



SNS COLLEGE OF ENGINEERING

Kurumbapalayam(Po), Coimbatore - 641 107

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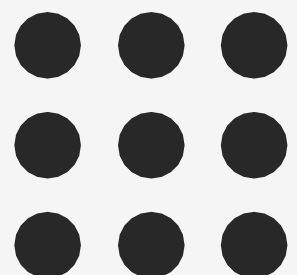
Department of Information Technology

Course Name - 19IT401 Computer Networks

II Year / IV Semester

Unit 1 - Introduction and Physical Layer

Topic 2- Network Types



Computer Network

Computer network is a **connection** of autonomous computers for the purpose of **resource sharing** and communication between them.

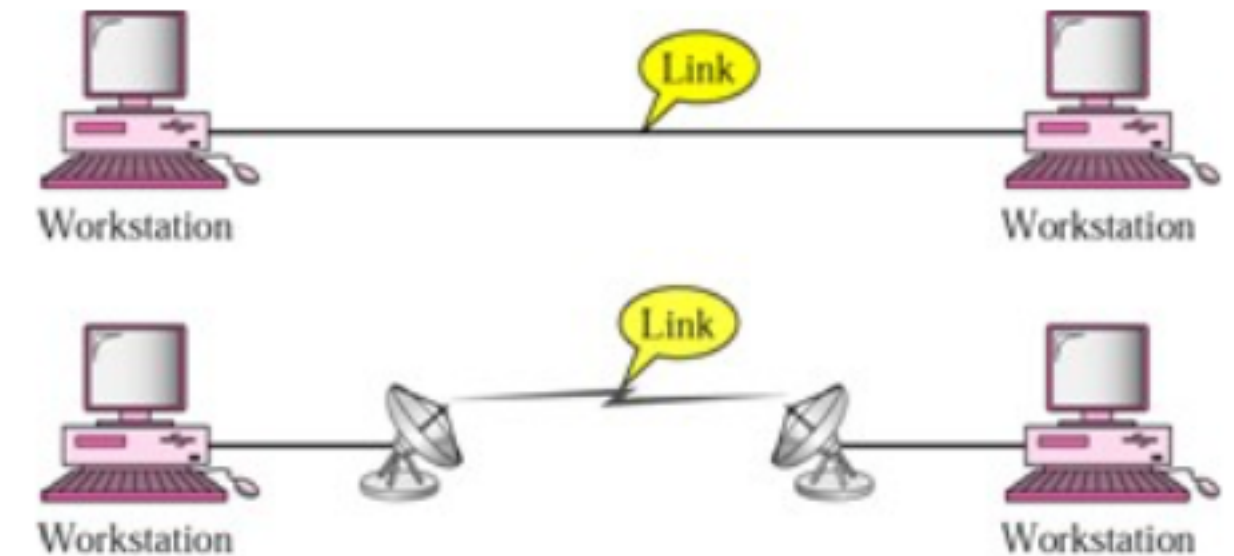
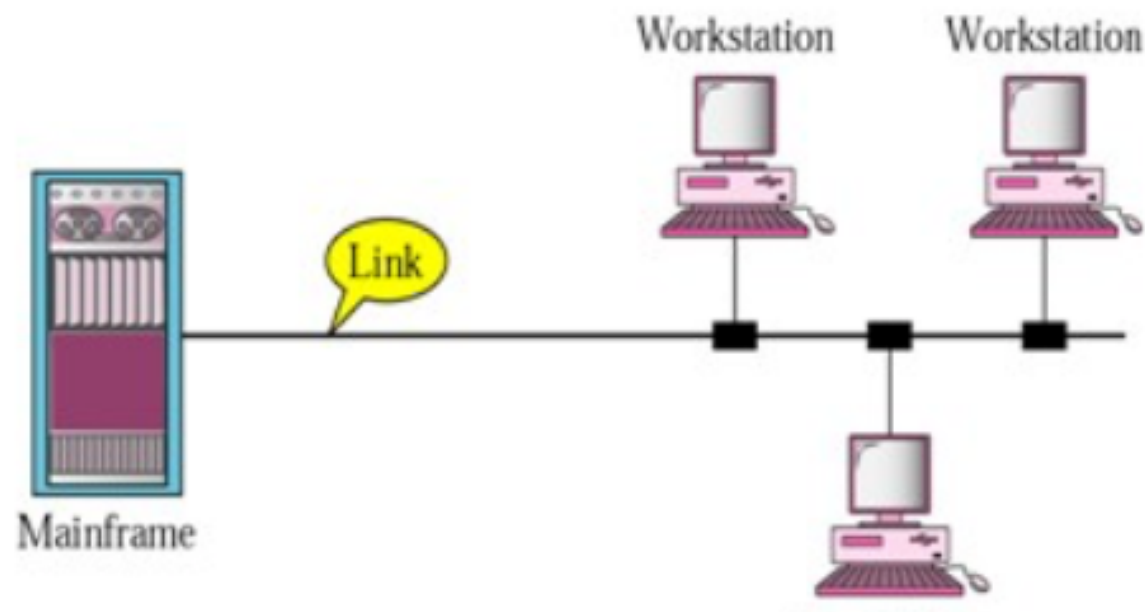
Basic Terminologies

Links and Nodes

- Links are physical medium such as coaxial cable or an optical fiber
- Nodes are computers.

