Introduction to Computer Networks

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Computer Networks

- It is a collection of autonomous computers interconnected by single technology.

- Two computers are said to be interconnected if they are able to exchange information.

- A network is a set of devices (often referred to as nodes) connected by communication links.

- Node:- can be a computer, printer, or any other device capable of sending and/or receiving data generated by other nodes on the network.

Data Communication
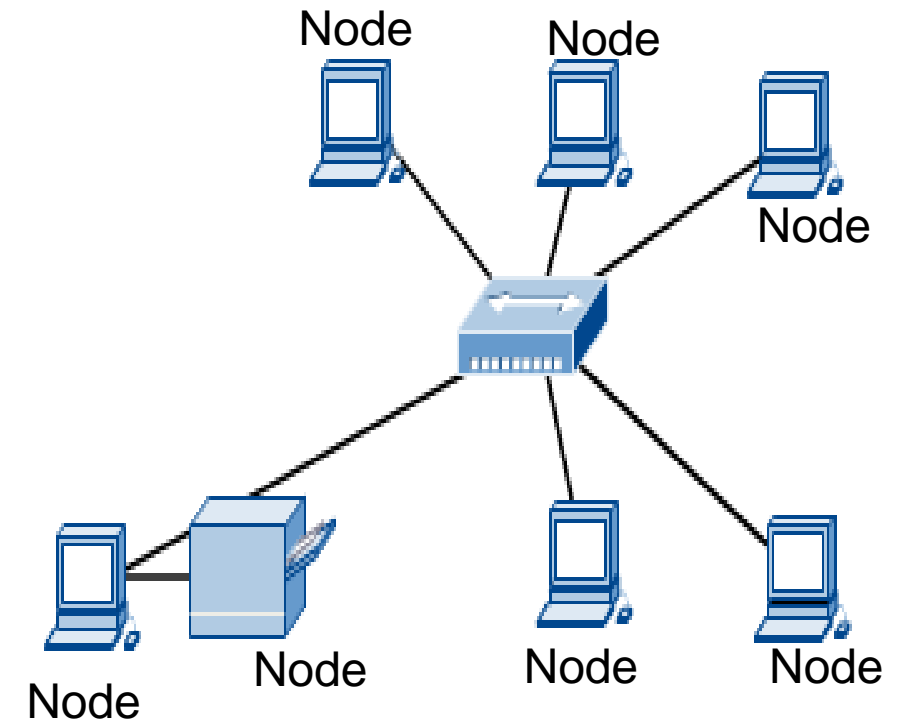
Telecommunication means communication at a distance.

Data refers to information presented in whatever form is agreed upon by the parties creating and using the data.
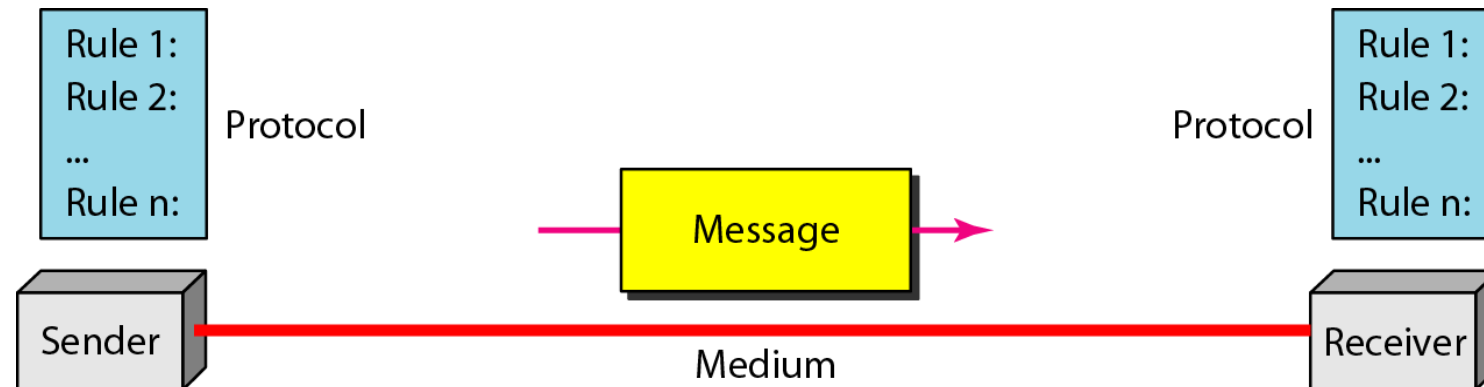
Data communications are the exchange of data between two devices via some form of transmission medium such as a wire cable.

