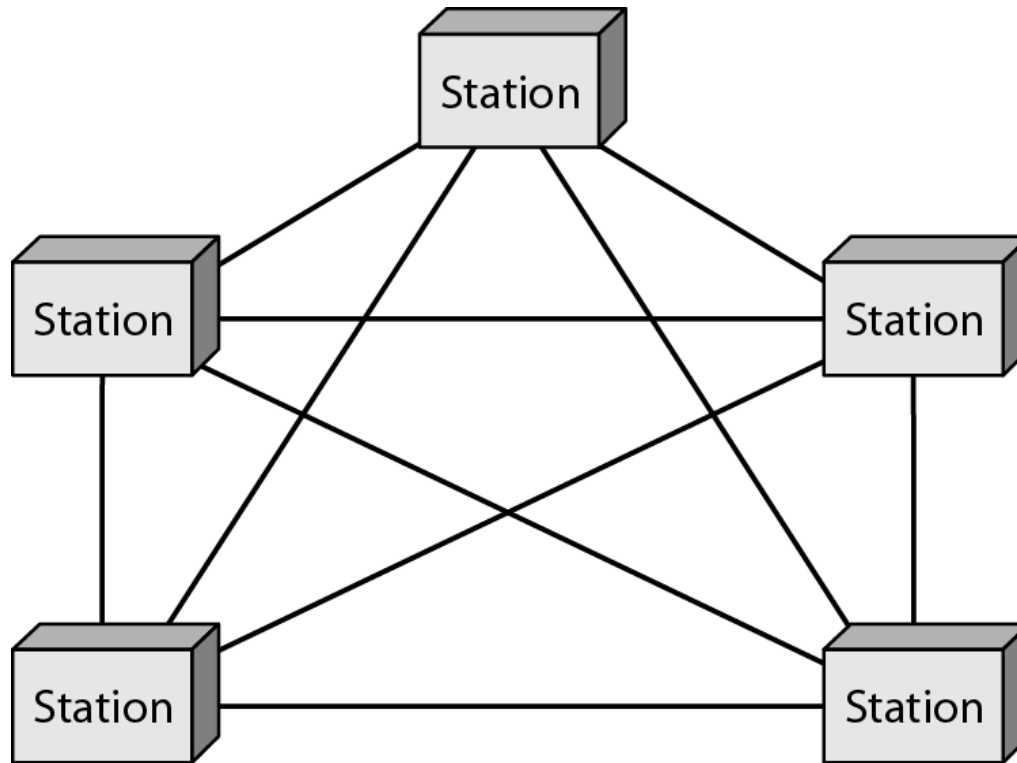


b. Multipoint

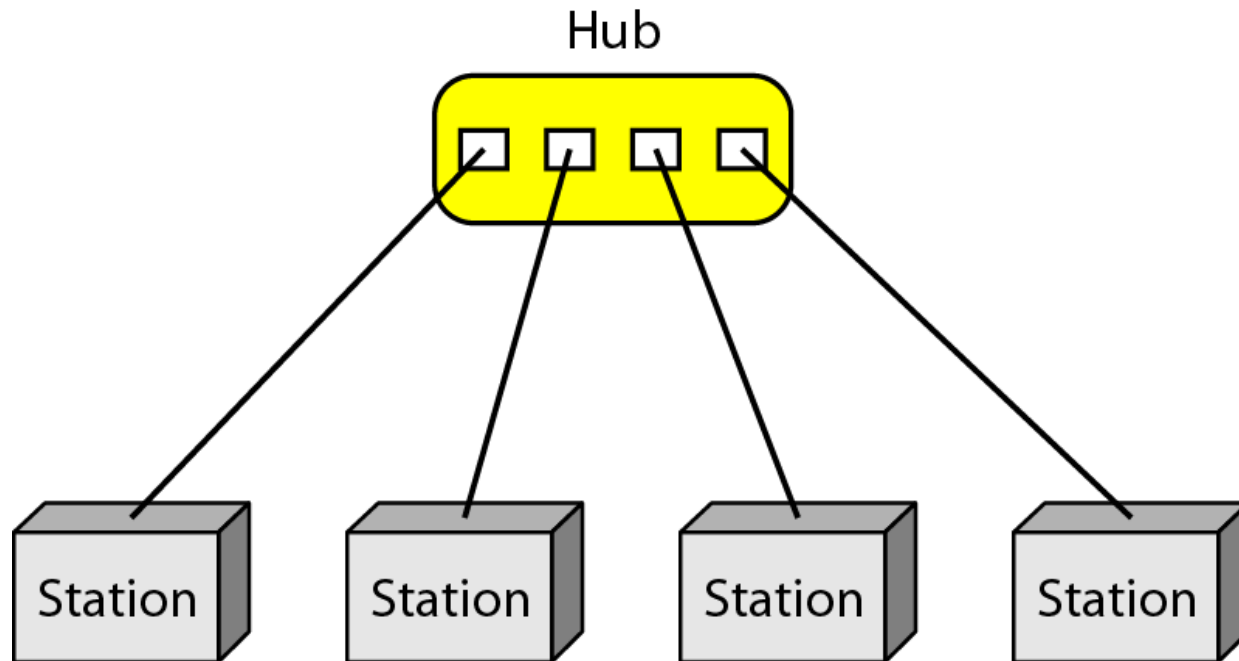
Categories of topology



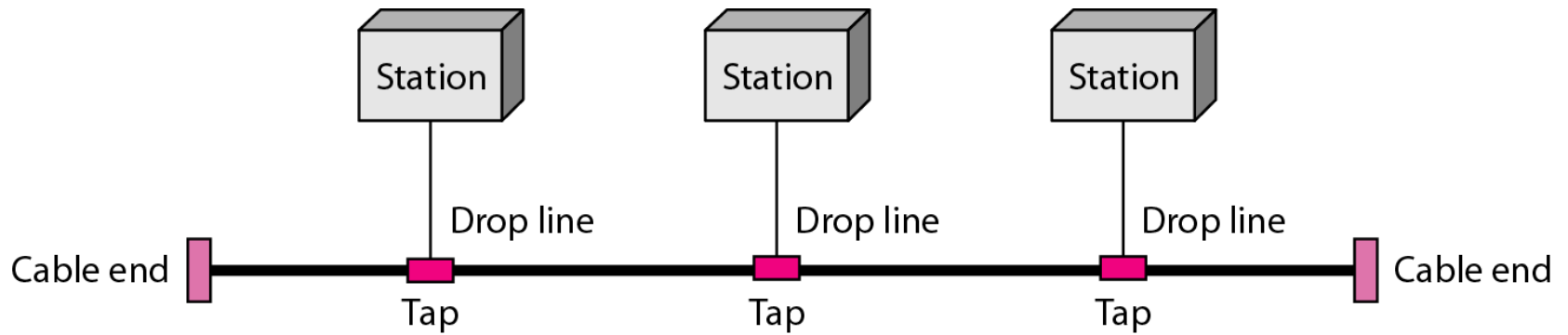