Link Types

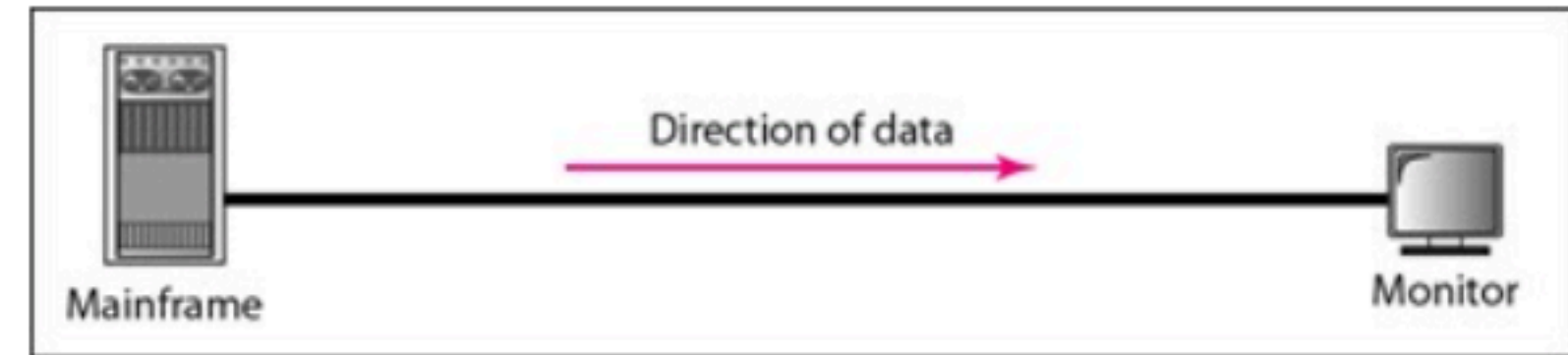
- Point to Point
- Multiple Access or Multipoint



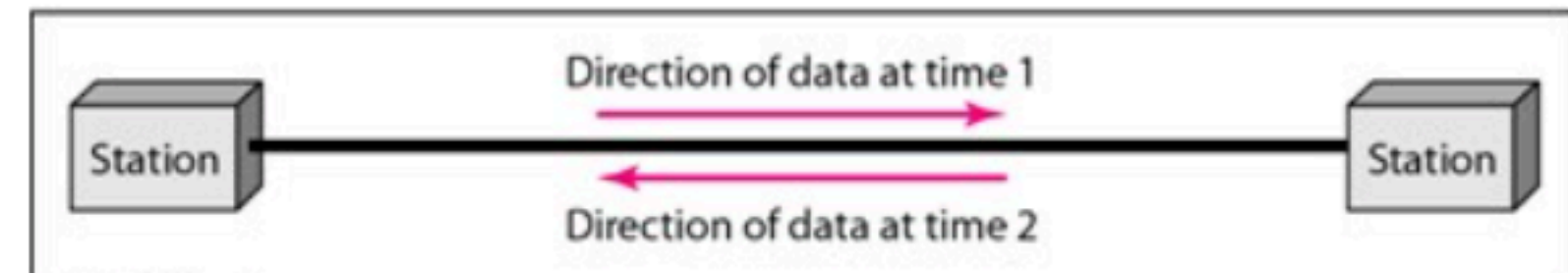
Computer Network

Flow of Information Transmission Mode

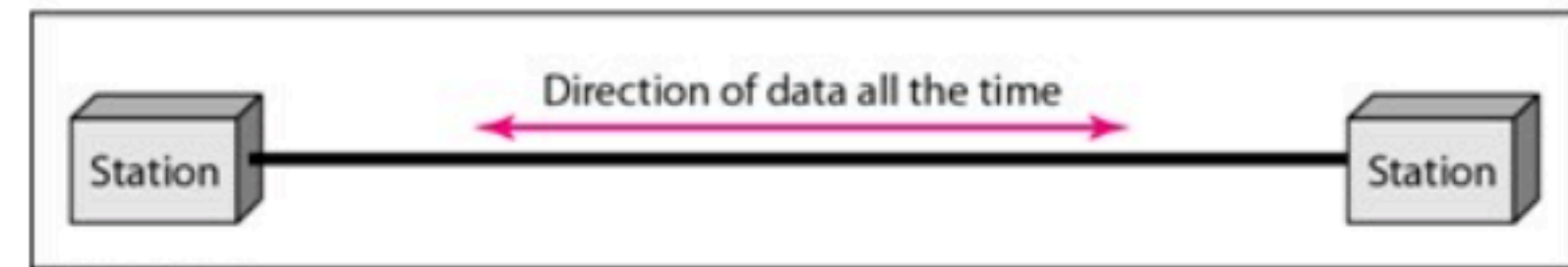
- **Simplex** - unidirectional (Eg: keyboard, monitor)
- **Half-duplex** - each station can both transmit and receive, but not at the same time (Eg. walkie-talkie).
- **Full-duplex** (also called duplex), both stations can transmit and receive simultaneously (Eg. telephone network).



