

6) \rightarrow Switch + Router \rightarrow Store & Forward.

Lecture #02

• ARP & RARP =

(Address Resolution Protocol) | (Reverse Address Resolution Protocol)

\Rightarrow Switches work on ARP & RARP.

ARP =

\Rightarrow Initially IP is available but MAC is reqd to communicate in LAN for it ARP request is required.

RARP =

\Rightarrow For discovering IP when MAC is known from client side.

Packet-Switching : (Forward chunks/packets).

\Rightarrow Works on both Datalink & Network layers.

• Communication link

\Rightarrow Data transmission b/w devices in a Network.
ii) Twisted pair cable.

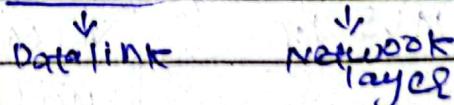
iii) Coaxial cable \rightarrow 1 extra layer

iv) Fibre optic \rightarrow more than 4 extra layer.

Switch 7000 :

works as both :-

Switch + Router



• Bandwidth = Transmission rate.

• Transmission rate \uparrow = loss \oplus \uparrow

\rightarrow "No. of bits transferred per second."

Layer with Examples :-

1) Physical Layer : (MAC address)

wifi, ethernet, LAN.

1) Physical Layer : (Etheonet, WiFi(802.11))

⇒ Actual Physical Medium & Signals.

e.g :-

- 1) Hubs
- 2) NICs

2) Data-Link : (MAC)

⇒ WiFi, ethernet, LAN

3) Network : (IP)

⇒ Router.

4) Transport : (end-to-end communication) (TCP), (UDP).

⇒ Protocols like TCP & UDP operate on this.

5) Session Layer : (TLS)

⇒ session establishment, maintenance.

6) Presentation Layer : (ASCII, JPEG)

⇒ Data encryption, translation, compression

e.g.: SSL/TLS, M3U8, MP3, ZIP, GZIP.

7) Application Layer

HTTP, FTP,

8) ISP (internet service provider).

⇒ User-interfaces, software, application.

• RFC = "Request for comments."

⇒ Series of documents of standard made

by IETF (internet engineer task force).

⇒ These are protocols & procedures & standards that are to be maintained.

⇒ Transport layer → TCP → Session layer.

• Network edge = (Host devices)

⇒ "Boundary b/w LAN & WAN".

⇒ It is the point where devices within network connect to the external devices.

Eg :-

1) Smart phones 2) Computers

3) Firewalls.

Responsibility of ISP

• Network Core = (interconnected routers)

⇒ Central part of Network

⇒ Refered as high Speed Routing and Transmission

⇒ Data is transmitted at very fast speed with minimum processing.

9)
(connection of end devices to edge routers) → Access networks.

e.g = Routers

Q: If we don't receive any response by sending ping req?

- 1) Call an ISP administrator or
- 2) Access the Router Remotely

Network Come

Wireless LAN

⇒ Within building
⇒ Like WiFi

⇒ LAN used to connect area
Small / personal devices.

WiFi

• 802.11 b/g/n, 54 Mbps, 450

Wide Area Networking access

⇒ wider Geographical area

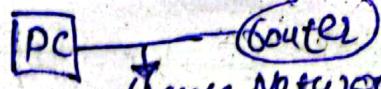
⇒ connect multiple

LAN

⇒ Transmission is microwave & transmits in a line

⇒ 10, Mbps

⇒ 3G / 4G

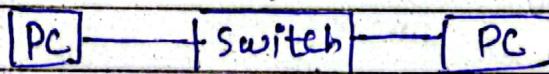
• Access Network = 
 connects the host & the router.
 ⇒ can be shared/dedicated path.

Packet transmission = $\frac{\text{No. of Bits (L)}}{\text{Transmission rate (R)}}$

Now, cables :-

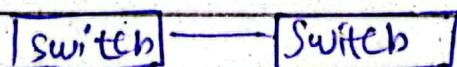
1) Straight - throw cables :-

"To connect different devices."



2) Cross - throw cable =

"To connect same devices."