Components of Data Communication

- Message
- Sender
- Receiver
- Medium
- Protocol

Networking Media

- Networking media can be defined simply as the means by which signals (data) are sent from one computer to another (either by cable or wireless means).
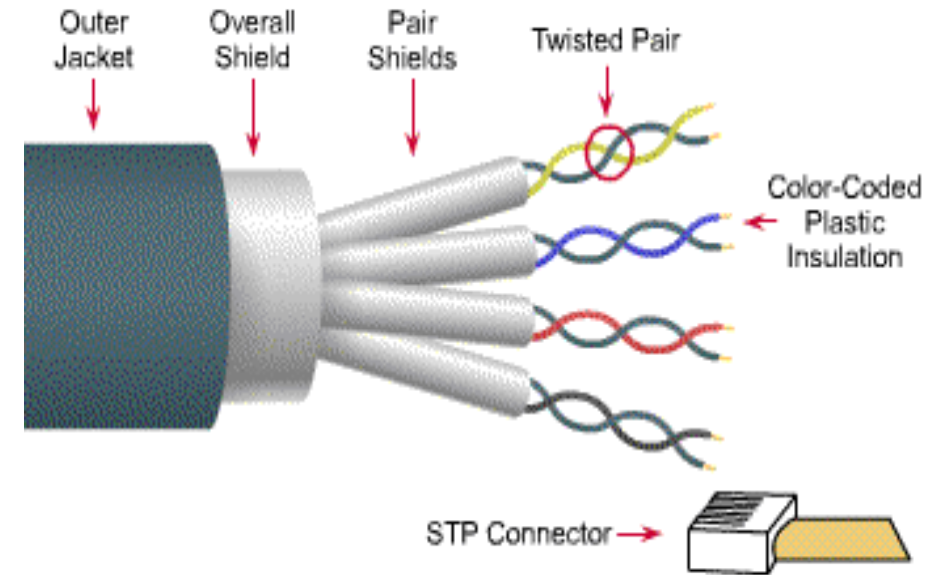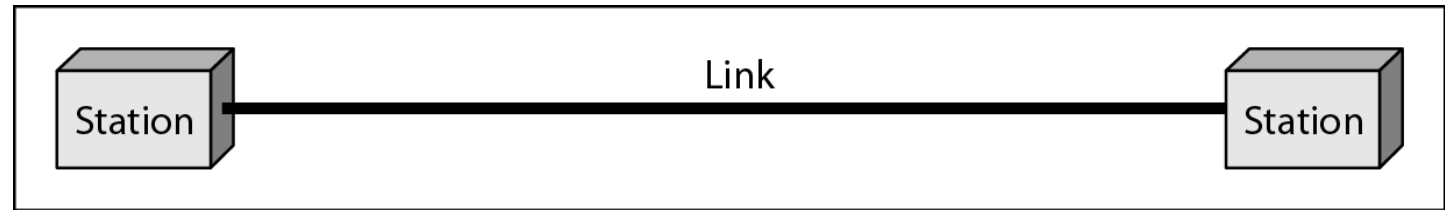