a. Simplex



b. Half-duplex

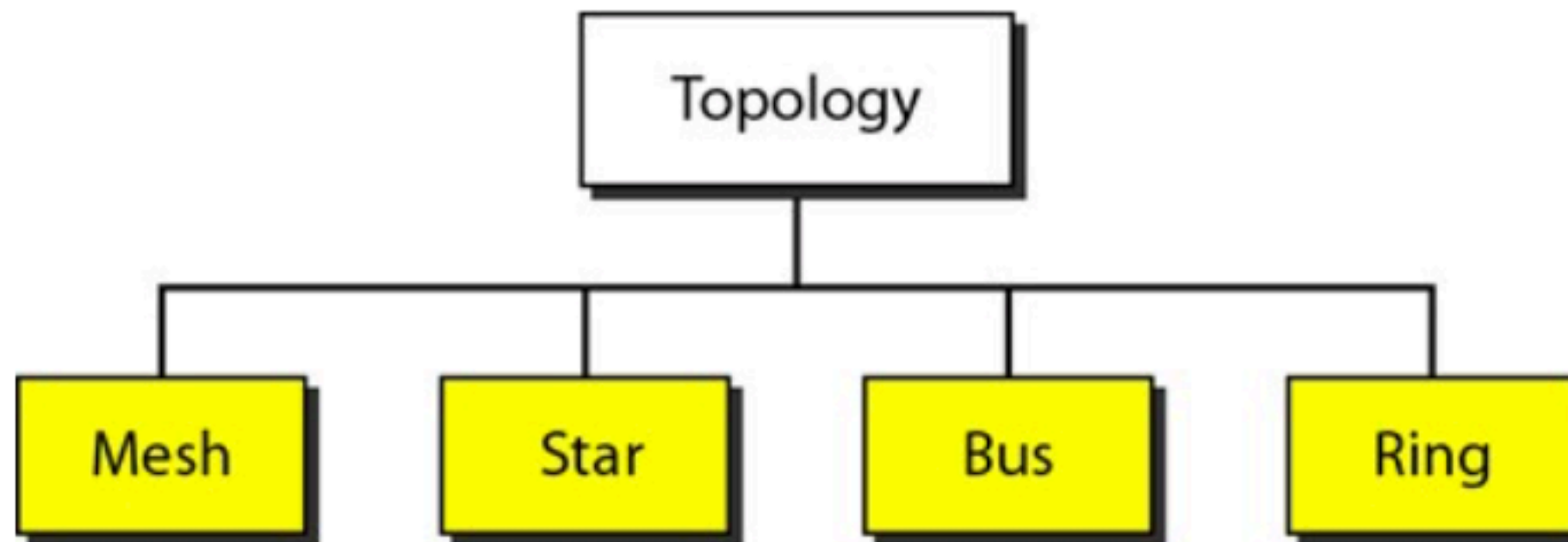


c. Full-duplex

Topology

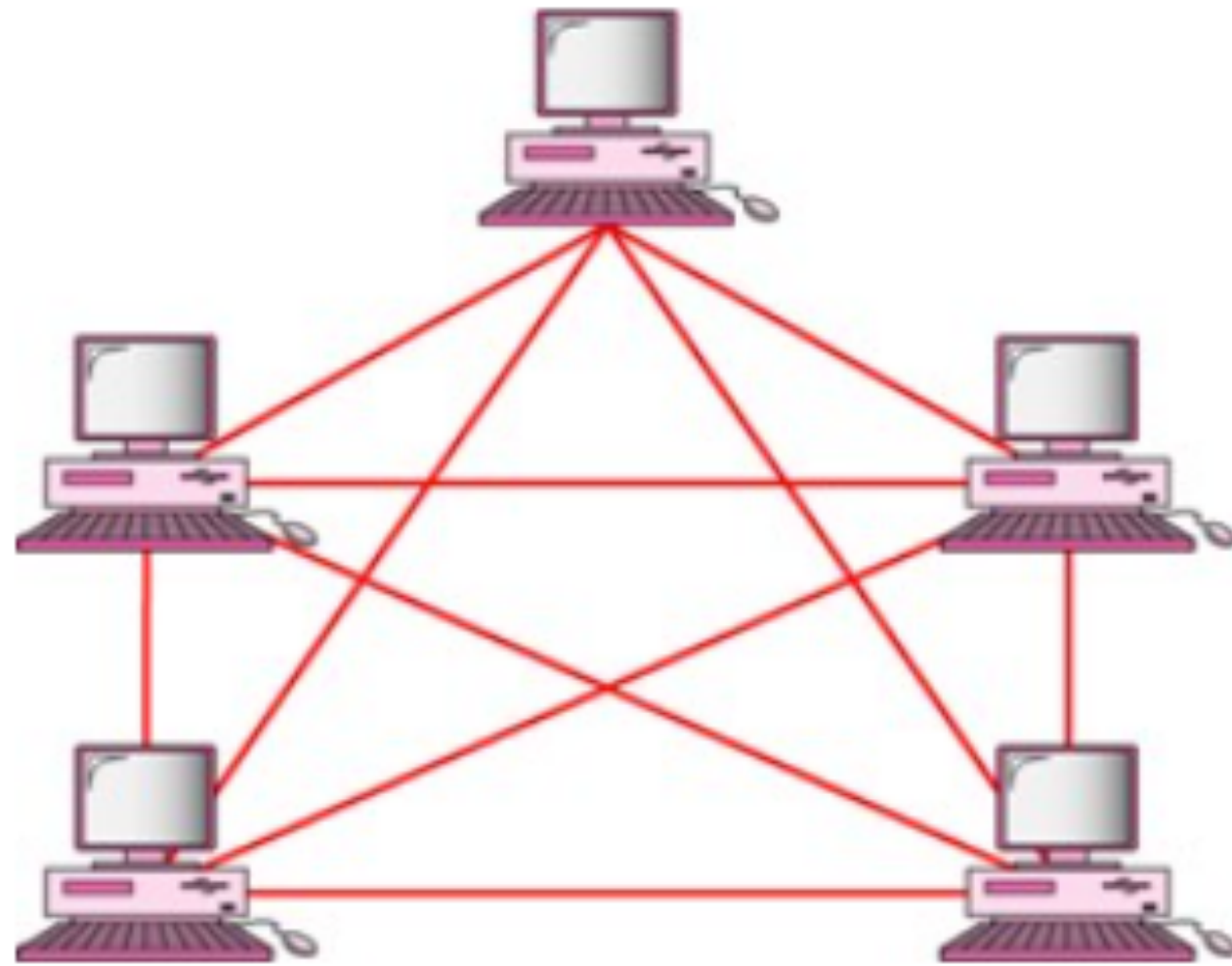
Physical Topology

- The term physical topology refers to the way in which a network is laid out physically.
- Two or more devices connect to a link; two or more links form a topology.
- 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.



Topology

Mesh Topology



$n(n-1)/2$ physical duplex links

- Dedicated point to point link
- $n(n - 1) / 2$ duplex-mode links

Advantages

