National Institute of Technology Karnataka Surathkal
Department of Information Technology

IT 200 **Computer Communication and Networking**

Transmission Fundamentals

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Syllabus

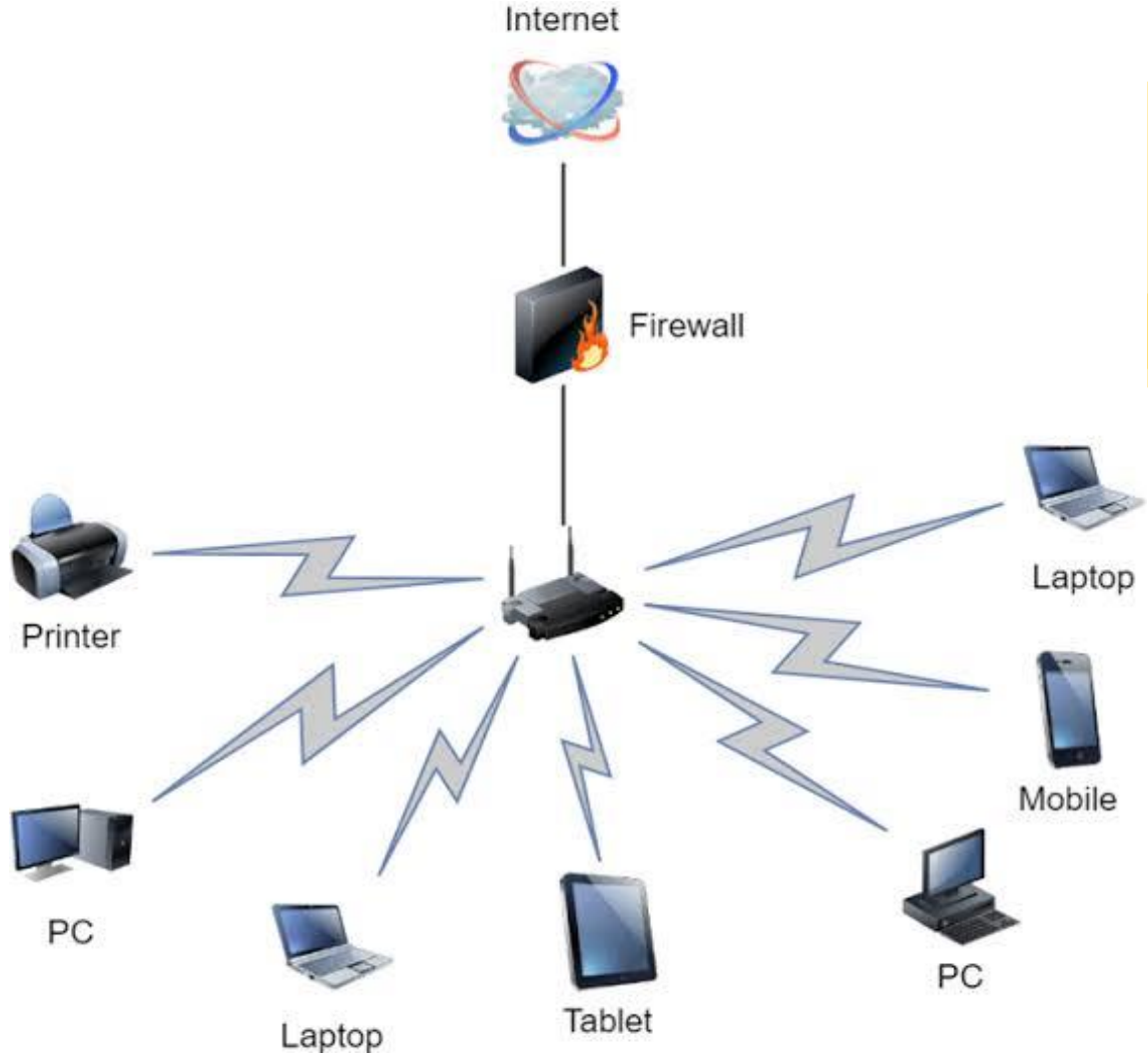
- **Evolution of Data Communication and Networks,**
- **Transmission Fundamentals: Signaling Schemes, Encoding and Modulation,**
- Data Transmission over Networks – Switching Techniques, Layered Architecture of Computer Networks,
- OSI & TCP/IP Architectures and Layers with protocols,
- Data Link Control and Protocols, Error Detection and Correction,
- Internetworking & Routing,
- Transport Layer Protocols,
- Applications: E-Mail, HTTP, WWW, Multimedia;
- Implementation of Signaling and Modulation, Bit, Byte & Character Stuffing and Error Detection/Correction Coding Techniques, TCP/IP Level Programming, Routing Algorithms, Exercises comprising simulation of various protocols.

Index

- **Transmission Fundamentals**

1. Introduction : Data Communication and Network

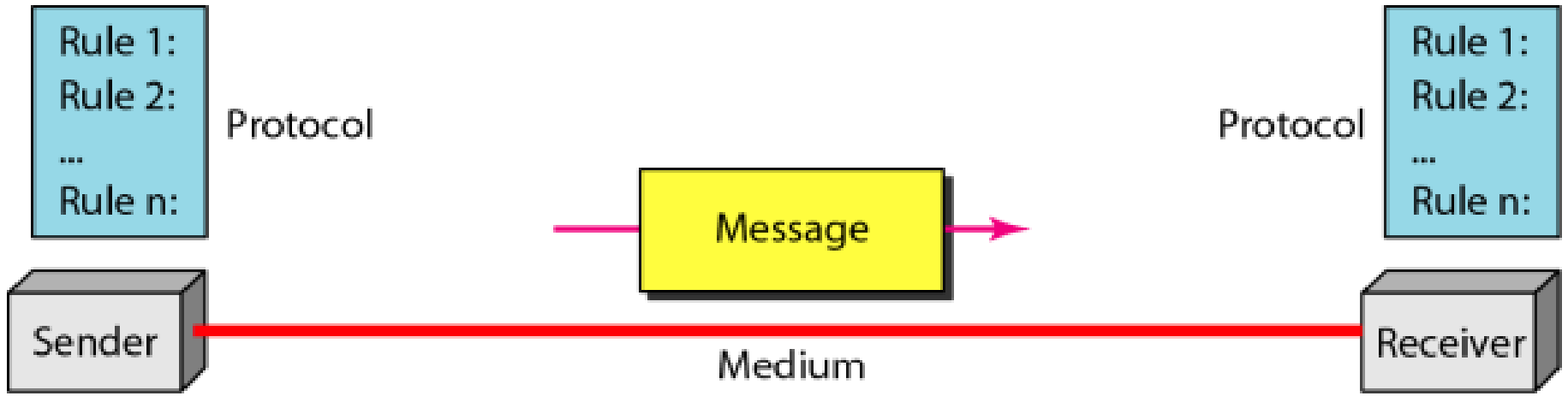
- Data can be any text, image, audio, video, and multimedia files.
- Communication is an act of sending or receiving data.
- Data communication refers to the exchange of data between two or more networked or connected devices. These devices must be capable of sending and receiving data over a communication medium.