Shielded Twisted Pair (STP)
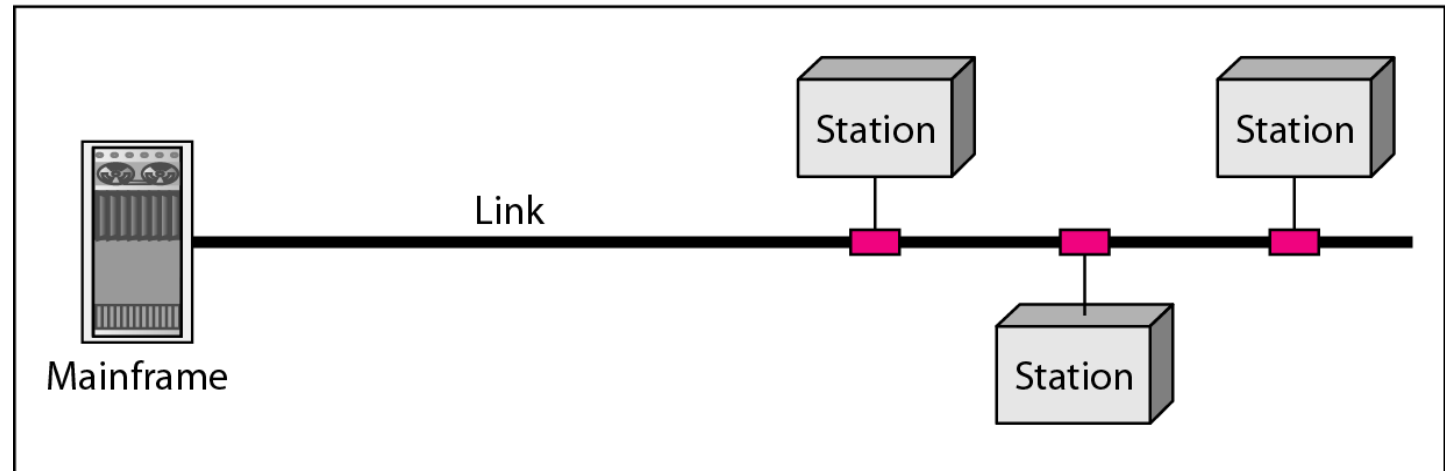

Unshielded Twisted Pair (UTP

Types of connections

- Point-to-point
- Multipoint

a. Point-to-point

b. Multipoint

Types of Data Flow

- Simplex
- Half-duplex
- Full-duplex
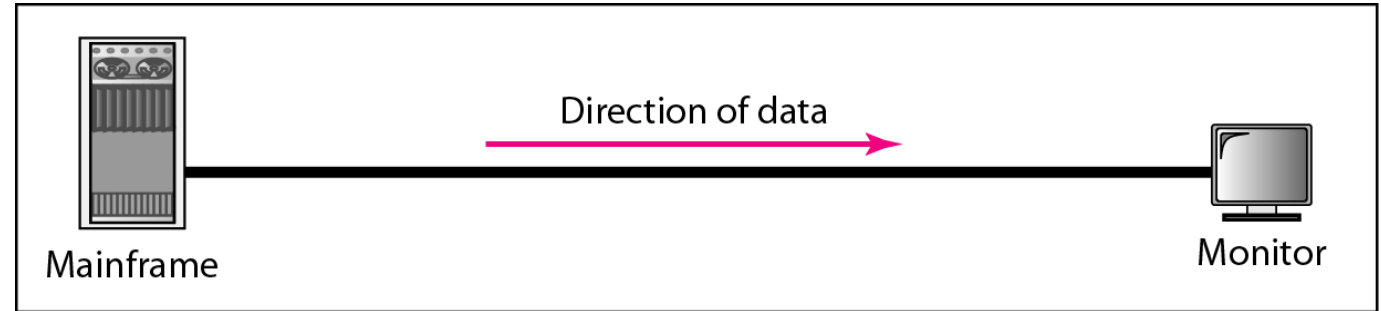
a. Simplex
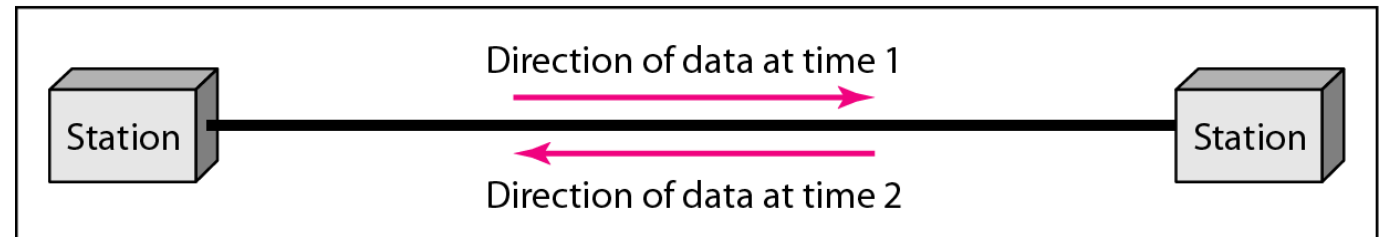
b. Half-duplex
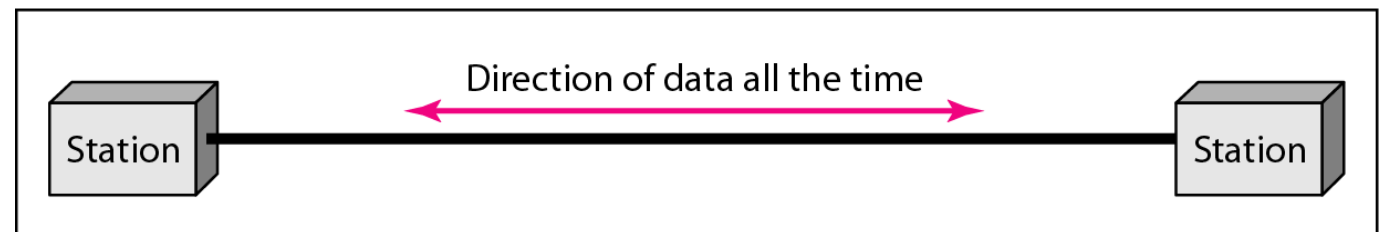
c. Full-duplex

Network Topology

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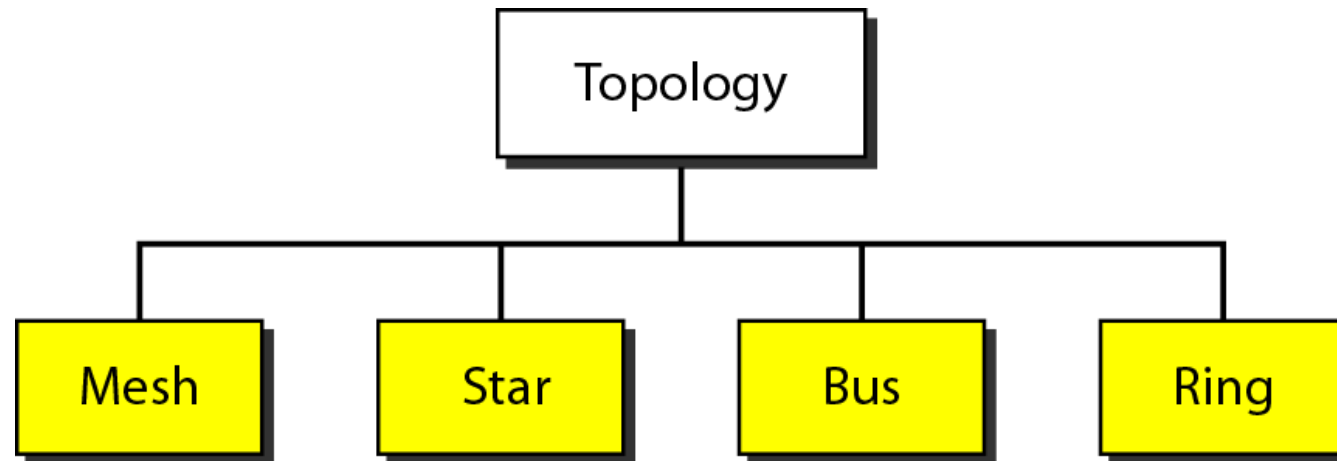
Bus Topology

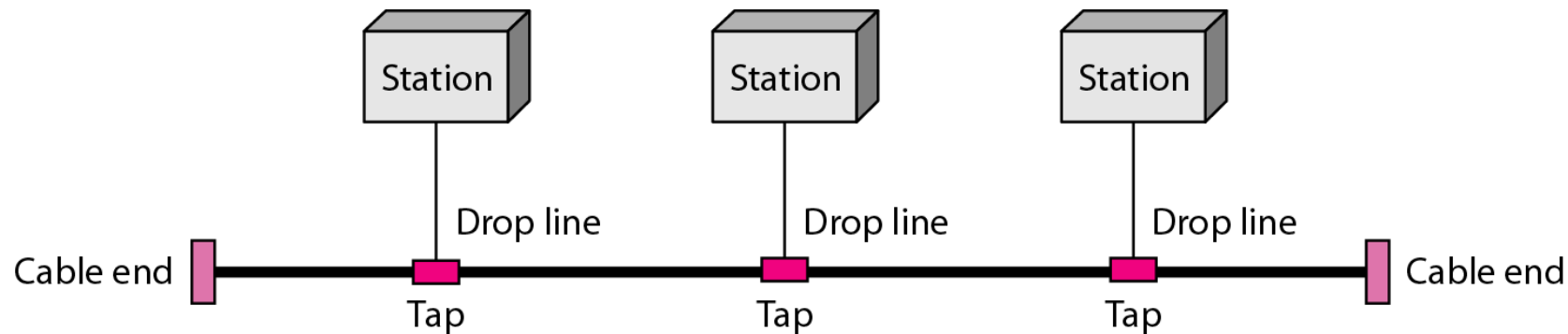- All devices share single communication line or cable.