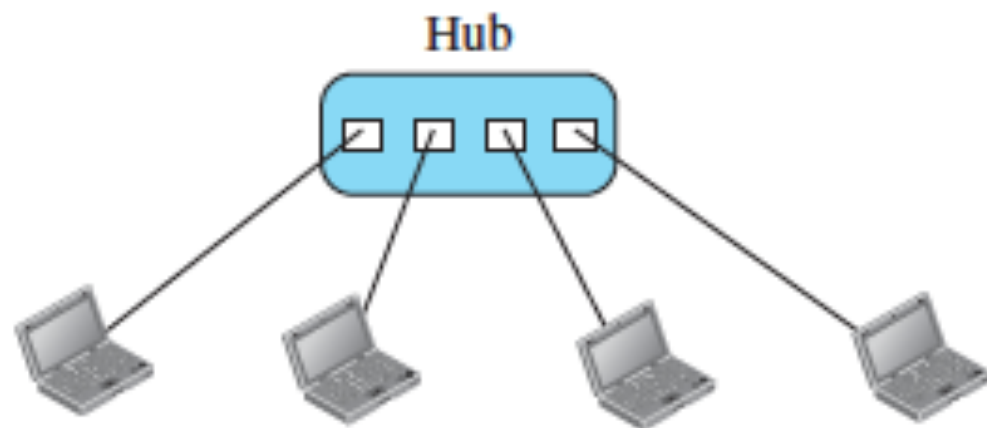
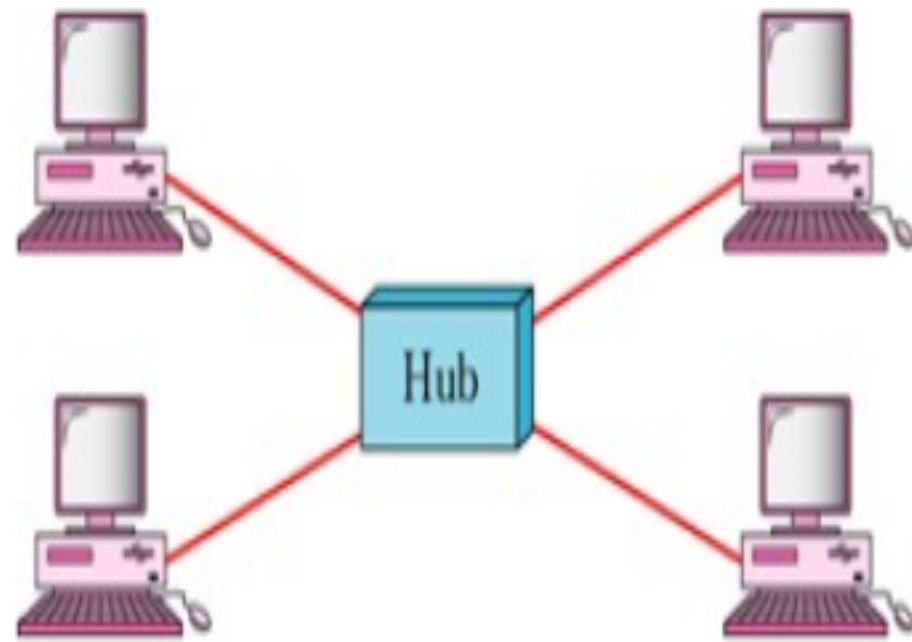
- Eliminating the traffic problems
- Robust i.e. If one link becomes unusable, it does not incapacitate the entire system.
- Privacy or security
- Fault identification and fault isolation easy

Disadvantage

- Amount of cabling and the number of I/O ports required.
- Installation and reconnection are difficult
- Very Expensive

Topology

Star topology



- Simple design
- Each device needs only one link and one I/O port to connect it to any number of others