A fully connected mesh topology (five devices)



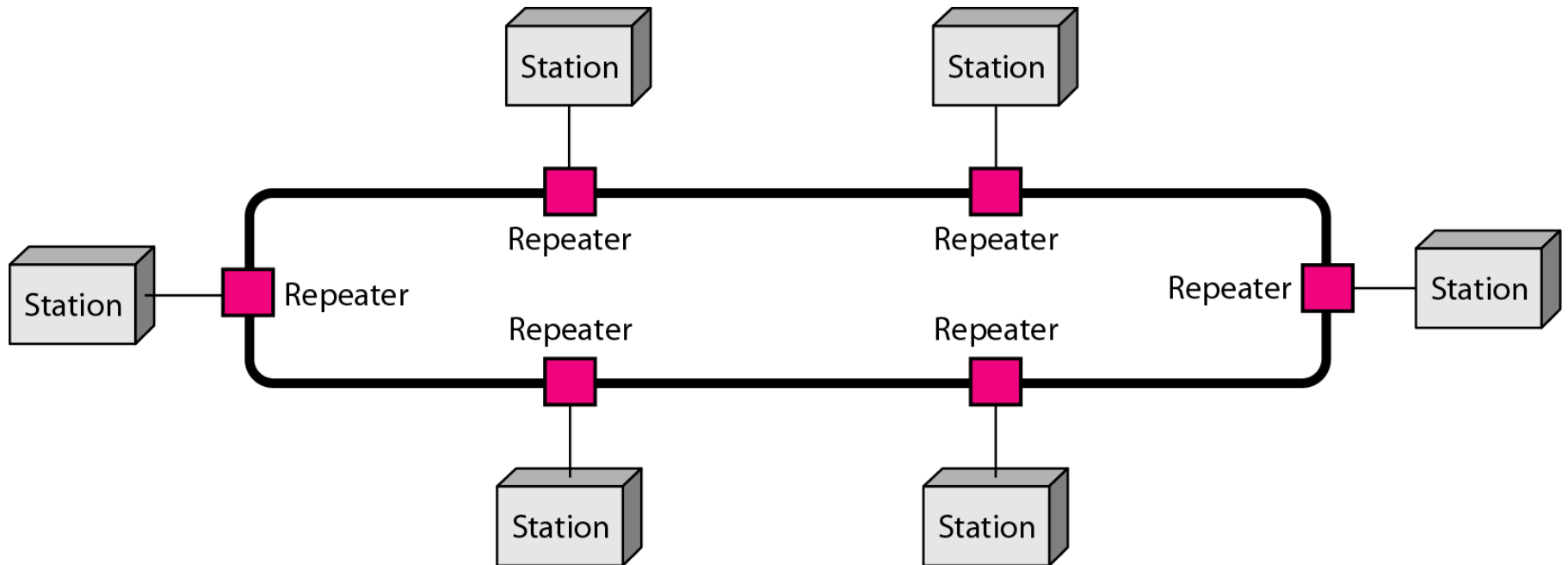
A star topology connecting four stations