1. Introduction : Data Communication and Network

Components of Communication

Sender , Receiver, Message, Protocol , Medium



1. Introduction : Data Communication and Network

Data Flow:

Simplex:

Unidirectional

Eg. Keyboard, Mouse

Half Duplex :

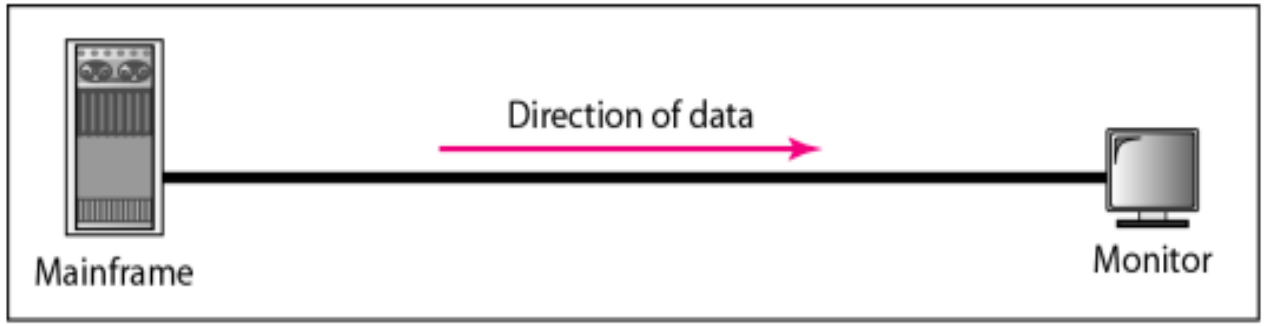
Bidirectional (one at a time)

Eg. Walkie -Talkie

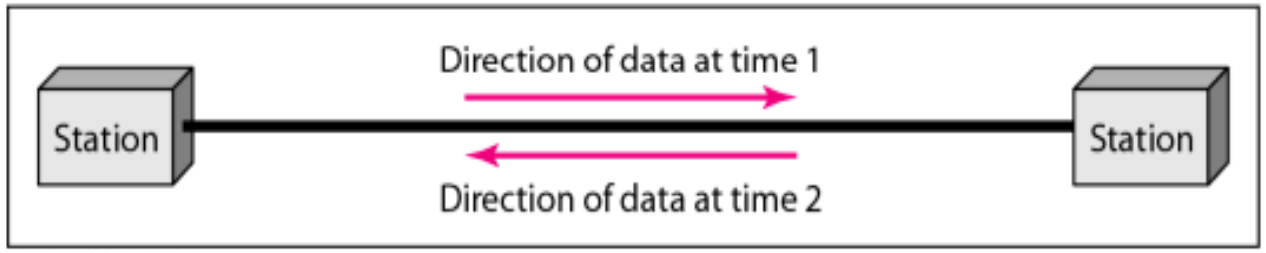
Full duplex:

Bidirectional (simultaneously)