Advantage

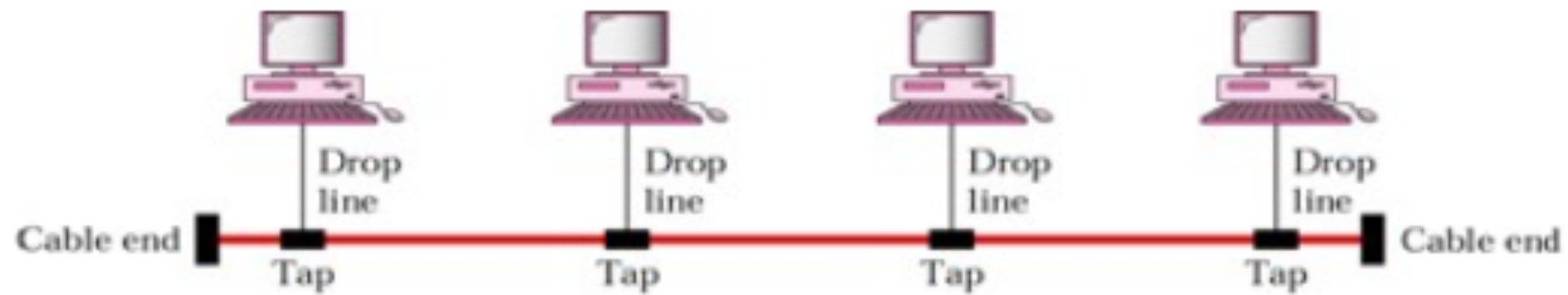
- Less Expensive
- Easy to install and reconfigure
- Robustness. If one link fails, only that link is affected.
- Easy fault identification and fault isolation

Disadvantage

- Single point of failure. If the hub goes down, the whole system is dead

Topology

Bus Topology



- A bus topology is multipoint.
- One long cable acts as a backbone to link all the devices in a network

- Nodes are connected to the bus cable by drop lines and taps
- it becomes weaker and weaker as it travels farther and farther, limitation on number of tap

Advantage

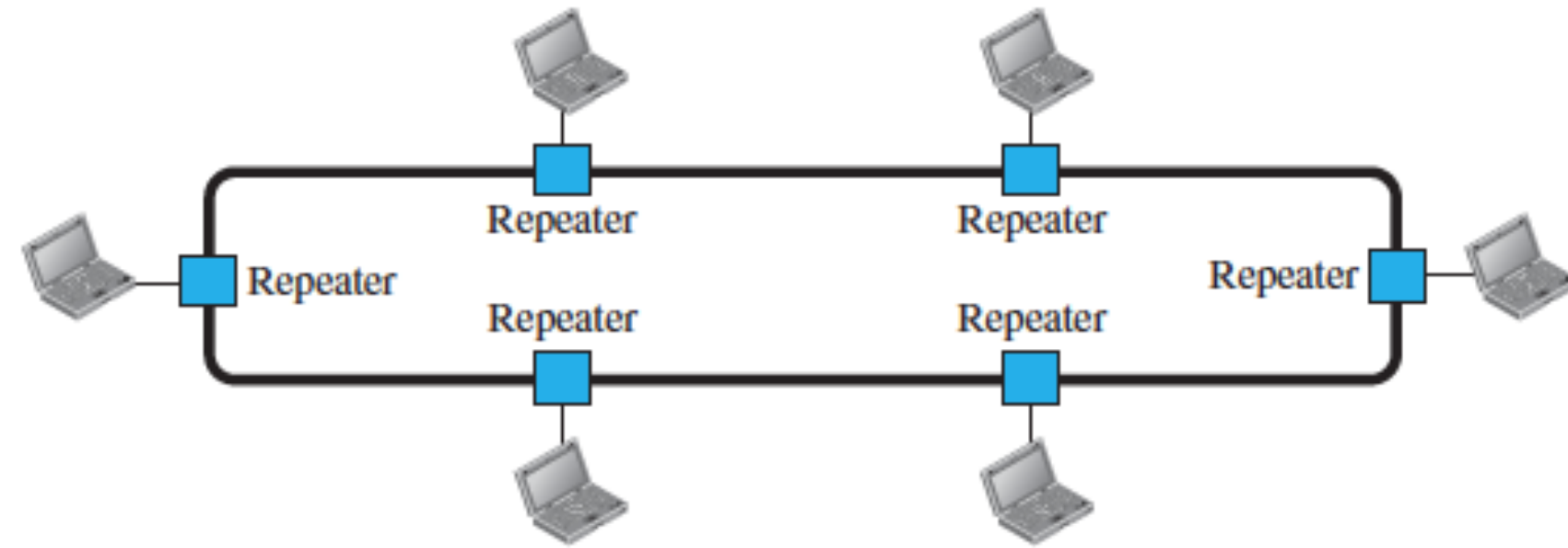
- Ease of Installation
- Uses less cabling than mesh or star topologies.

Disadvantages

- Difficult reconnection and fault isolation
- A fault or break in the bus cable stops all transmission

Topology

Ring Topology



- In a ring topology, each device has a dedicated point-to-point connection with only the two devices on either side of it.

Advantage

- Easy to install and reconfigure
- Fault isolation is simplified.

Disadvantage

- Unidirectional traffic
- A break in the ring (such as a disabled station) can disable the entire network