- It is one of the simple forms of networking where a failure of a device does not affect the other devices. But failure of the shared communication line can make all other devices stop functioning.

Star Topology

All hosts are connected to a central device, known as hub device, using a point-to point connection.

The hub device can be any of the following:
- Layer-1 device such as hub or repeater
- Layer-2 device such as switch or bridge
- Layer-3 device such as router or gateway

Hub

Station   Station   Station   Station
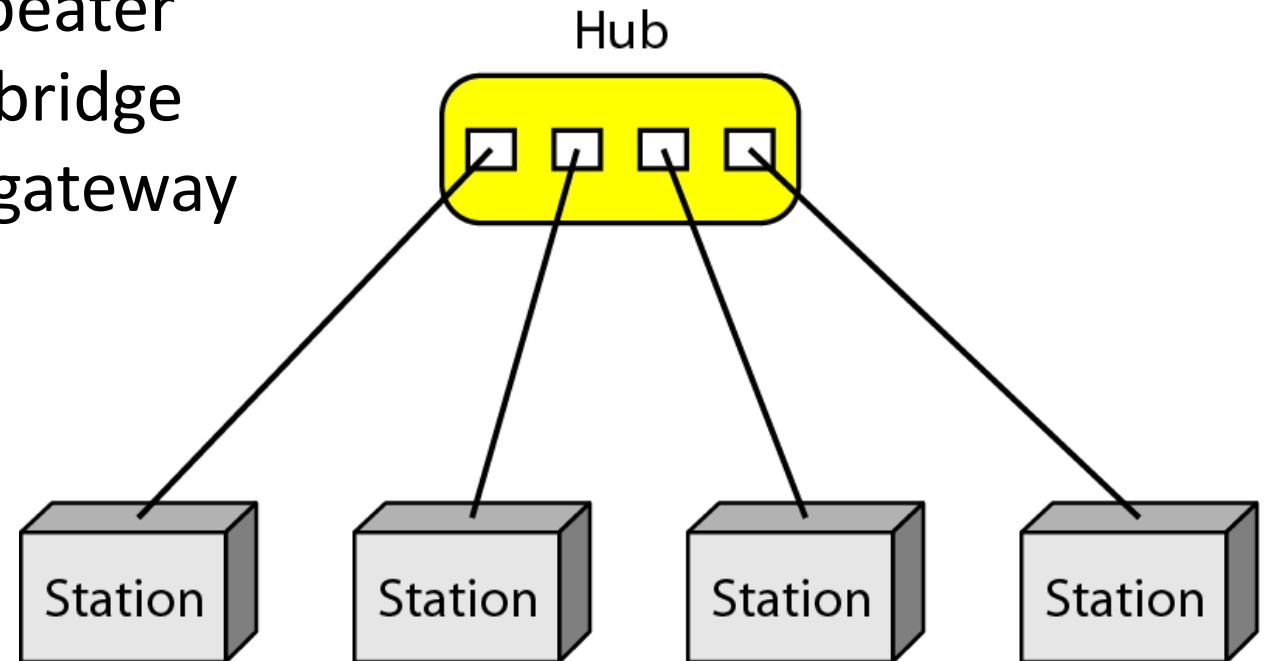
- A host is connected to one or multiple hosts.
- This topology has hosts in point-to-point connection with every other host or may also have hosts which are in point-to-point connection to few hosts only.

Types of Mesh technology

Full Mesh: All hosts have a point-to-point connection to every other host in the network. It provides the most reliable network structure among all network topologies.