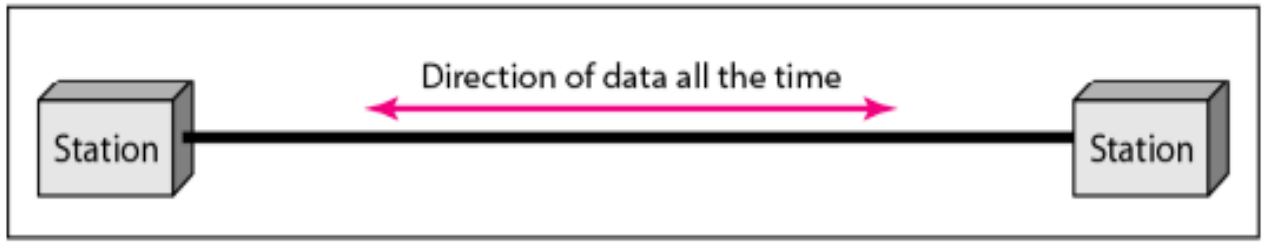
Eg. Telephone



a. Simplex



b. Half-duplex



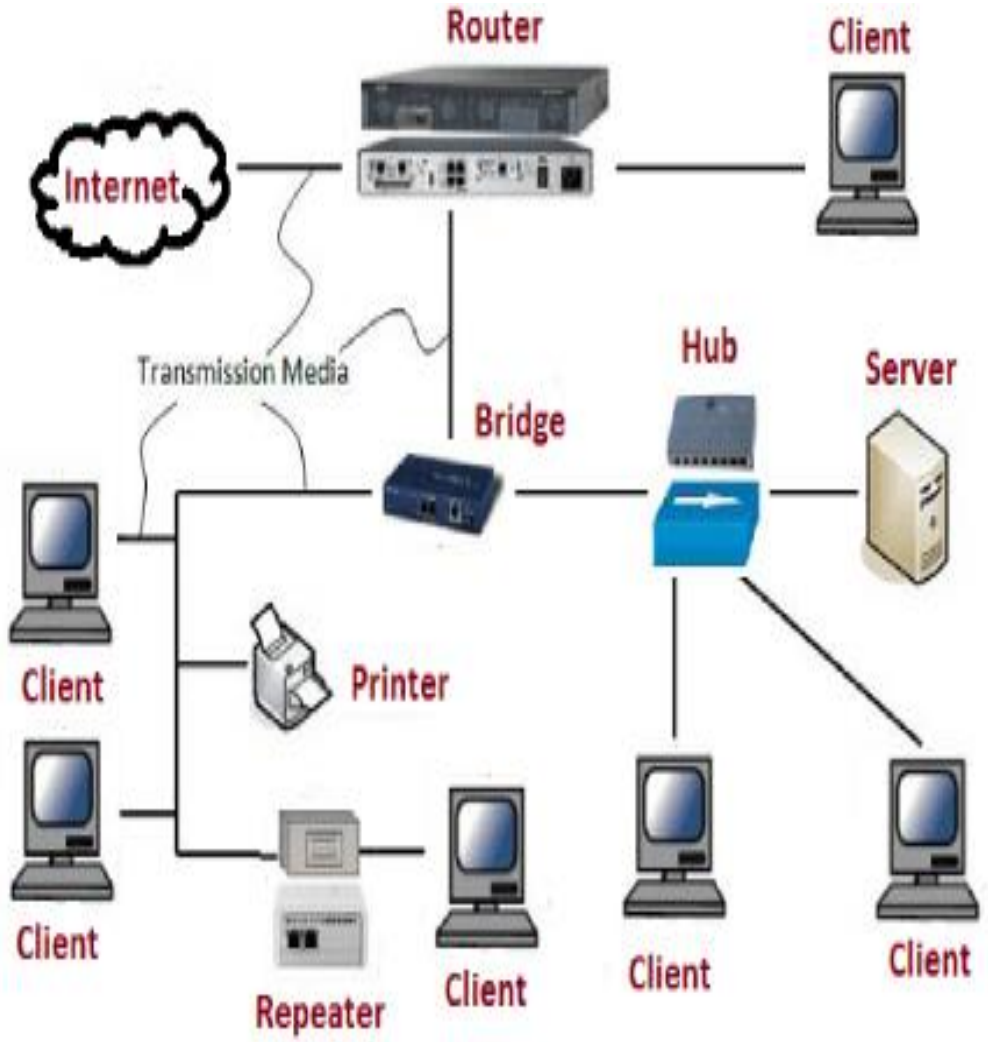
c. Full-duplex

1. Introduction : Data Communication and Network

Network

A network is a set of devices (nodes) connected by communication links.

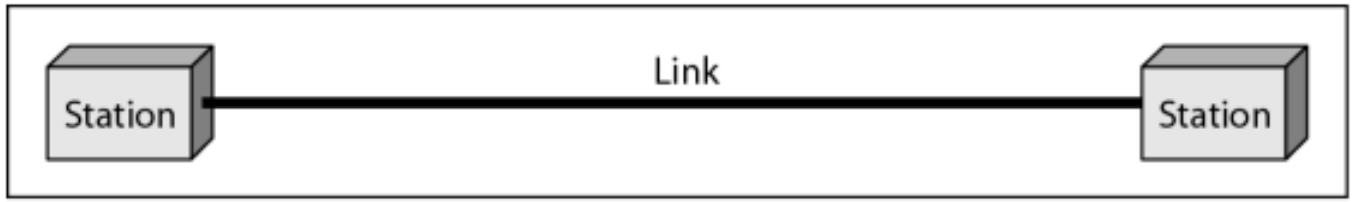
A node can be computer, printer, or any other device capable of sending and/or receiving data generated by other nodes on the network.



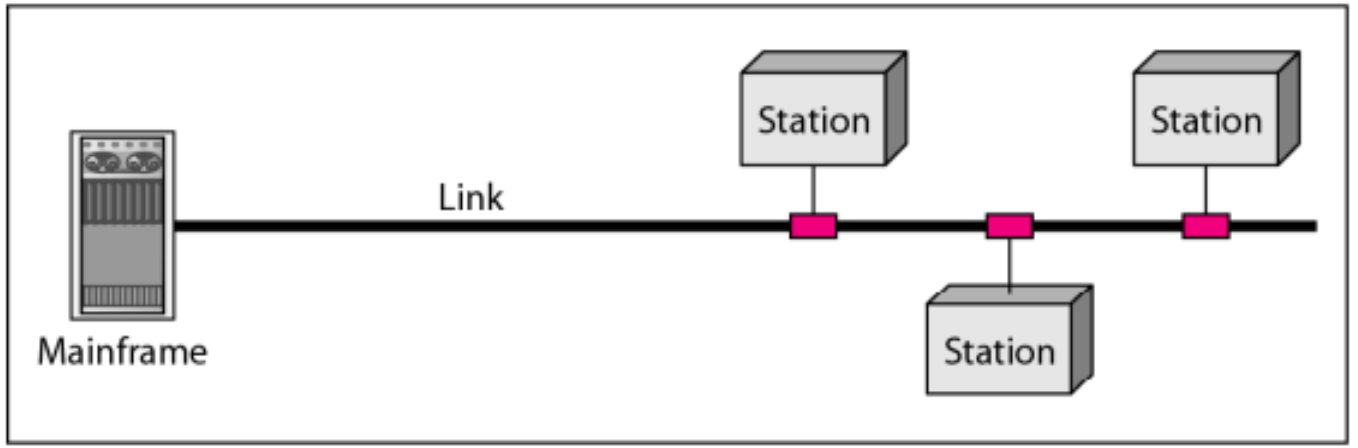
1. Introduction : Data Communication and Network