Computer Network - Types



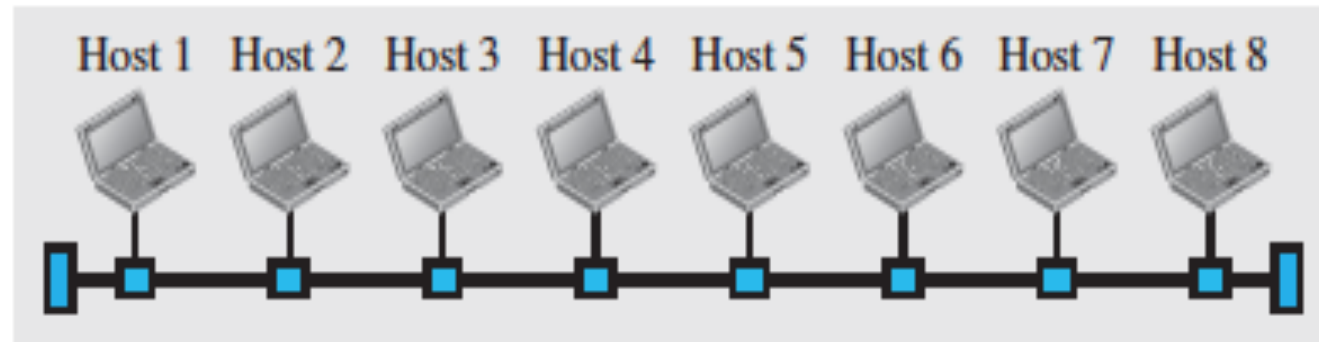
Categories of Network

- Local Area Network (LAN)
- Wide Area Network (WAN)
- Metropolitan Area Network (MAN)

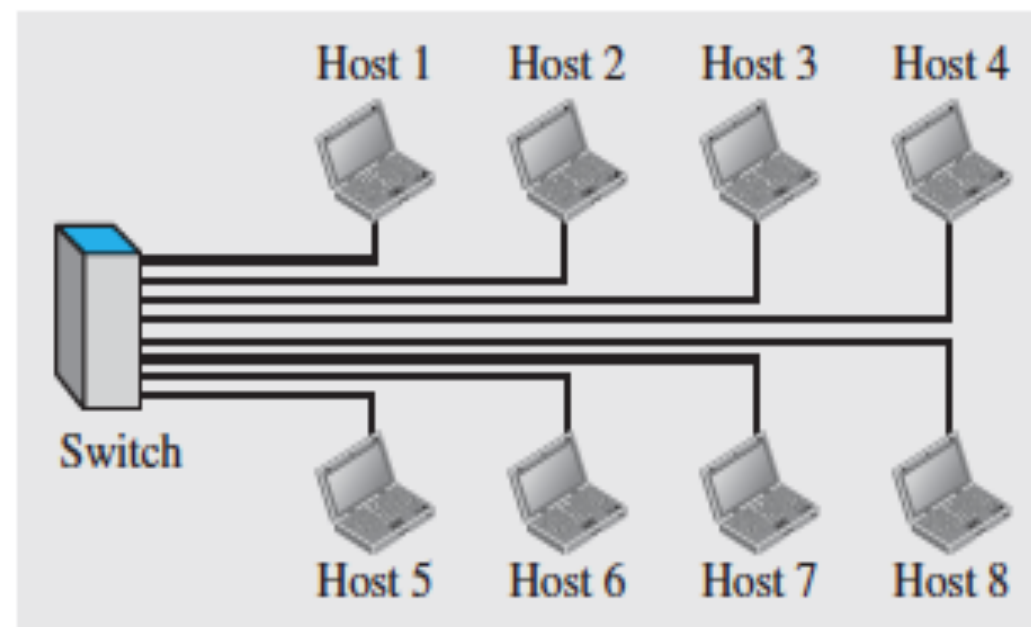
Local Area Network (LAN)

- Privately owned, and connects some hosts in a single office, building, or campus.
- Each host in a LAN has an identifier, an address, that uniquely defines the host in the LAN.
- In the past, all hosts in a network were connected through a common cable, which meant that a packet sent from one host to another was received by all hosts. The intended recipient kept the packet; the others dropped the packet.
- Today, most LANs use a smart connecting switch, which is able to recognize the destination address of the packet and guide the packet to its destination without sending it to all other hosts

Computer Network - Types

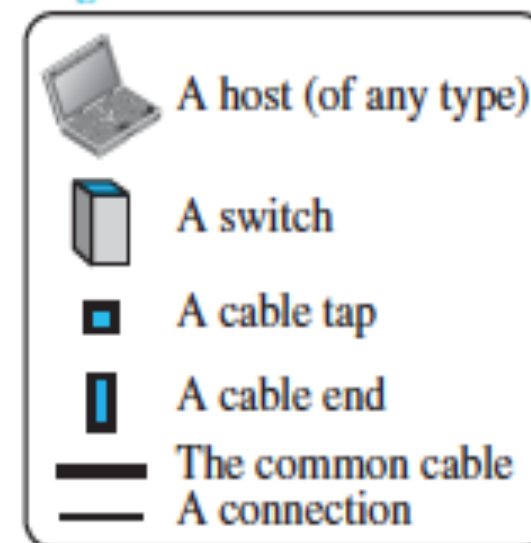


a. LAN with a common cable (past)



b. LAN with a switch (today)