Partially Mesh: Not all hosts have point-to-point connection to every other host. Hosts connect to each other in some arbitrarily fashion.
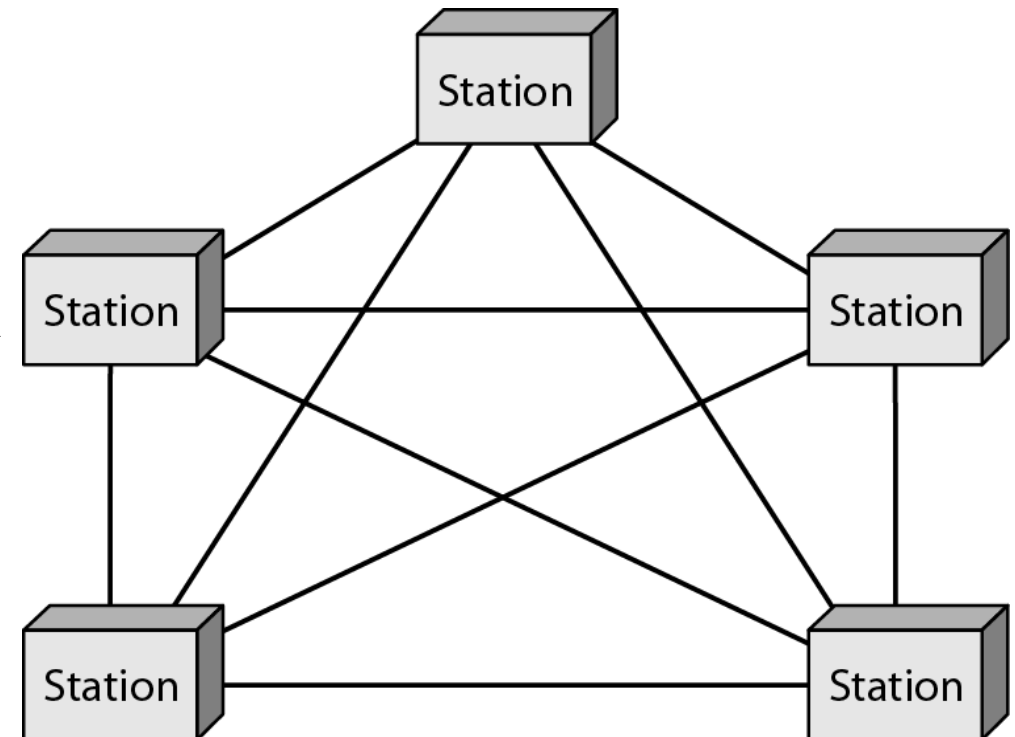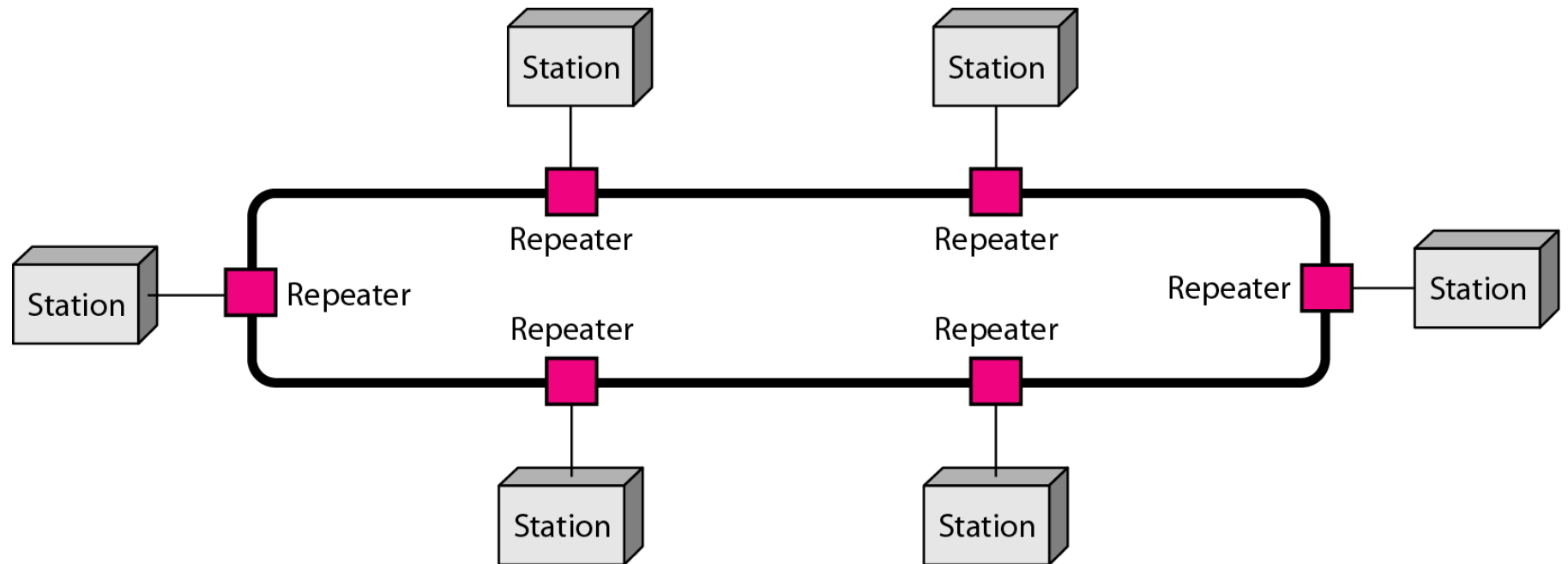
Ring Topology

- Each host machine connects to exactly two other machines, creating a circular network structure.
- When one host tries to communicate or send message to a host which is not adjacent to it, the data travels through all intermediate hosts.
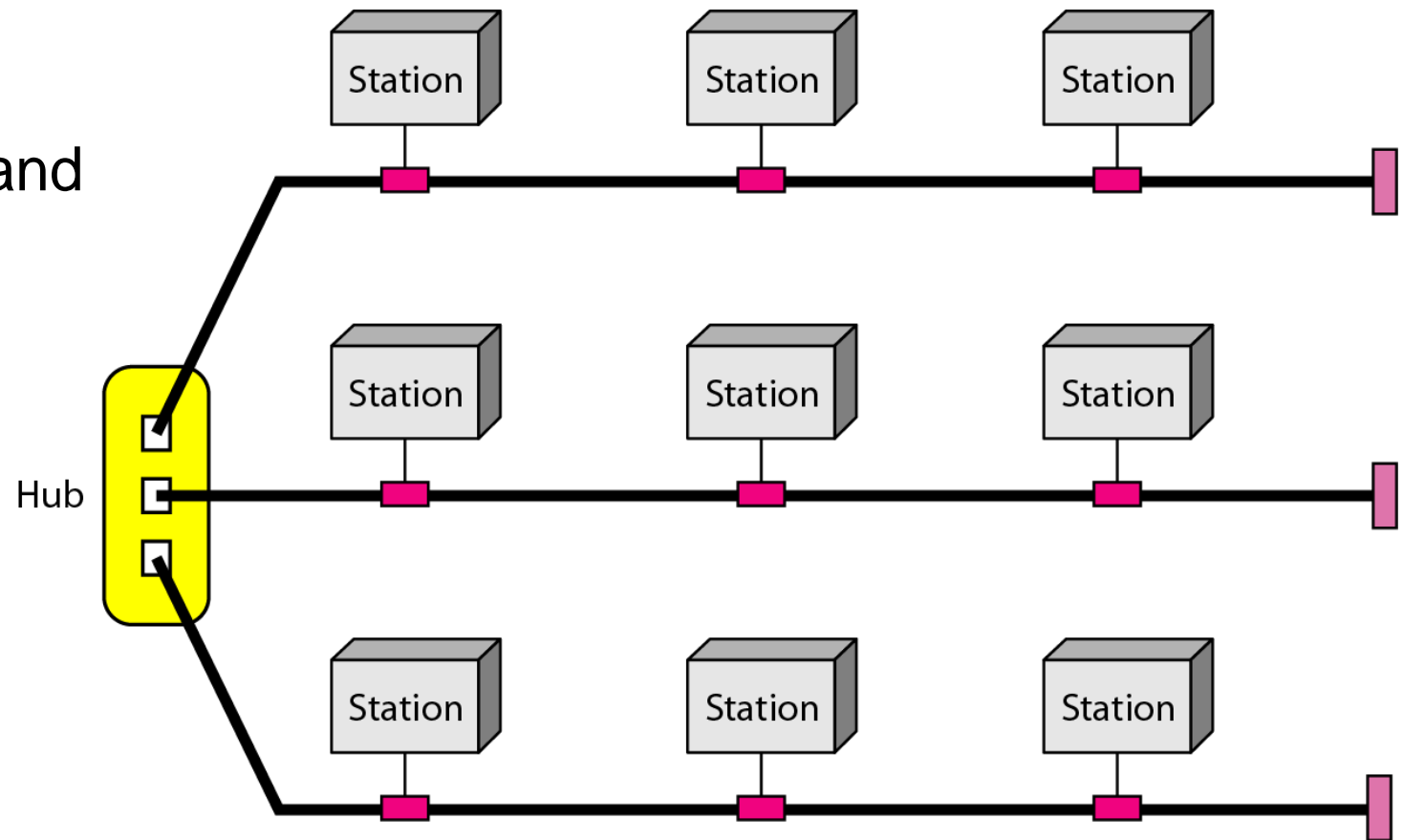
Hybrid Topology

