

Five Basic Components of Communication

Protocal
Sender
Medium
Receiver

Protocal

- 1) Simplex \rightarrow one way communication
- 2) Half duplex \rightarrow two mode of communication

Sender and Receiver

- 3) Full duplex \rightarrow Two way communication

2 Point to Point communication

3 Multipoint connection

4 Topology \rightarrow Arrangement of Servers/
networks

$$n(n-1)/2$$

$$10(10-1)/2$$

$$100(100-9)/2$$

$$10 \times 9 / 2$$

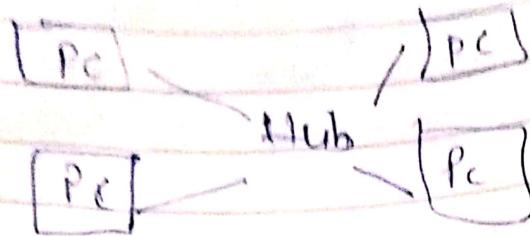
$$45$$

4850

5) Star topology

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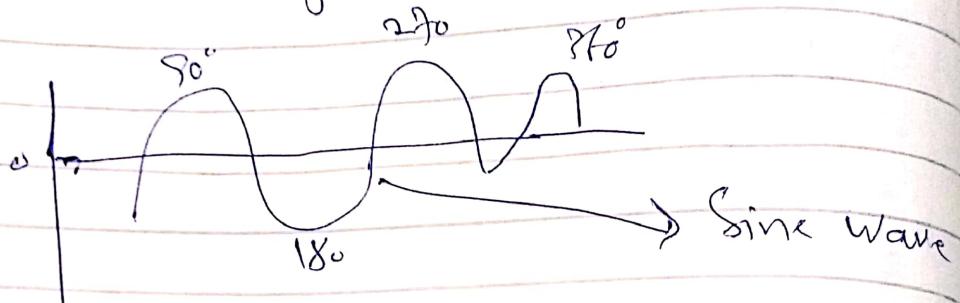
Star topology



⇒ Bus topology

⇒ Ring topology

Periodic Signal



Formula

$$\text{Period} = T = \frac{1}{f}$$

A Periodic Signal

where pattern is not repeating
is called a Aperiodic Signal

1000 hertz

$$T = \frac{1}{1000} = 0.001$$

Piles 10^8
MHz 10^6
Giga 10^9

$$T = \frac{1}{10^8 \text{ Hz}} = 0.0001$$

10^{-6} micro sec

$$T = \frac{1}{20,000} = 0.00005 \text{ sec}$$

50 Mega

$$T = \frac{1}{50,000} = 0.00002 \text{ sec}$$

1 Gigahertz

$$T = \frac{1}{100,000,000,000} = 10^{-12} \text{ sec}$$

50ghz

$$T = \frac{1}{50 \text{ GHz}} = 0.02 \times 10^{-9} \text{ sec}$$

30GHz

$$T = \frac{1}{30 \text{ GHz}} = 30^{-9} \text{ sec}$$

$$0.033 \times 10^{-9}$$

$$\frac{1}{30}$$

Calculating the Frequency

$$F = \frac{1}{T}$$

① $T = 300 \text{ milli Sec}$

$$F = \frac{1}{300 \times 10^{-3}} = 0.003 \times 10^3$$
$$= 0.003 \times 10^3 \text{ Hz}$$

② $T = 500 \text{ milli Sec}$

$$F = \frac{1}{500 \times 10^{-3}}$$

$$= 0.002 \times 10^3$$

③ $T = 200 \text{ nano}$

$$T = \frac{1}{200} = 0.005 \times 10^{-9}$$

④ $T = 220 \text{ micro}$

$$F = \frac{1}{220} = 0.0045 \times 10^{-6}$$

Network

A group of computers connected to each other. It's called Computer network.