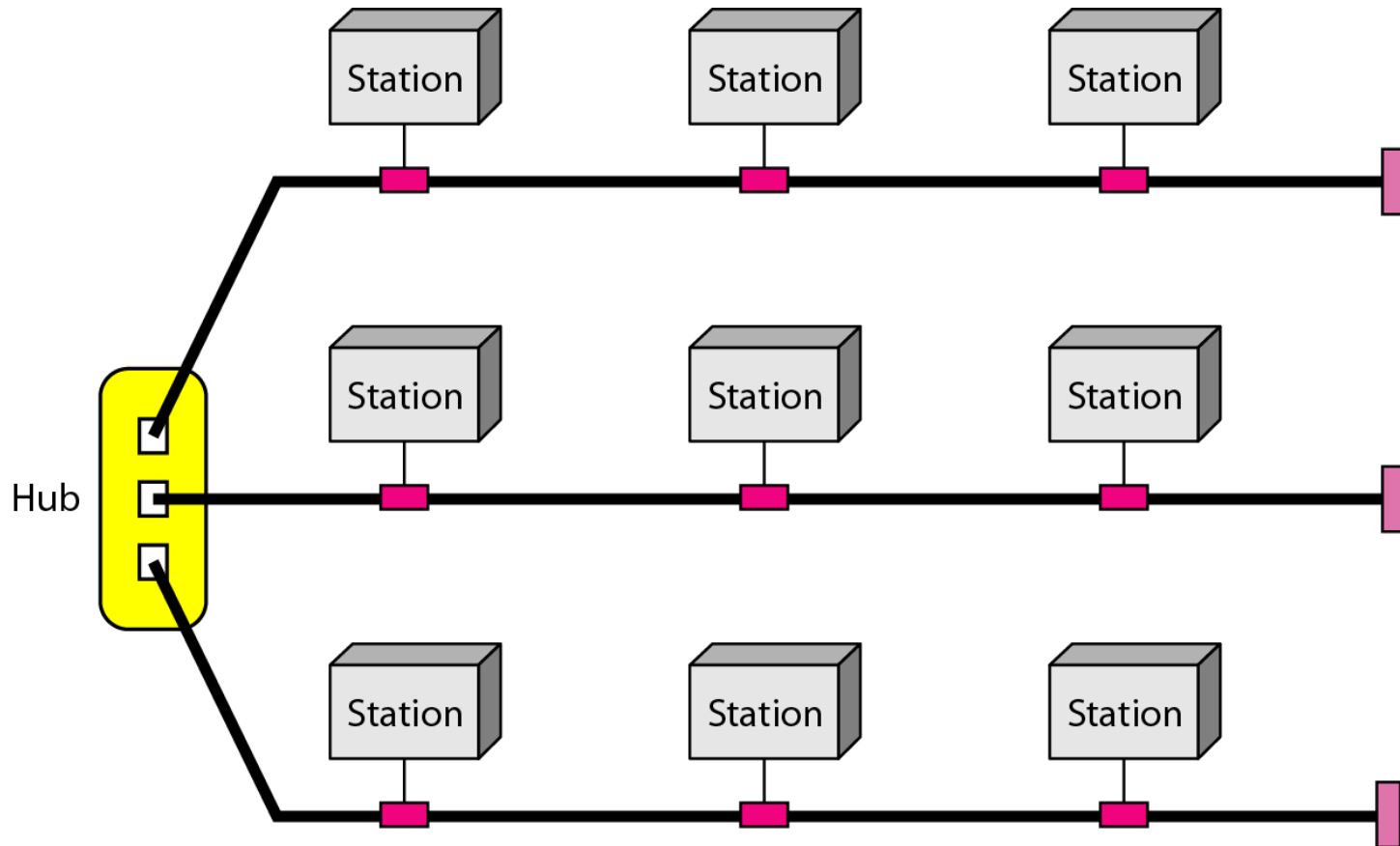
A bus topology connecting three stations