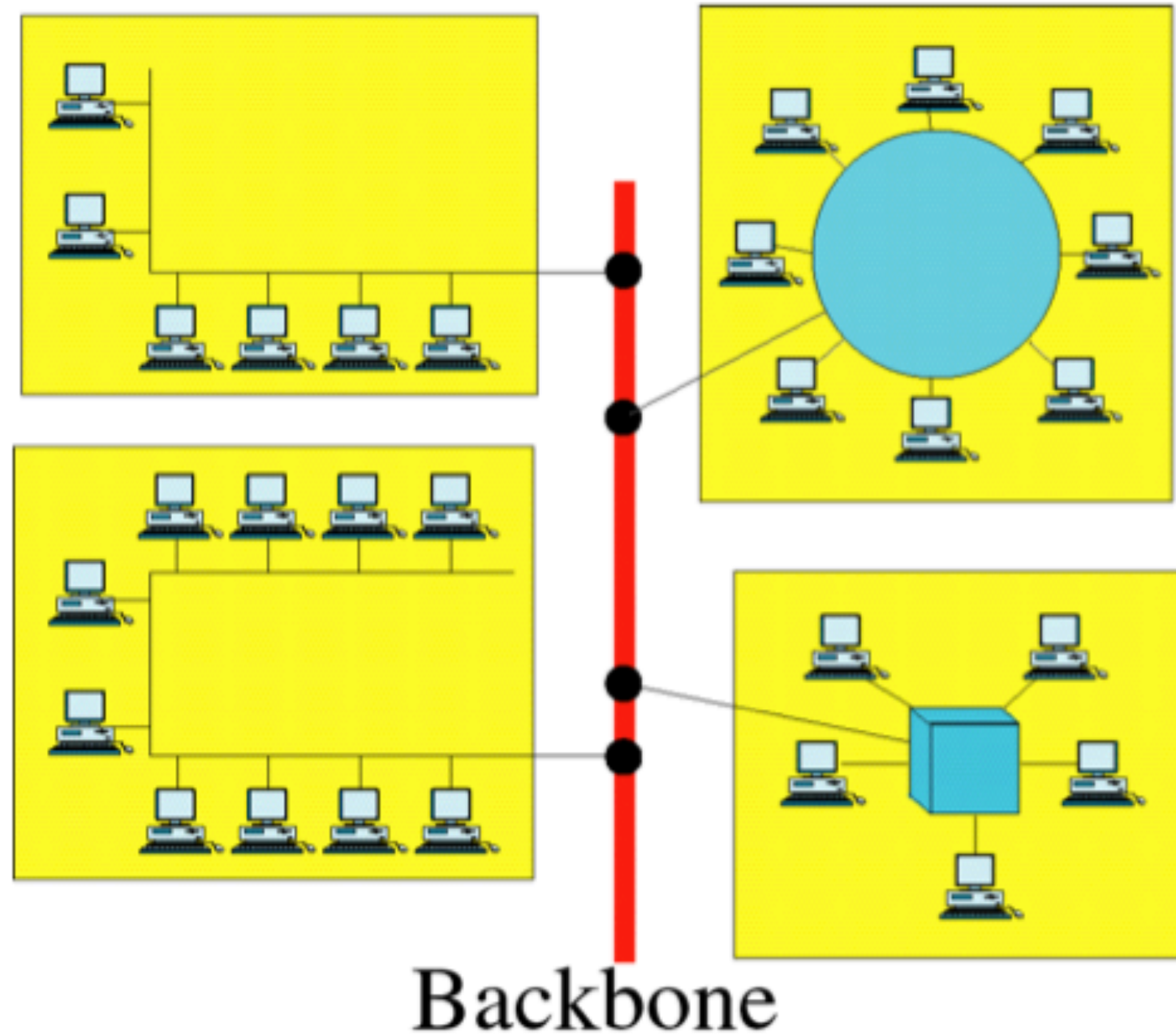
Legend



- LANs are distinguished from other types of networks by their transmission media and topology.
- The most common LAN topologies are bus, ring, and star.
- Early LANs had data rates in the 4 to 16 megabits per second (Mbps) range. Today, however, speeds are normally 100 or 1000 Mbps or even Gigabits.
- Wireless LANs are the newest evolution in LAN technology.

Computer Network - Types

Multiple Building LANs





Computer Network - Types



Wide Area Network

- A WAN has a wider geographical span, spanning a town, a state, a country, or even the world.
- A LAN interconnects hosts; a WAN interconnects connecting devices such as switches, routers, or modems.
- A LAN is normally privately owned by the organization that uses it; a WAN is normally created and run by communication companies and leased by an organization that uses it.