⇒ Components of communication =

- 1) Sender
- 3) Data
- 5) Protocol.
- 2) Receiver
- 4) Medium

• Models of communication:

1) Simplex = "Signal is send in one direction."
 e.g. Radio signals.

2) Half-duplex = "Both direction but at a time."

e.g. Satellite signals.

ii)

3) Full duplex =

Both direction at same time

e.g: messaging

⇒ Physical Link (Between Transmitter & Receiver).

i) Guided

ii) UnGuided media :

⇒ Signal propagate
in a solid
media e.g: copper,
fiber, coax.

⇒ Signal propagate freely.
e.g :- Radio Waves.
⇒ Wireless.

Physical Media:

i) wireless radio : Radio-link types

- | | |
|----------------------------------|------------------------------|
| 1) Electromagnetic Spectrum | 1) Microwave (45 MbPS) |
| 2) Broadcast & no physical wire. | 2) Wireless LAN (100 MbPS) |
| 3) Half-duplex. | 3) Wide - area (4G, 10 MbPS) |
| | 4) Satellite (45 MbPS) |

⇒ Wired

TP

Coaxial
cable

Fiber optic
cable

1) 2 insulated
copper wires.

2)

Category 5 :

100. MbPS

1. Gbps (ethernet)

Category 6 :

10. Gbps.

1) concentric copper
wire.

2) Bi-directional.

3) Broad band.

100. MbPS.

1) Glass fiber carrying
light pulses.

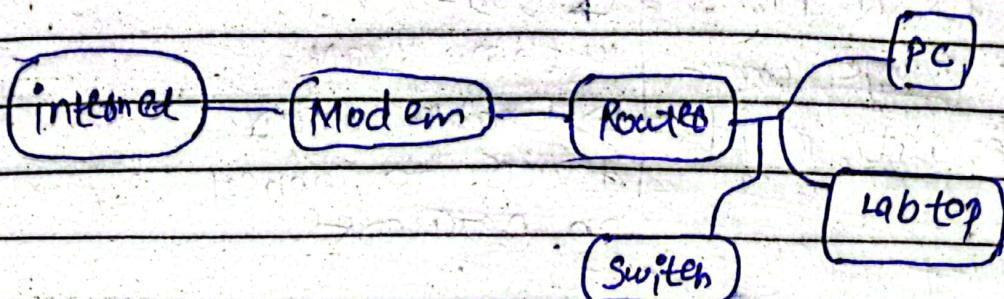
2) 10-100. Gbps.

Lab LAB: 01

Ethernet cables:

"Used to share information with each other."

Home Network:



- Ping google.com → to get the reply
- traceroute google.com → to check the path

1) Physical cable =

Plug on a ethernet cable,

2) Domain Name System

- Convert a certain name into an IP and convert into internet traffic.

google.com → 192.168.1.1

Characteristics of a Network:

1) Topology :

i) Physical :

"How a network is formed."

⇒ Arrangement = interconnected.

1. by $R = 8 \text{ bits}$

13)

ii) Logical :

"Network device" → "Network user."
appears.

• Speed =

"Measure of data-rate."

1) In sharing

2) Security.

3) Availability : "When to use it is there"

$$\% \text{ Availability} = \frac{\text{(No. of min in a year)} - \text{(down time)}}{\text{(no. of min in year)}} \times 100$$

f) Scalability =

"Make network in mind for growing."

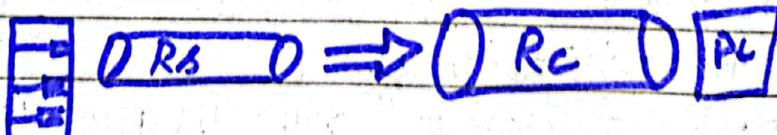
⇒ Adjust more user.

5) Reliability = (MTBF)

(Mean-time before failure).

• Throughput :

$R_s < R_c$: More Transmission, than receiving.



$R_s > R_c$ (Received date > transmission).

⇒ Buffer get stored,

⇒ Bottleneck.