Network: Types of Connection

- Point –to-point
- Multipoint



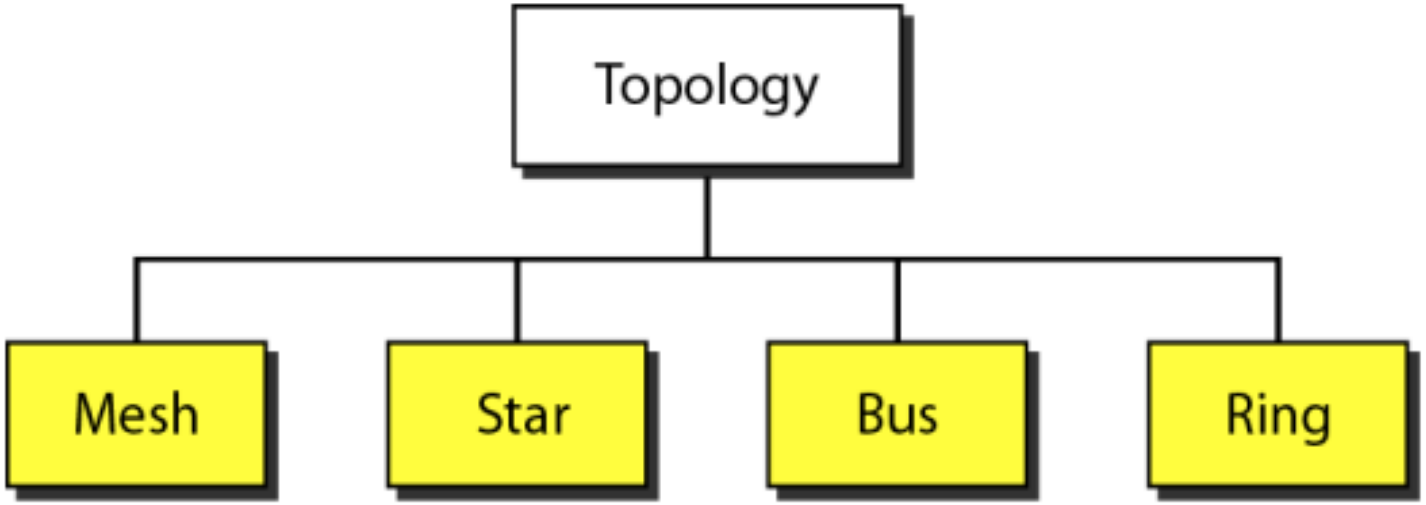
a. Point-to-point



b. Multipoint

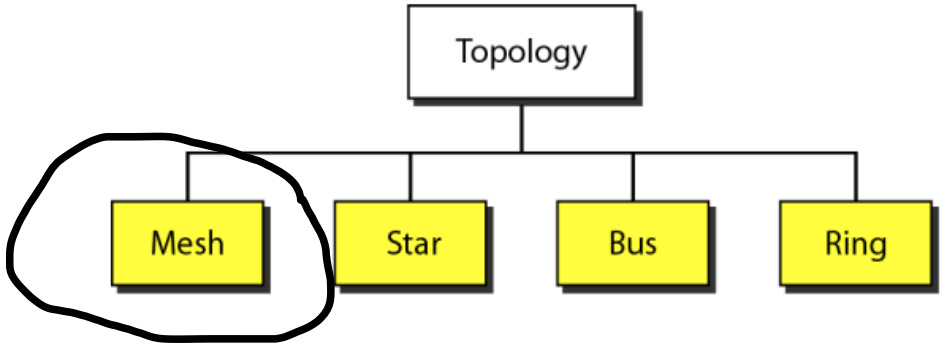
1. Introduction : Data Communication and Network

Network Topology : Physical arrangements of devices in a communication network



1. Introduction : Data Communication and Network

Network Topology : Fully Connected Mesh

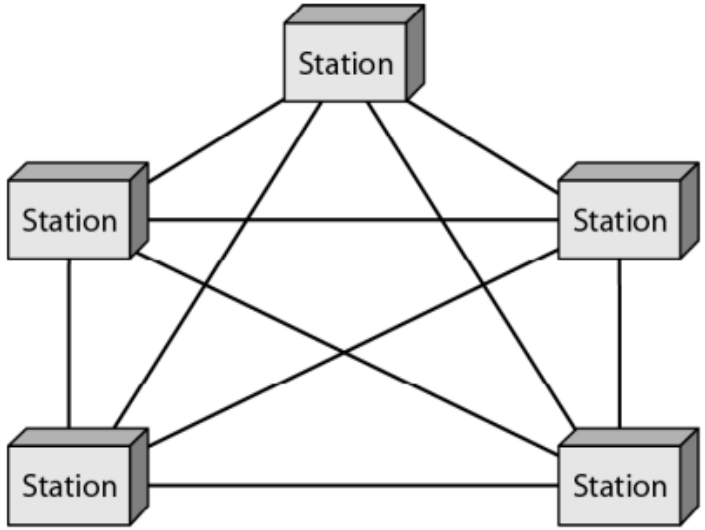


All nodes connected to each other.

n nodes => n(n-1)/2 physical channels

-Costlier in terms of links.

-Reliable, No data loss, Fast



1. Introduction : Data Communication and Network

Network Topology : Star

All nodes connected to central hub or router.

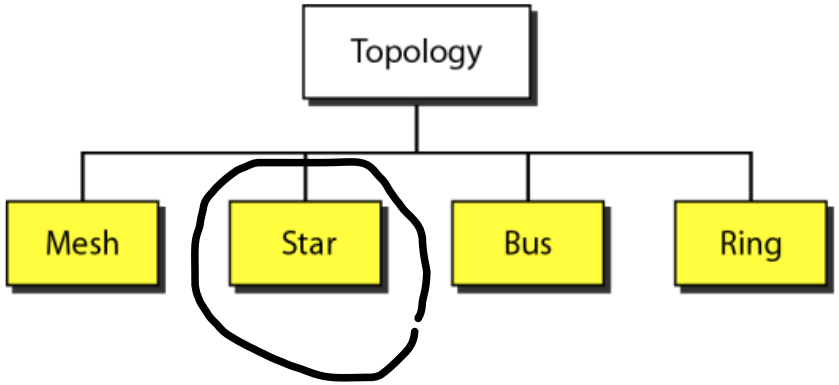
n nodes => n physical channels

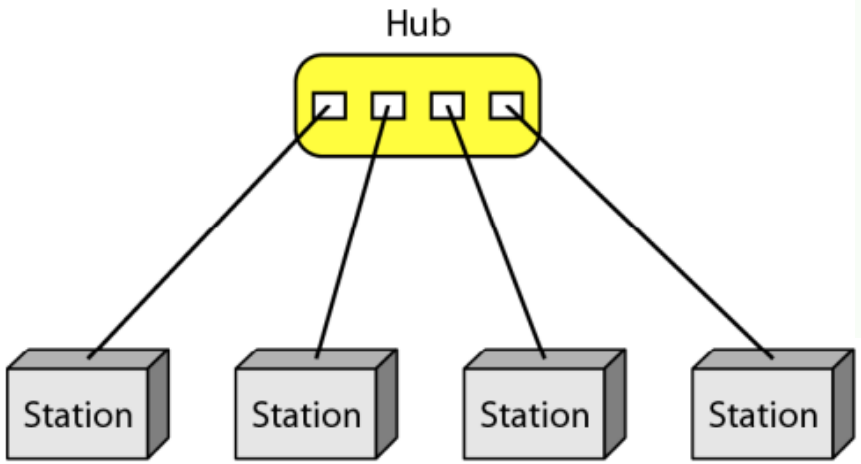
-Simple structure.