Types of WAN

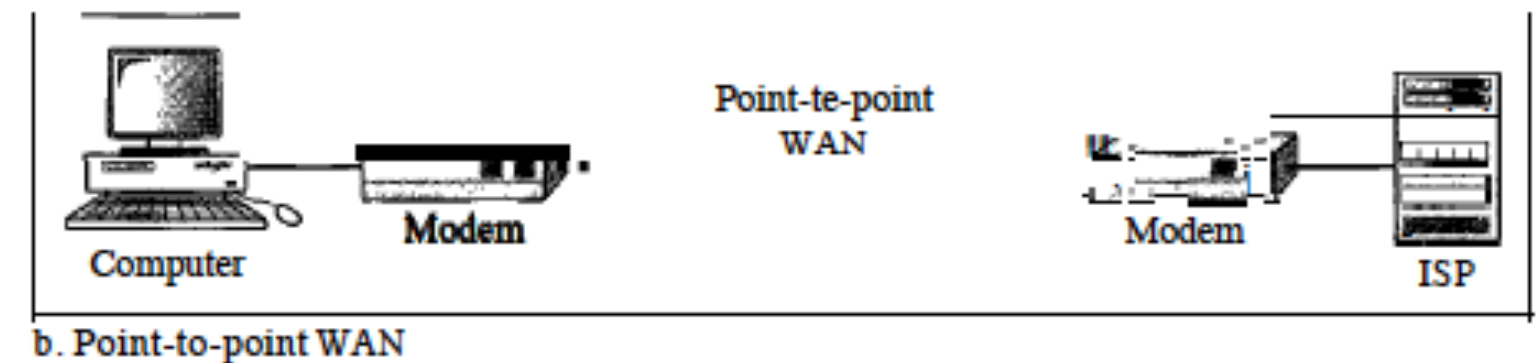
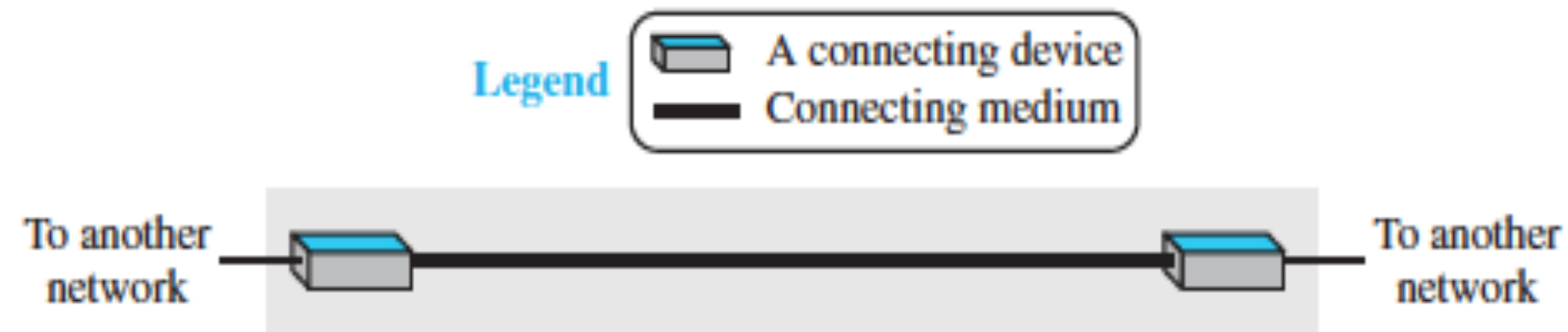
- Point-to-point WANs and
- Switched WANs

Computer Network - Types

Point-to-Point WAN

A point-to-point WAN is a network that connects two communicating devices through a transmission media (cable or air).

The point-to-point WAN is normally a line leased from a telephone or cable TV provider that connects a home computer or a small LAN to an Internet service provider.

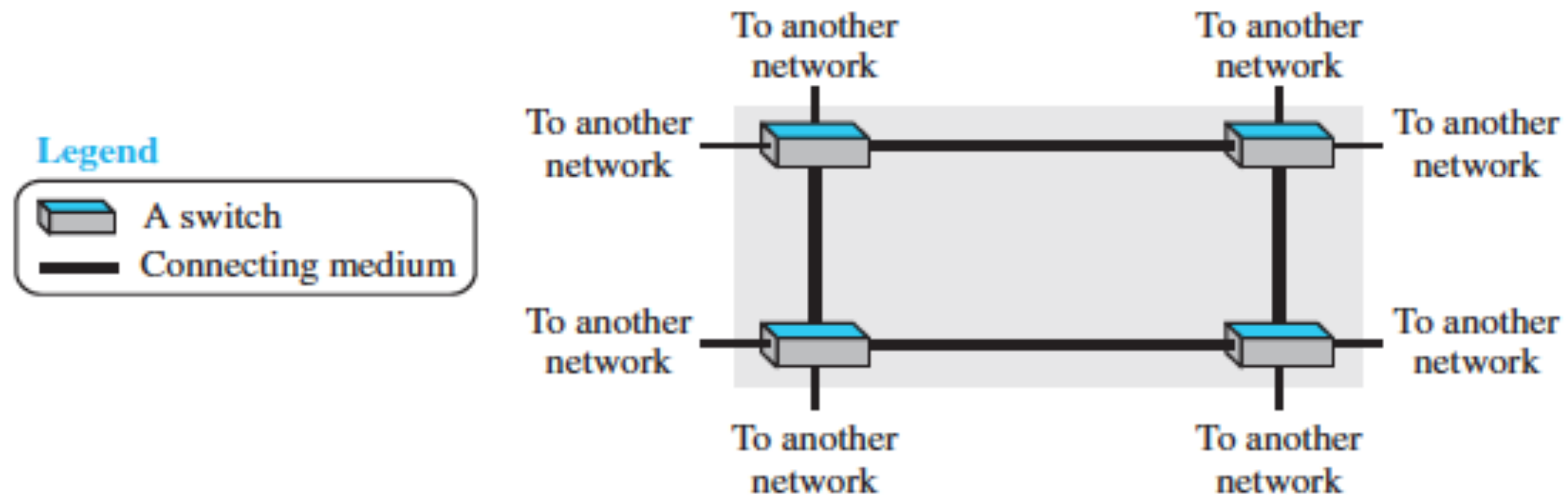


Computer Network - Types

Switched WAN

A switched WAN is a network with more than two ends. A switched WAN, is used in the backbone of global communication today.

We can say that a switched WAN is a combination of several point-to-point WANs that are connected by switches.





Computer Network - Types



Metropolitan Area Networks

- A metropolitan area network (MAN) is a network with a size between a LAN and a WAN.
- It normally covers the area inside a town or a city.
- It is designed for customers who need a high-speed connectivity, normally to the Internet, and have endpoints spread over a city or part of city.
- A good example of a MAN is the part of the telephone company network that can provide a high-speed DSL line to the customer.

Computer Network - Types

Internetwork

When two or more networks are connected, they make an internetwork, or internet.





THANK YOU