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CHAPTER 1

Network Edge: hosts, access network, physical media (wire)

~~Core: packet/network switching~~

Packets: Data internet pe aik saath nhi jata small chunks mai divide ho k jata hai, each small chunk is called a packet.

Communication Link: fiber, optic, wireless etc

Protocol: Rules for sharing data over a network
FTP, HTTP, HTTPS etc

Network Core: Interconnected routers/network of networks

FDM: (Frequency Division Multiplexing) ?
Different channels transmitted in different frequency bands like cable TV.

Access Network:

- i) Cable Based Access (like connect)
- ii) Digital Subscriber Line (DSL) (like PTCL)
- iii) Home Network (local network)
- iv) Enterprise Network
- v) Data Center Network

Dated:

Packet Transmission Delay = L/R

where L is data size & R is bandwidth/transmission rate

Guided Media: Signal travel through solid media (wires)

Unguided Media: Signals travel freely (wireless)

Twisted pair: → Two insulated copper wires

Category 5: 100 Mbps Ethernet | Category 6: 10 Gbps

Coaxial Cable:

→ Bidirectional

→ Broadband

→ Multiple frequency channels

→ 100 Mbps per channel

→ two concentric copper conductors

Fiber Optic: → glass fiber carrying light pulses

→ high speed transmission (10-100 Gbps)

→ low error rate (reduced noise)

Wireless radio link Types

→ Wireless LAN (10-100 Mbps)

→ Wide-area (4G cellular) (10 Mbps)

→ Bluetooth

→ Satellite

Dated:

'Network Model'

- i) Application \rightarrow Message
- ii) Transport \rightarrow Segment
- iii) Network \rightarrow Packet / Datagram
- iv) Data Link \rightarrow Bits (Frames)
- v) ~~Topology~~^{Physical} \rightarrow Topology

OSI Model (Open System Interconnected)

OSI Model further broke down the application layer into three layers.

- i) Application
- ii) Session
- iii) Presentation
- iv) Transport
- v) Network
- vi) Data Link
- vii) Physical

PDU = Packet Datagram Unit

Dated:

Router \rightarrow Used to connect two or more networks

Packet Size = L/R

$L \rightarrow$ Number of bits

$R \rightarrow$ Bandwidth

Routing: Finding the path that data needs to take to reach its end point.

Forwarding: Sending data or the actual movement of data from source to destination is forwarding.

Queuing \rightarrow Agar router pe data bahut ziada a raha hai lekin output link slow hai to jo data a raha hota hai usko buffer mai queue mai daal dete aur agar data buffer full hai to packet loss ho jaty.

Circuit Switching mai resources share nhi hoti. Aik path allocate ho gya to jab tk wo apna kaam khtm nhi karega, wo share to link/circuit sh. koi aur use nhi kr sakta.

Packet Switching mai resources share hoti hain

Dated:

IXP \rightarrow Internet Exchange point

ISP connects to "regional ISP", and those regional ISPs are connected to IXP

$$\text{Propagation delay} = \frac{\text{length of physical link}}{\text{propagation speed}} = \frac{d}{s}$$

traceroute \rightarrow provides delay measurement from source to routes

Throughput \rightarrow How much data can be transferred from source to destination in a given time frame

Bandwidth \rightarrow Max amount of data which can be sent ~~at any~~ through a link

Packet Sniffing \rightarrow Data PC "A" ne "B" ko send kia hai, beech mai se "C" se access kr leta hai.

IP Spoofing \rightarrow C data send krta hai A ko B ban k. Mtlb k C apna naam B rakh leta hai aur A ko lagta hai k B se data a raha hai jab k C se a raha hota hai

Dated:

Denial of Service (DoS) → Aik server at a time 10 users handle kr sakta hai to uspy 100 users ka traffic send kr k server down krdo to jo legitimate user hai usko service nhi milegi.

Line of Defense:

- i) Authentication
- ii) Confidentiality (by encryption)
- iii) Integrity Checks
- iv) Access restriction (passwords)
- v) Firewalls

Network Layer revisited

- i) Application → Supporting networking applications
→ HTTP, DNS etc
- ii) Transport → process data transfer
→ TCP, UDP
- iii) Network → Routing of datagrams from source to dest
- iv) Link → Data transfer b/w neighbouring network elements (like on Ethernet, wifi etc)
- v) Physical → Bits "on the wire"
- vi) * Network layer ends here the other two are part of OSI Model

Dated:

- vi) Presentation → Allow applications to interpret meaning of data eg., encryption etc
- vii) Session → Synchronization, checkpointing

"CHAPTER 2"