Characteristics:-

Resource Sharing
Communication Speed

Backup

Capability

Reliability

Slow or High Sharing

Security

Network Devices to connect a network

HUB, Switch, Bridge, Gateway, Modem
Router, Repeater etc.-

Network Types

① PAN → Personal Area Network

A network that we make to connect our systems with bluetooth wireless speaker etc. --

② LAN → Local Area Network

When a building, a department or office rooms are connected with each other by a network is called LAN

Range > 150 m

③ MAN → Metropolitan Area Network

A collection of local area networks

This purpose of networking we can use to provide networks within a city.
Range → 50 km

④ WAN → Wide Area Network

Collection of LAN and MAN networks is called WAN.

The usage of this networking purpose within countries or all over the world.

Range is not fixed.

Summary

- * PAN is use for Personal usage its Range is [0 to 10 m]
- * LAN is use for a Particular Place e.g building \ department. Range is 150m
- * MAN is use for providing a network to a City. Range is [50 km]

Find TSM Based usage

Industrial Significant Medical
Scientific

Switching Terms

- 1) Switching Nodes
buffer moves data not connected
Data
- 2) Station
End device that wish to communicate
with station connected with switching nodes
- 3) Communication Network
A collection of switching nodes

Techniques used in switched network

- 1) circuit switching
telephone example Point to Point
- 2) packet switching

Phases of circuit switching

- 1) circuit establishment
- 2) information transfer
- 3) circuit disconnect

Characteristics of Circuit Switching

- 1) Can be inefficient
- 2) Once establishment, network is transparent to users.

Common Components of Public Telecommunication Networks

- Subscribers' devices that attach the network
- Subscriber line
- Subscription loop and local loop
- Trunks - branches between exchange

OSI Model

Provide

Application
Presentation

Session

Transport

Network

Data

Physical

TCP/IP

Suite of Protocol

Circuit Switching \rightarrow voice via telephone

Asynchronous Transfer Mode (ATM)

This is a switching technique in this technique supports voice data and video at the same time using cell switching techniques.

one-way — web

two way — voice message

FDDI \rightarrow Fibre distribution Data Interface



optical cable packet 1000 bytes

Ethernet \rightarrow for twisted cable

Serial Port \rightarrow for Routers

Cell size \rightarrow 53 bytes

5 \rightarrow Header

48 \rightarrow Payload

TDM \rightarrow Time Division Multiplexing Technique
Division

BISDN \rightarrow Broadband integrated Services
for digital Networks



UNI → User to Network Interfaces

NNI → Network to Network interfaces

BICI → Broadband inter Carrier interfaces

Syed

UNI → User to Network Interfaces

NNI → Network to Network Interfaces

B1C/I → Broadband Inter Carrier Interfaces

Syif

IP address or Logical Address
is like 32-bit address.

MAC \Rightarrow Media Access Control
this also called Physical Address

IP Address Space of IPv4
 2^{32}
0 to

4,294,967,296

(17)₁₀ D1110101
10010101 11001010

(148)₁₀
 \downarrow
 $(28)^{10}$

96543210
1101010 \Rightarrow (234)₁₀
Ans.

7+6+5+4+3+0+1
7+6+5+4

1000000 0001011 0000000 0000000

① 11101001

② 11111111

100000001
110110111
111111111
101010101
110110111
111111111
100000001

110110111
110110111
110110111

③ → 11101001 → → →

Classful IP Address

A B C D E
level in

Class A - ① = First start from 0 → 10-127

class B	10	First, last 2 stands as 10 128-191
class C	110	First 3 stands as 110 192-223
class D	1110	First 4 stands as 1110 224-239
class E	1111	First 5 as 1111 240-255

Total Range in dotted decimal

① 610001 11110001 11101111 00110011

B9. 1241. 239. 49



Class A

② 11010011 11000001 00000001 11011111

208. 237. 1. 175

Class C

③ 111111 11001100 1 1010110 11011101

255. 201. 174. 205

Class E

④ 1110001 10011001 11101000 00111111

225. 152. 38. 31

Class D

Network and Hostid

Network - Network id

Hostid -
Byte 1
Class A Network and remaining Hostid

Class B 16 byte for network and 16 for Hostid

Class C 24 byte Network and 8 for Hostid

Class D Multicast address 32 byte

Class E 32 byte Reserved for future

73.0.0.0

Network under occupation
Address

Recommended
for paper