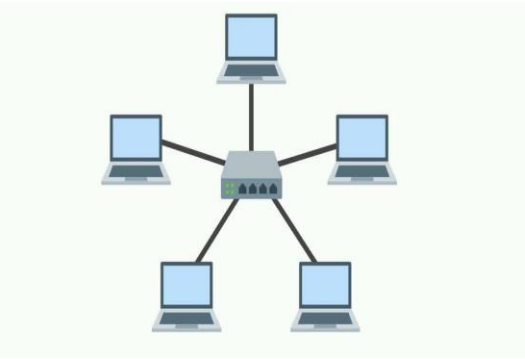
-If hub fails, then no communication.

-Less expensive, Reliable

-No much scalability







1. Introduction : Data Communication and Network

Network Topology : Bus

All nodes connected to Single bus called back bone cable.

Broadcast the messages

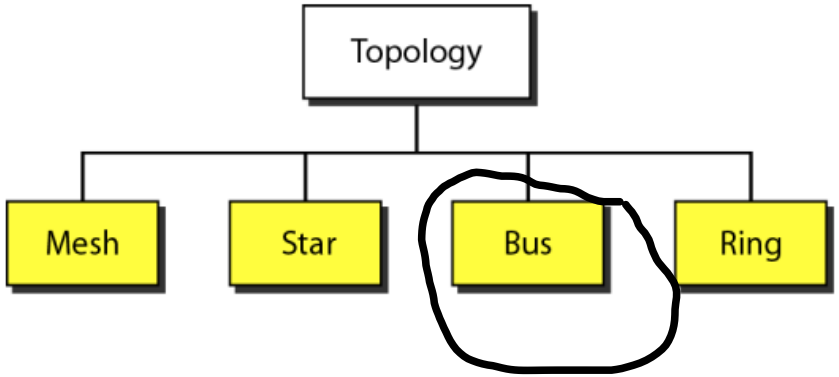
-Simple structure.

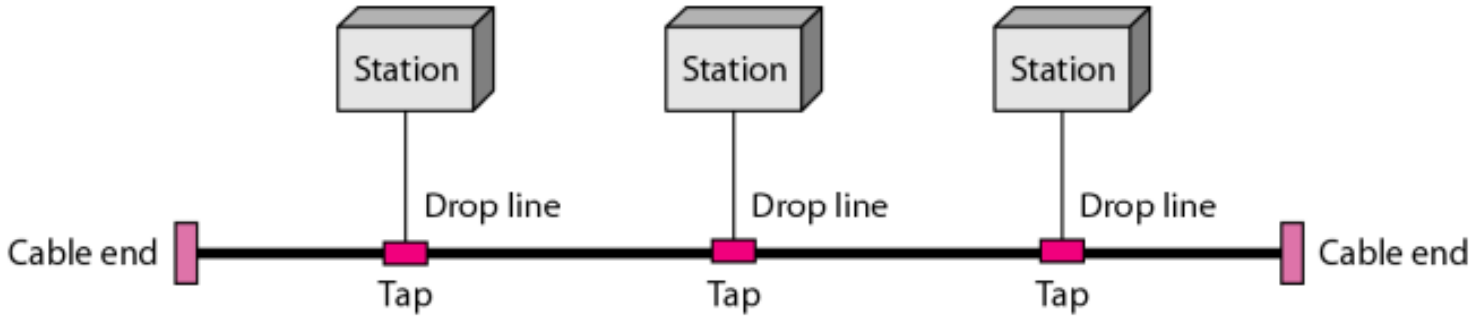
-Less expensive,

-Easy maintenance

-Link failure causes network down.

-Data traffic issues





1. Introduction : Data Communication and Network

Network Topology : Ring

All nodes connected to Single bus in ring fashion.

Unidirectional

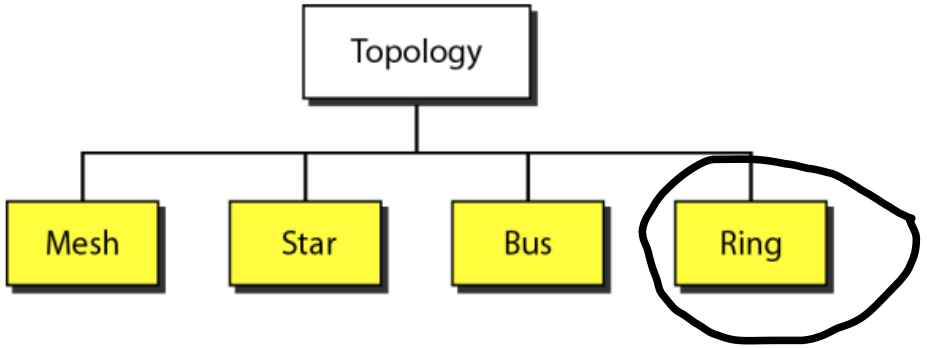
Token passing method

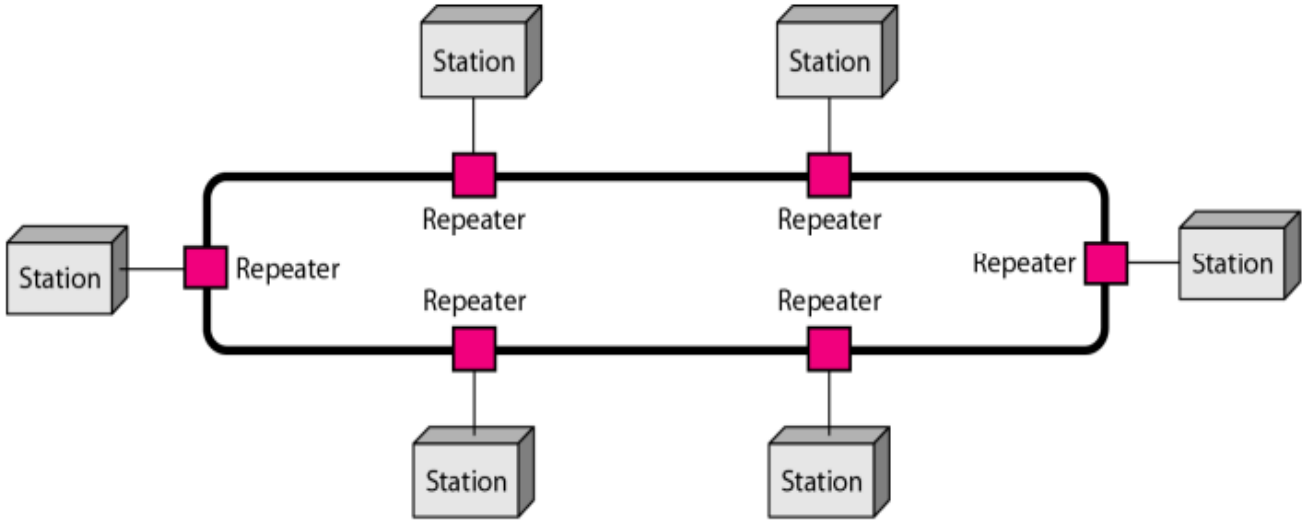
Data transmission in clockwise direction

-Easy to install, less expensive,
easy maintenance.