A ring topology connecting six stations



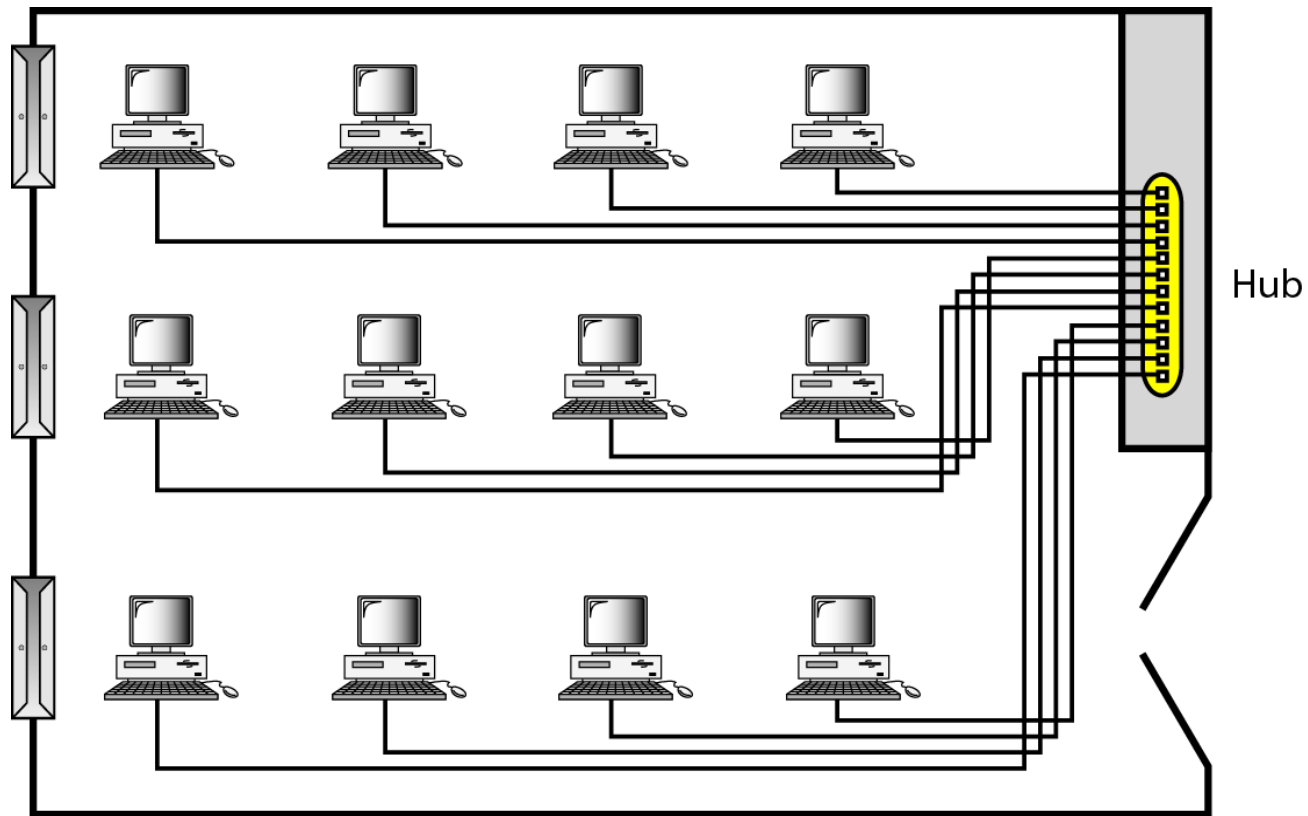
A hybrid topology: a star backbone with three bus networks



