

Computer Networks

- > networking is every where
- > networking support the way we learn
- > networks support the way we communicate
- > networks support the way we work
- > networks support the way we play

chapter 1 : Fundamentals

chapter 2 : Data link layer

chapter 3 : network layer

chapter 4 : Transport layer

chapter 5 : Application layer

chapter 6 : network Security

Outcomes

- * understand " what is computer network ?"
- * identify end devices and intermediary devices.

Definition - computer network

> A computer is a set of nodes connected by communication links.

> A node can be a computer, printer or any other devices capable of sending/receiving data generated by other nodes in the network

Example nodes \Rightarrow Computer
Server
Printer
Security Camera
many more / Switches, Bridges, Routers
(etc.)

A communication link can be a wired link
or wireless link

The link carries the information

Wired = cable

Wireless = Air

> Computer network mainly used for resource sharing.

End devices	Intermediary devices
Desktop computer ✓	modem ✓
Smartphone ✓	Internet Cloud ✓
Tablet ✓	Router ✓
Printer	Wireless Router ✓
Printer ✓	Cell tower ✓
Web server ✓	Switch ✓

Outcomes

- * Understand the need for fault tolerant networks
- * Understand the need for scalable networks
- * Understand Quality of Service (QoS)
- * know the importance of security in computer networks

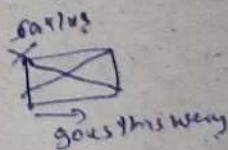
Basic characteristics of networks

- * Fault Tolerance
- * Scalability
- * Quality of service (QoS)
- * security

Fault Tolerance

The ability to:

1. continue working despite failures ✓
2. ensure no loss of service ✓



Scalability

The ability to:

1. grow based on the needs ✓
2. Have good performance after growth

ex: internet

Quality of Service (QoS)

The ability to:

1. set priorities ✓

2. manage data traffic to reduce data loss
delay etc.,

consider scenarios of

① sending an email

② talking over internet

both are at the same time so real time
communication takes the first priority
than email sending.

Security

The ability to prevent:

• Unauthorized access ✓

• misuse ✓

• Forgery ✓

The ability to provide:

• Confidentiality ✓

• Integrity ✓

• Availability ✓

Outcomes

- * know " what is Data Communication? "
- * Understand data flow.
- * Understand the importance of protocols in computer network.
- * know the elements of protocol

Data Communication

- > exchange of data between two nodes via some form of link (transmission media) such as a cable.

Data Flow

- > How data flows from one node to other node.

- * Simplex
- * full duplex.
- * Half duplex.

Simplex

- Communication is always unidirectional.
- One device can transmit and the other device will receive.
- Ex: Keyboards, Traditional monitors

Half duplex

communication is in both directions but not at the same time.

if one device is sending, the other can only receive, and vice versa.

Ex: Walkie-Talkies

Full duplex (or) duplex

communication is in both directions simultaneously

Device can send and receive at the same time

Ex: Telephone line.

Protocols

All communication schemes will have the following things in common:

- source or sender
- Destination or receiver
- channel or media.

Rules or protocols govern all methods of communication

Protocol = Rule

It is a set of rules that govern data communication protocols determine

- * what is communicated?
- * How it is communicated?
- * when it is communicated?

Protocols - Human Communication

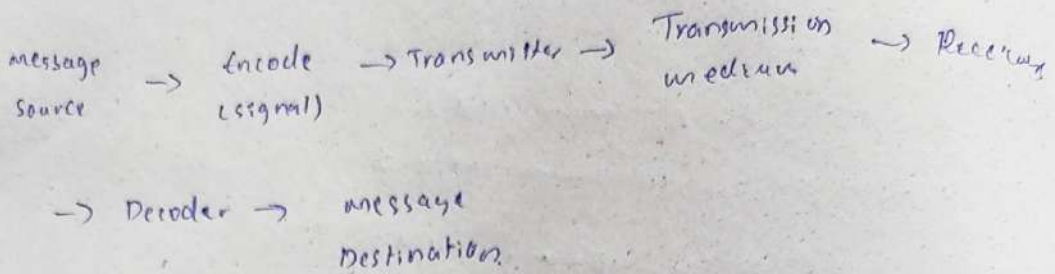
Protocols are necessary for human communication and include:

- * An identified sender or receiver
- * Common language and grammar
- * Speed and timing of delivery
- * Confirmation or acknowledgement requirements

Protocols - network communication

- * message encoding ✓
- * message formatting and encapsulation ✓
- * message timing ✓
- * message size ✓
- * message delivery options ✓

1. message encoding



2) message Formatting and encapsulation

→ Agreed Format

→ encapsulate the information to identify the sender and the receiver rightly

3) message size

> Human break long messages into smaller parts or sentences

> like wise long messages must also be broken into smaller pieces to travel across a network.

4) message Timing

> Flow Control

> Response Timeout

↳ acknowledgement
mechanisms

3) message. Delivery options

* unicast → one sender one receiver

* multicast → one sender and two or more in network but not all

* Broadcast

↳ one sender and sends the data to all in the network