-Link failure causes network down

-Data Traffic Issues





1. Introduction : Data Communication and Network

Network Topology : Hybrid Topology

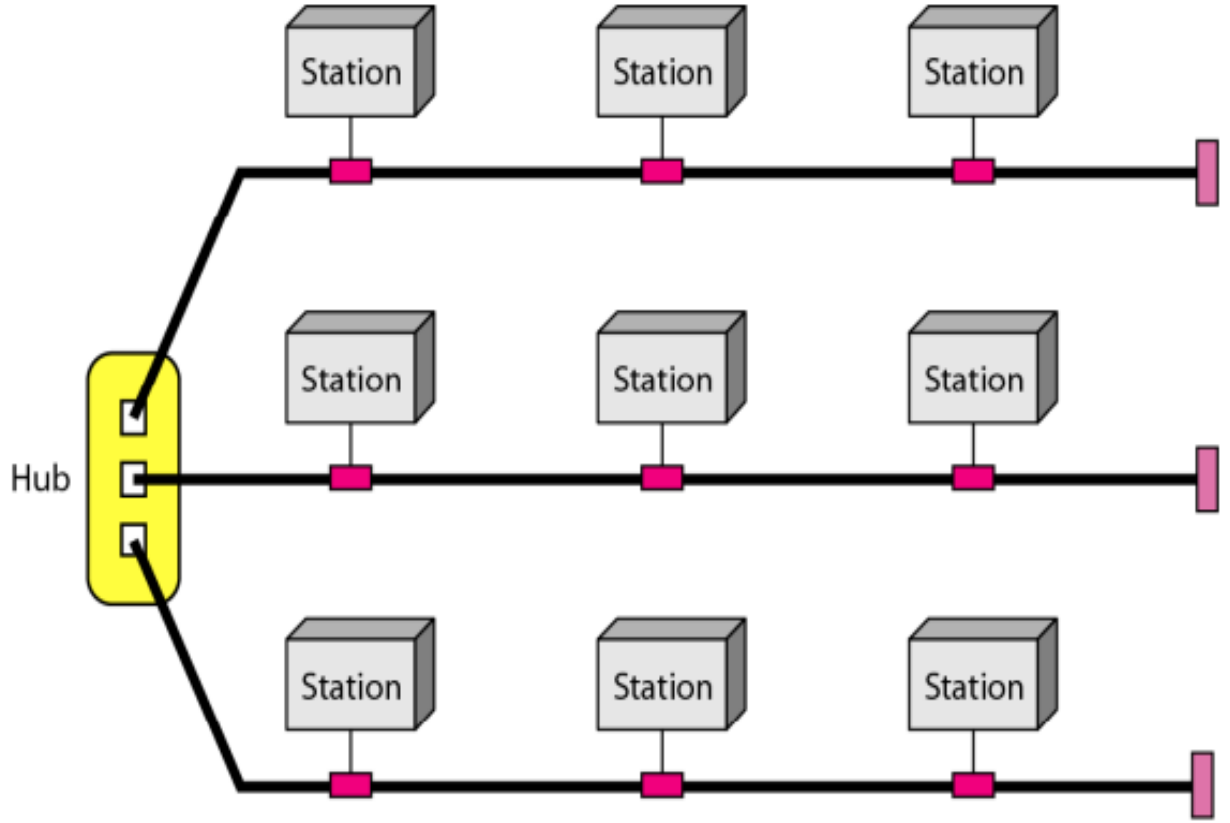
Based on requirement of application

-Scalable

-Installation is difficult

-Fault detection is difficult

-Design is complex



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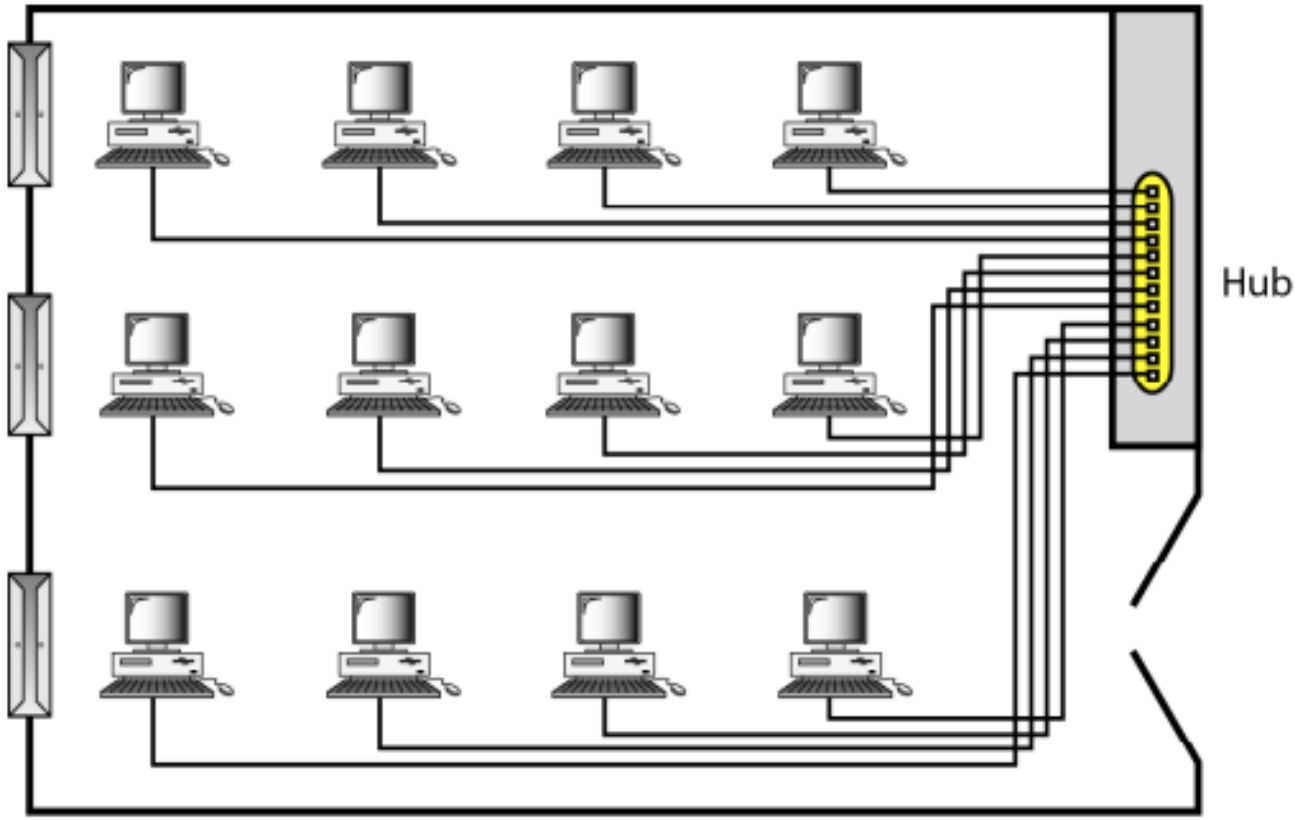


