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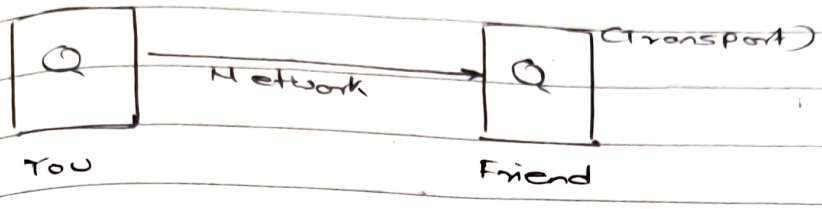
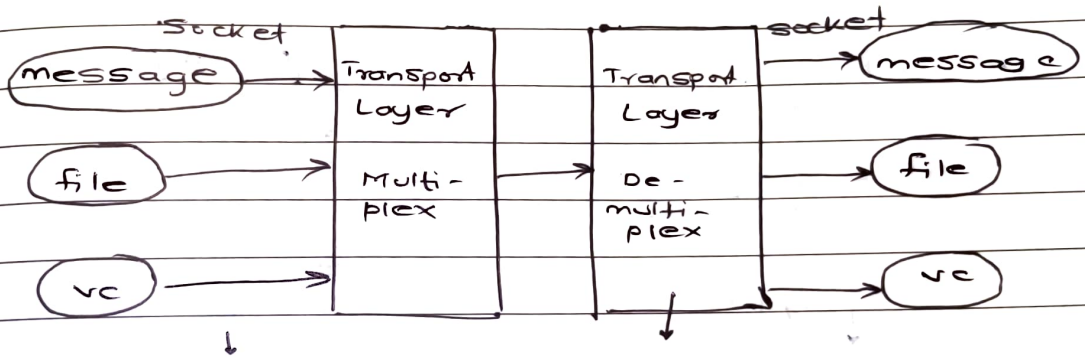
Transport Layer :



- within PC, transportation of data from network to application is done by transport layer
- Network layer deal with delivering message from 1 PC to another.

Protocols :

- TCP
- UDP



Data travels in packets → Transport Layer will attach these socket port numbers.

- Transport Layer takes care of conjestion control.
- It uses few algorithms built in TCP

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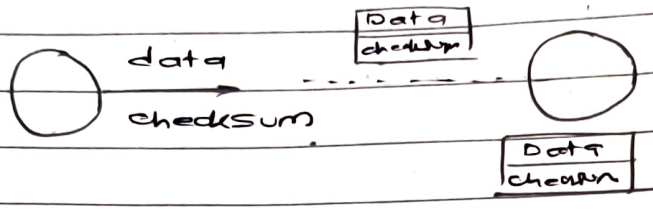
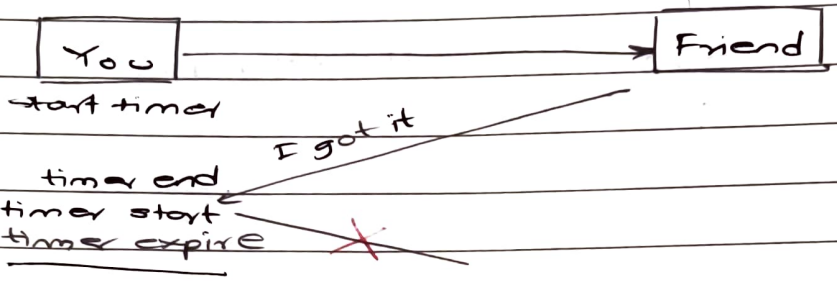
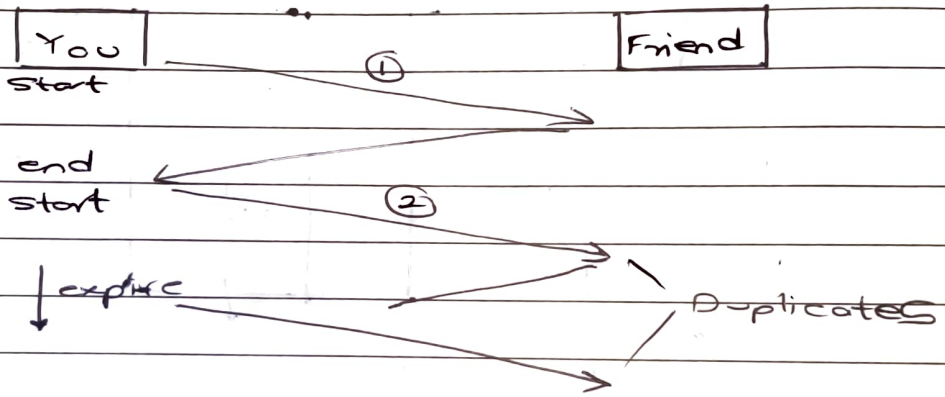
- Checksum : (A number)



- Timers (Retransmission timer)

* 

* 

Solve this using sequence numbers

- UDP

→ Data may / may not be delivered

→ Data may change

→ Data may not be in order

It is a connectionless protocol

→ It uses checksum, checks but doesn't correct it.