- A network structure whose design contains more than one topology is said to be hybrid topology.

- Hybrid topology inherits merits and demerits of all the incorporating topologies.

- The combining topologies may contain attributes of Star, Ring, Bus topologies.

Type of Networks

❑Local area network (LAN)

❑Metropolitan area network (MAN)

❑Wide area network (WAN)

❑Personal area network (PAN)

Local Area Network (LAN)

- Network in small geographical Area (Room, Building or a Campus) is called LAN (Local Area Network)

  - **Short distances**

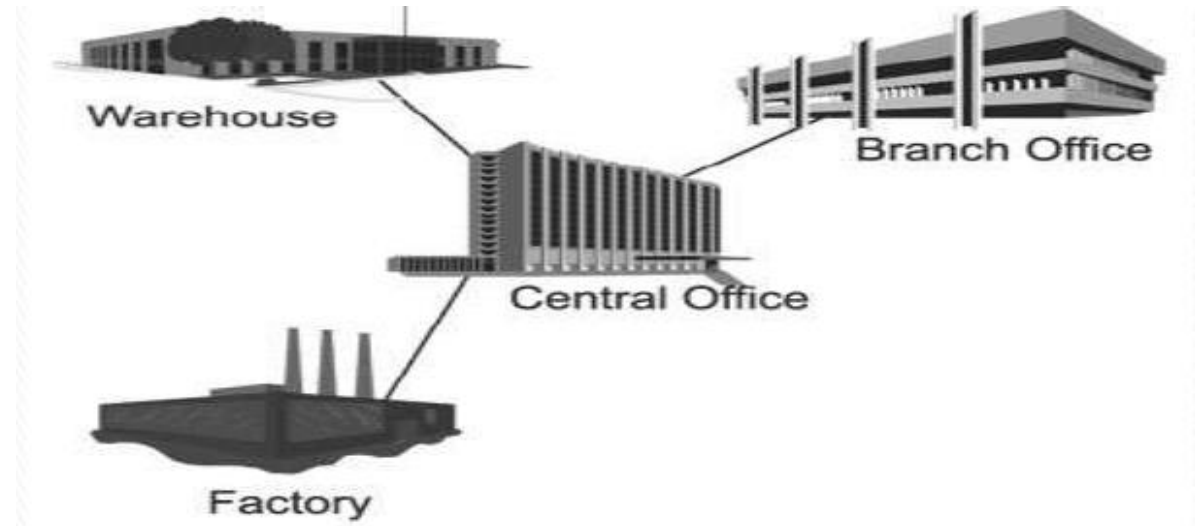 - **Designed to provide local interconnectivity**

  - **Range:- 1 -10 km**

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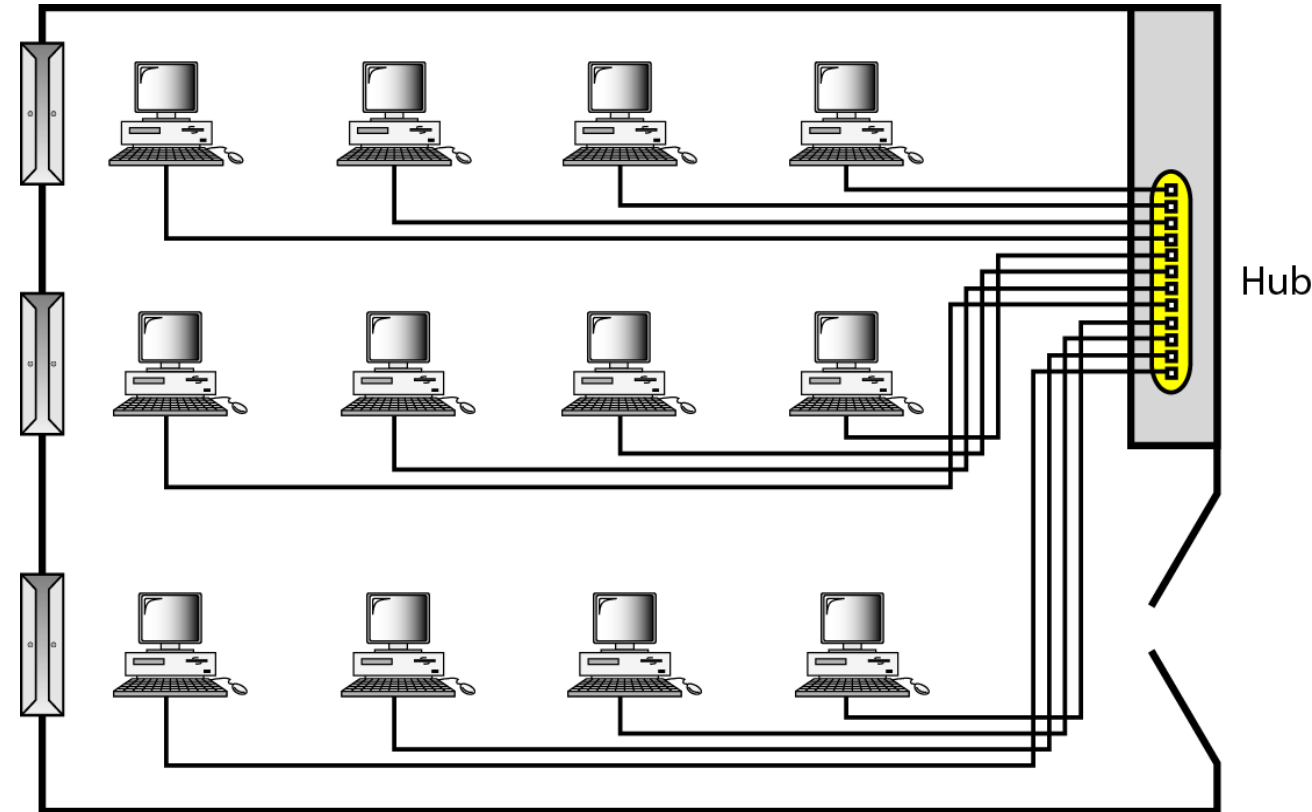
An isolated LAN connecting 12 computers to a hub in a closet