An isolated LAN connecting 12 computers to a hub in a closet

1. Introduction : Data Communication and Network

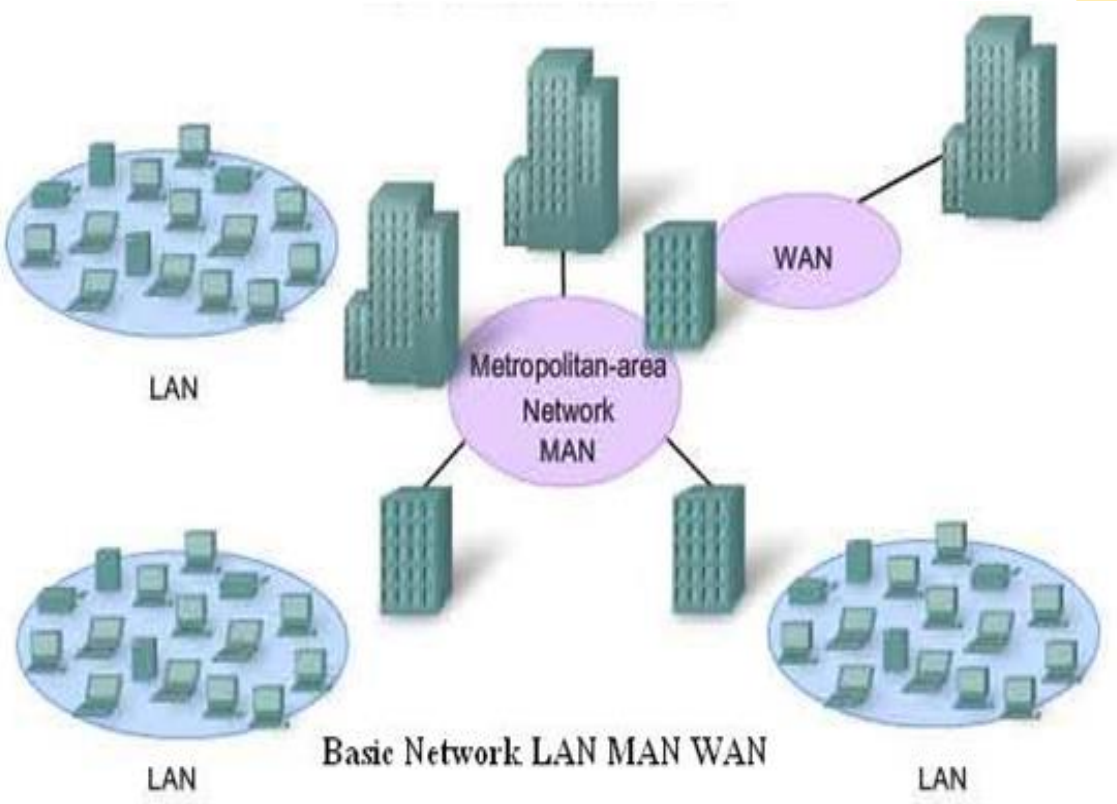
Categories of Network:

LAN WAN AND MAN

Local Area Network (LAN) : Few km area

Wide Area Network (WAN): geographically large location

Metropolitan Area Network (MAN): Larger than LAN and Smaller than WAN



Basic Network LAN MAN WAN

1. Introduction : Data Communication and Network

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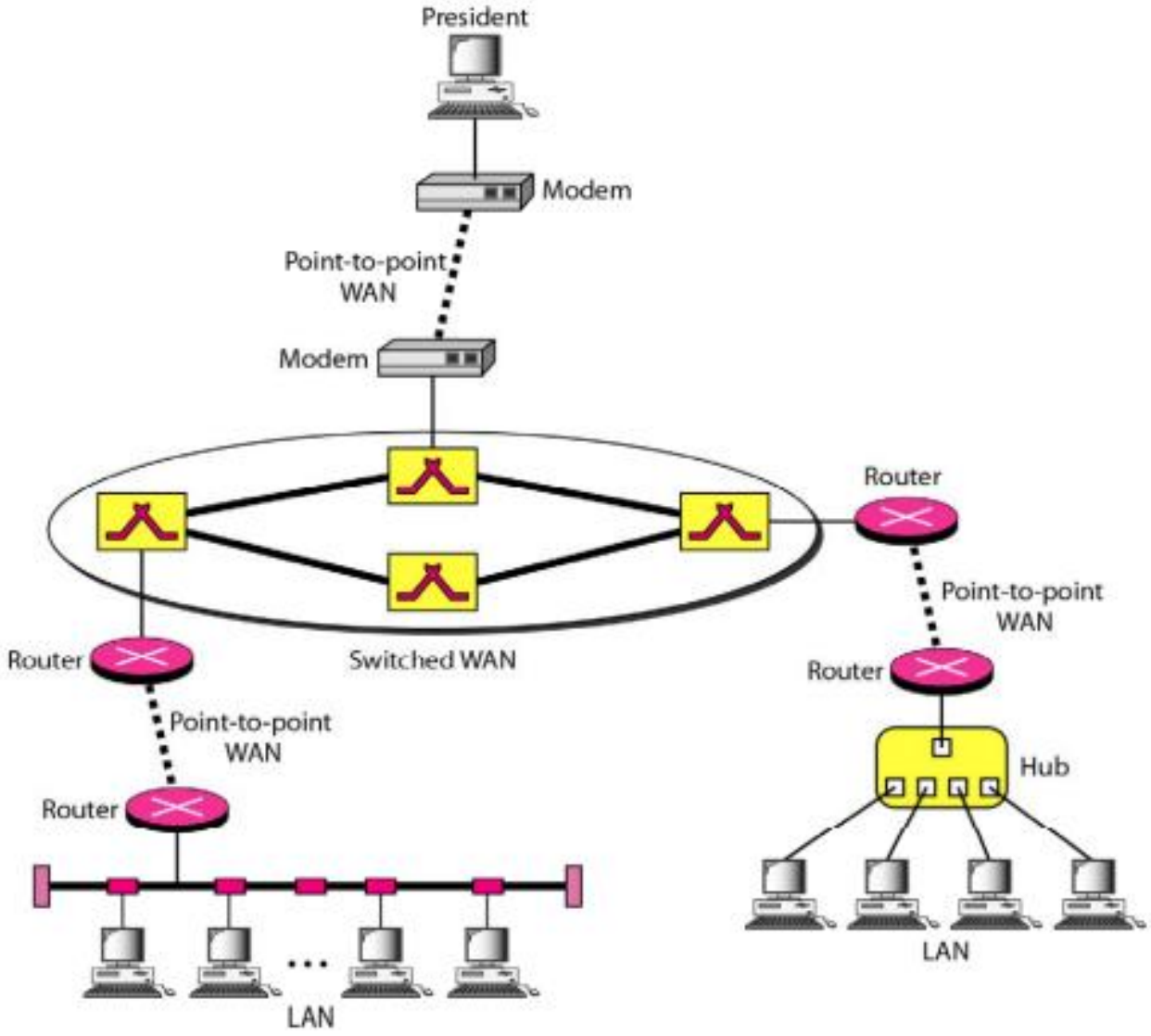


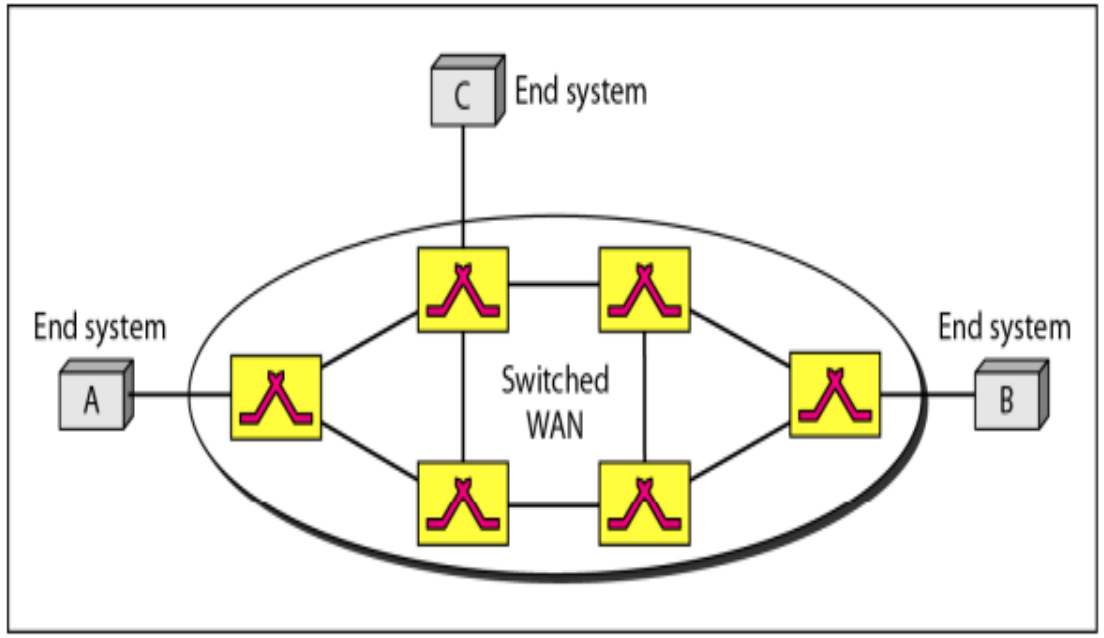
1. Introduction : Data Communication and Network

Categories of Network:

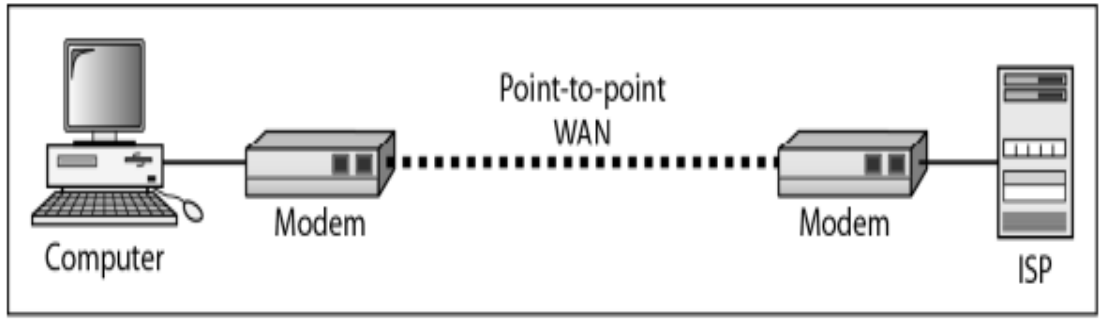
Switched WAN vs Point to Point WAN

Switched WAN : End systems are connected through switches/routers.

Point to Point WAN: Is a line leased from a telephone or cable TV provider that connects a home computer or LAN to Internet Service Provider (ISP).This provides Internet access



a. Switched WAN



b. Point-to-point WAN

Reference

- “Data Communications and Networking”, Behrouz A. Forouzan, 5th Edition, McGraw Hill, 2017.

Thank You