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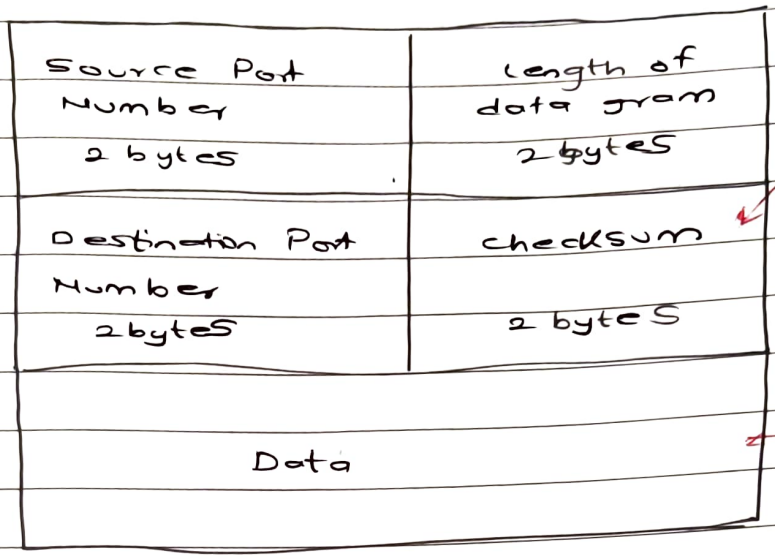
UDP Packet:

→ Total Size = 2^{16}



Use Cases --> It is fast

→ video App, Gaming, DNS

* tcpdump -c 5

• TCP (Transmission Control Protocol)

→ App layer sends lot of raw data, TCP segments this data → divide in chunks.

→ Conjestion Control

→ Collects data

→ Takes care of 2 things:

↳ when data doesn't arrive

↳ maintains order of data

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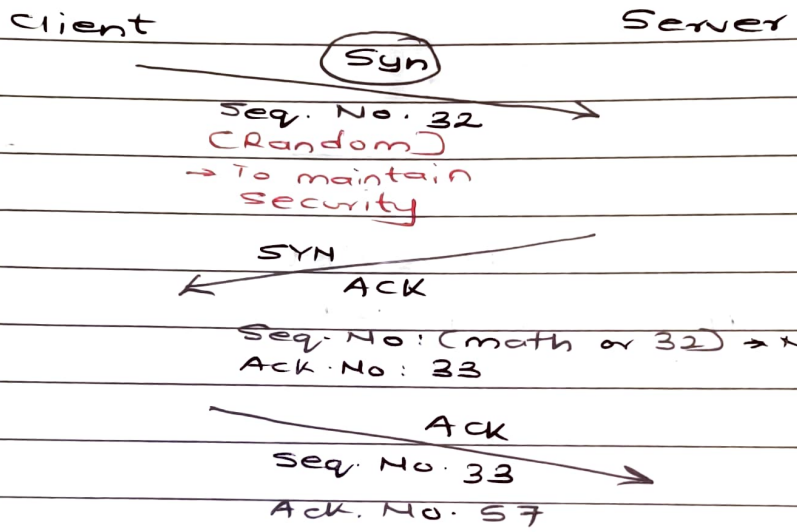
- Features:
  - → Connection oriented
  - → Error & Conjestion Control
  - → Full Duplex

- 3-way handshake:



- Reset & Finish Flags

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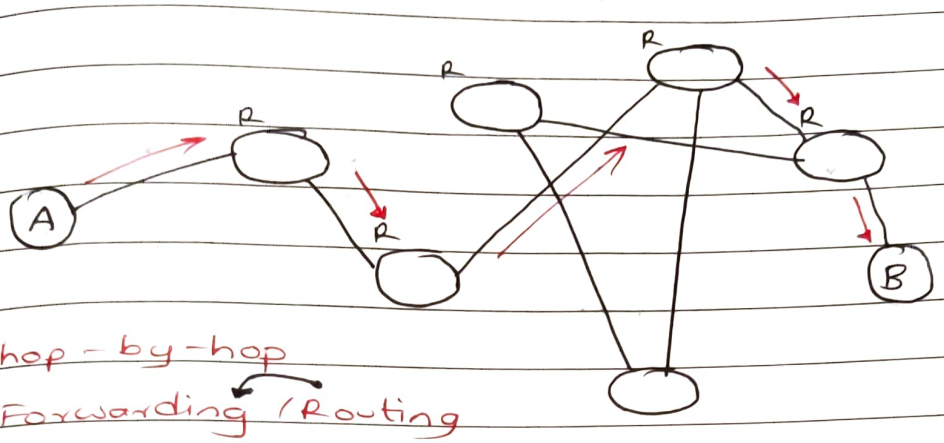
3] Network Layer :

→ Here we work with the routers.

Transport → Segments
Network → Packets
Data Link → Frames



- hop - by - hop
- Forwarding / Routing

Tables are inside router

192.168.2.30

Network Address → Subnet ID
Device Address → Host ID

- Control Plane - Creates forwarding table

↳ Routers → Nodes
Links → Edges

① Static Routing - Do manually

② Dynamic Routing - Evolves

Bellman Ford

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- IP (Internet Protocol)

IPv4 → 32 bit, 4-words

IPv6 → 128 bits

class A	class B	class C	class D	class E
↓	↓	↓	↓	↓
0.0.0.0	128.	192	224	240
till	till	till	till	till
127.255.	191	223	239	255

- Subnet masking

- IETF (Internet Enginesring Task force)

→ Assigns IP to ISPs

Resewed Addresses:

127.0.0.0./8

eg. Localhost : 127.0.0.1

Loopback Addresses

- Packets

→ Header is 20 bytes

→ TTL (time to live)

IPv4: $2^{32} \approx 4.3$ billion

- IPv6: $2^{32 \times 4} = 2^{128} \simeq 3.4 \times 10^{38}$

Cons → Not backward compatible

world not shifted, lot of hardware work

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Middleboxes:

→ Extra devices that interact with IP packets

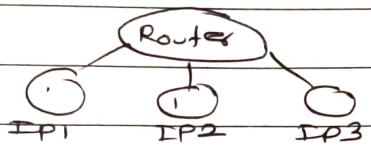
① Firewall

• NAT

• Data Link Layer

→ Transports data between connected devices

DHCP



New Device → DHCP Server