Metropolitan Area Network (MAN)

- Network in a City is called MAN

  - **It may be a single Network such as cable television network**

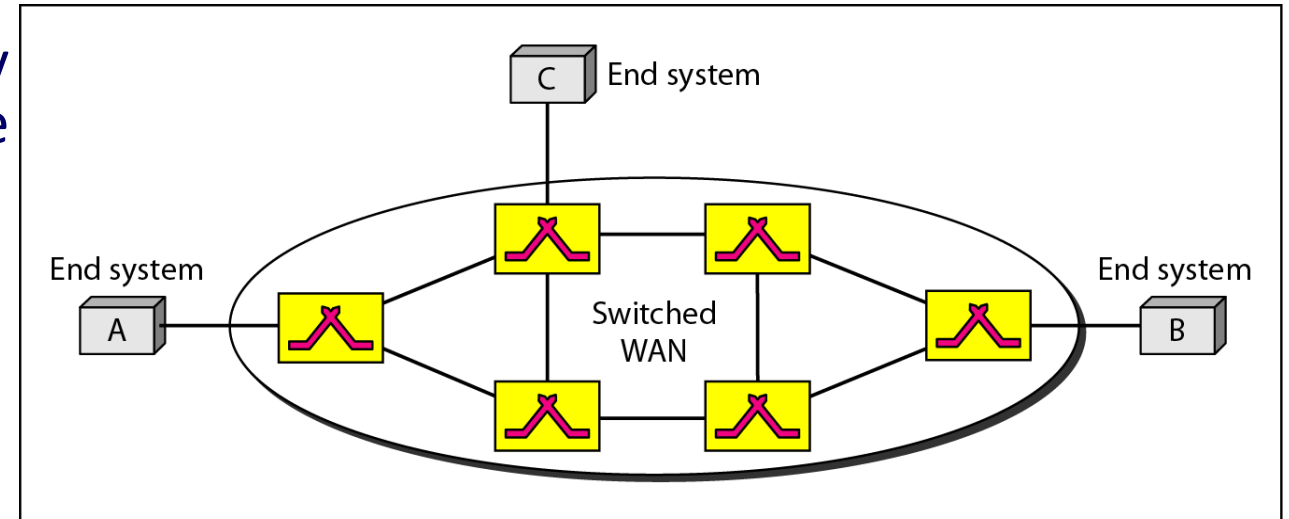 - **Range:- with in 100 km**

MAN
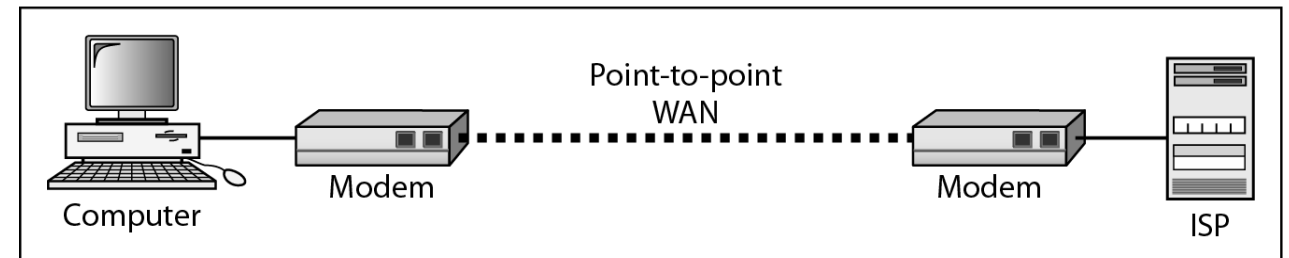
Wide Area Network (WAN)