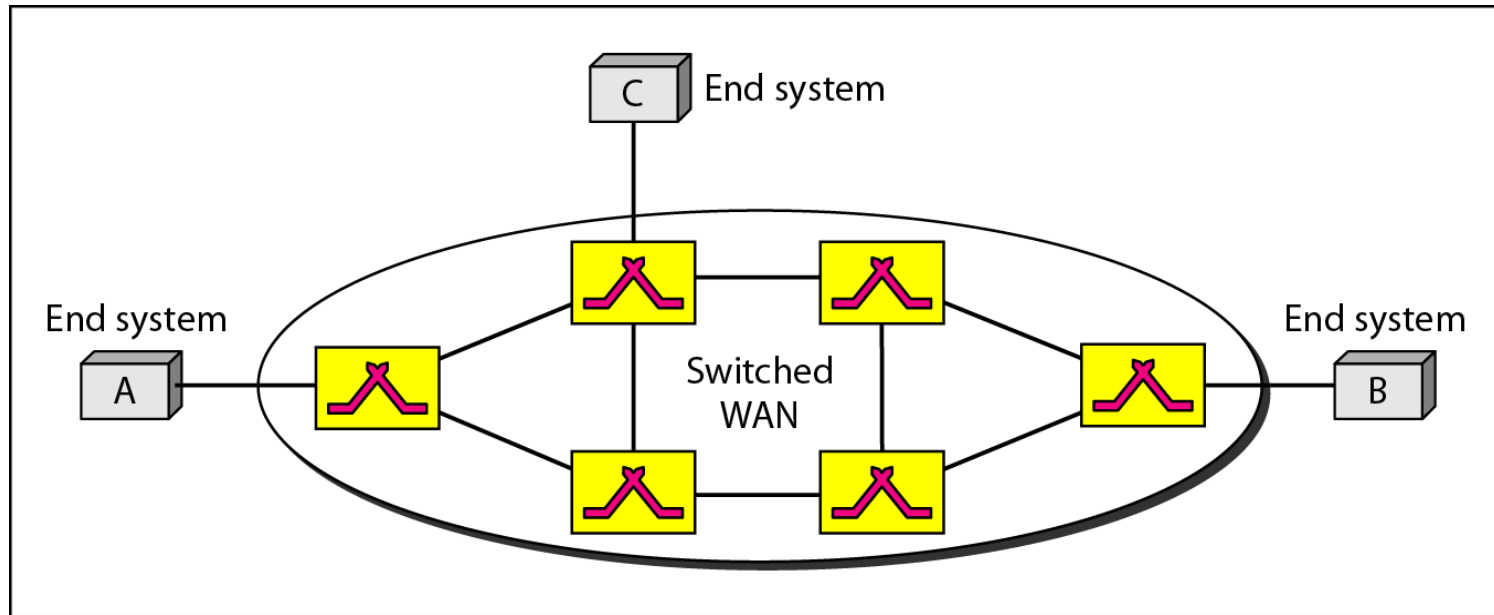
Categories of Networks

- **Local Area Networks (LANs)**
 - Short distances
 - Designed to provide local interconnectivity
- **Wide Area Networks (WANs)**
 - Long distances
 - Provide connectivity over large areas
- **Metropolitan Area Networks (MANs)**
 - Provide connectivity over areas such as a city, a campus

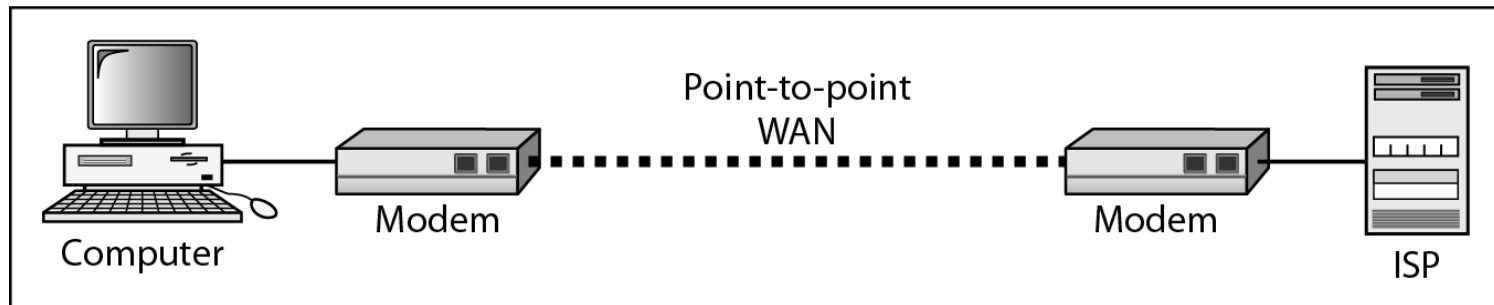
An isolated LAN connecting 12 computers to a hub in a closet



WANs: a switched WAN and a point-to-point WAN



a. Switched WAN



b. Point-to-point WAN

A heterogeneous network made of four WANs and two LANs