- Network spread geographically (Country or across Globe) is called WAN (Wide Area Network)
  - **Long distances**
  - **Provide connectivity over large areas**
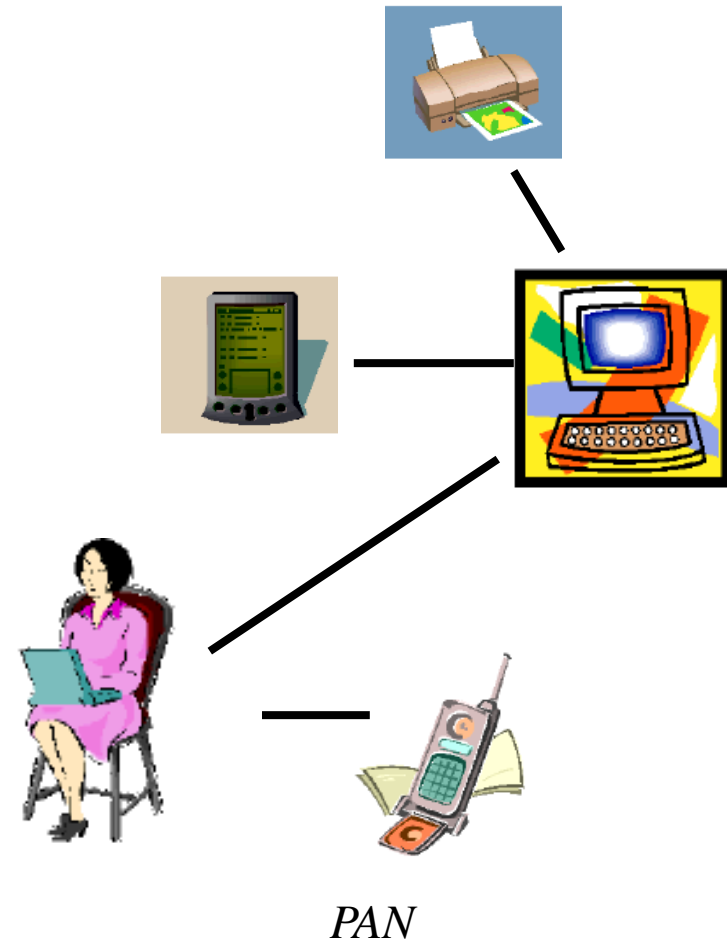 - **Range:- beyond100 km**

a. Switched WAN

b. Point-to-point WAN

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

Wide area network (WAN)

Personal Area Network (PAN)

- *A PAN is a network that is used for communicating among computers and computer devices in close proximity of around a few meters within a room*
- PAN's can be wired or wireless
- **Range:- up to 100 m**

PAN

THE INTERNET

The Internet has revolutionized many aspects of our daily lives. It has affected the way we do business as well as the way we spend our leisure time. The Internet is a communication system that has brought a wealth of information to our fingertips and organized it for our use.
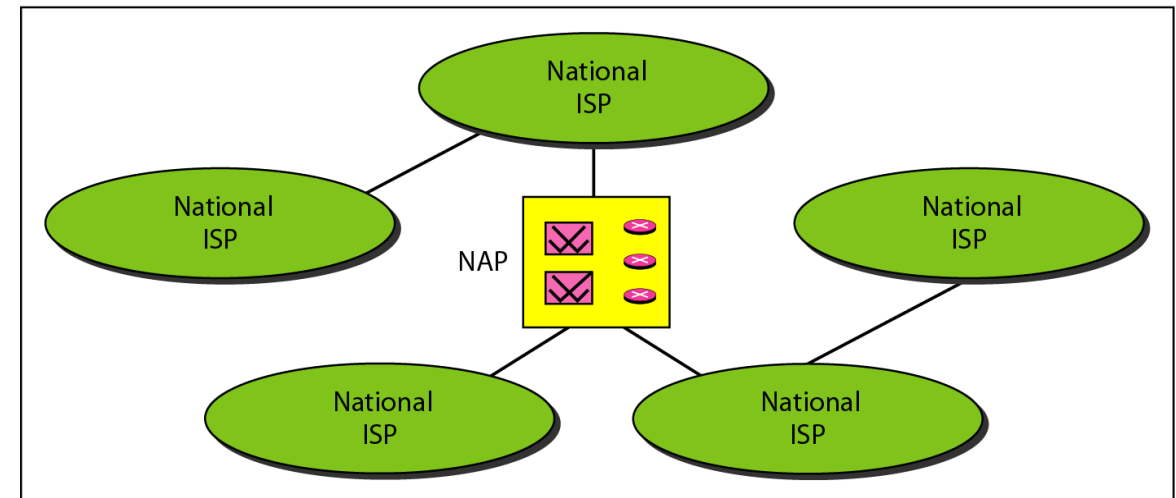
International Internet Service Providers

- At the top of the hierarchy are the international service providers that connect nations together.
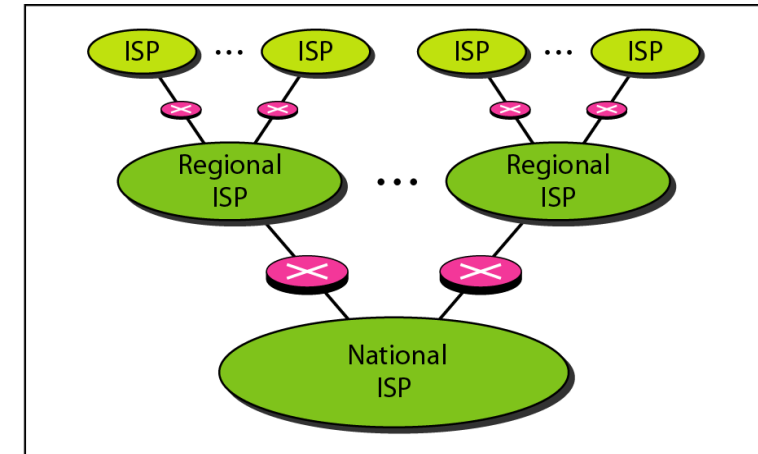
a. Structure of a national ISP

b. Interconnection of national ISPs

NAPs:- Network Access Points

Q1. Internet is an example of the most common type of ……………network.
(a) LAN (b) WAN (c) MAN (d) PAN
Q2. Uploading a photograph from mobile to desktop computer is an example of …… network.
(a) LAN (b) WAN (c) MAN (d) PAN
Q3. Bluetooth is a ……….. technology that connected devices in a small area.
(a) LAN (b) WAN (c) MAN (d) PAN

Q4. A communication between a computer and a keyboard involves which type of transmission.
a) Simplex b) half duplex c) full duplex d) semi-duplex