Seg5 Transport Layer

Design Issue of TL

It is a critical part of the OSI & TCP/IP models ensuring reliable data transfer between system over a network.

Key design Issue

Reliability: Ensure data delivered correctly without duplication

Sol^n → retransmission, error correction

Flow Control: prevents receiver buffer overflow due to fast sender transmission.

Sol^n → Sliding window mechanism.

Error detection & Correction: Detect & Correct data Loss.

Sol^n → checksums, data retransmission

Congestion Control: Manage network congestion to prevent overload

Sl^n → use TCP AlgoRithm, fast retransmist.

Transport Layer Services

- Transport layer is 4th layer in OSI model. It responsible for end to end data Communication and data transfer between devices over network

- End to end Communication.
- Segmentation. • flow control. • error detection & correction
- Congestion control • Relibility for TCP

Primitives for transport Service

Primitives	Packet	Mean.
Listen →	(none) →	Block untill some process tries to connect.
Connect →	Connection req →	Actively attempt to establish a connetion.
Send →	Data →	Send information
Receive →	none →	Block untill data packets arrive.
Disconnect →	Disconnect Req →	Request a release of the Connection.

Connection oriented Transport Layer Service &
connectionLess " " " Difference .

Connection less (UDP)	Connection oriented (TCP)
•Send data without connection	• Requires dedicated connection before data transfer.
• No setup required send directly	• Requires handshake connection setup
No error Correction	Error detec & Correction
faster and less overhead	Slower bec overhead
use in real time application streaming , DNS	, used in sensitive data (eg- file transfer, Email
Examples U DP (user data gram protocol	Example TCP.

UDP (user datagram protocol)

It is a Connectionless transport Layer protocol the provides fast, lightweight communication without generating reliability or error correction

SH 7 8 16 32 bit 16 — 23 — 24 — — 31

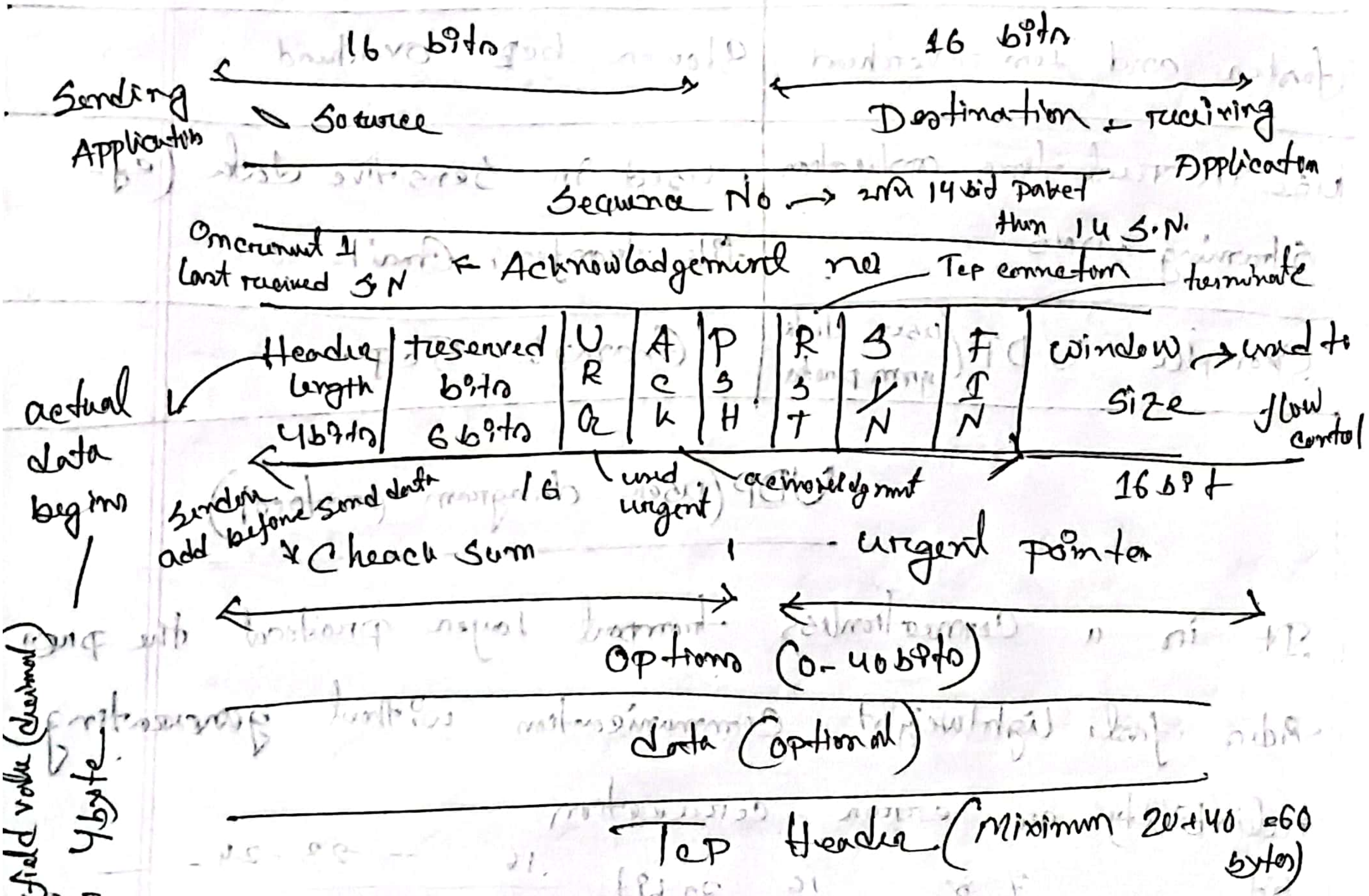
0	Source port	Destination port
32	Length	Data Checksum.

UDP Header format

Tcp (Transport Control protocol)

It is a Connection oriented reliable transport Layer protocol that ensure data is diliverud accurately in proper order

Tcp works with (IP). Defines how Computer send packets of data each other



Tcp Header (Mixinmum 20+40 =60 bytes)

- Tcp header more fields than UDP bcz its connection oriented. Its provids more info to be exchanged between endpoints in publish & maintain connection.

~~Elements of Transport protocol~~

• ~~port addressing~~:

Sp22 (4) Describe TCP & UDP headers field.

Sorce port (16) → Identify Sending Application.

Destinition port (16) → " receving "

Sequence Namber (32) → Track order of Data Segment

Ack " (32) → Ack the receipt of " "

Header length (4) → actual data begins

reserved bit (6) → reserved for future use

URG bit (1) → treat certain data on urgent basis

ACK bit (1) → weather Ack no is valid or not

RST bit (1) → reset TCP Connection.

FIN bit (1) → terminate " "

window size (16) → size of receiving window of the sender

Checksum (16) → ensure integrity of header data.

urgent pointer (16) → indicates start of urgent data.

options → provide additional info about TCP Connection.

elements of transport protocol

# port addressing : Transport Layer use port no to identify specific application (TASP) on a device for communication. Each station has one transport entity and port no ensure the correct upper layer protocol.

Connection establishment

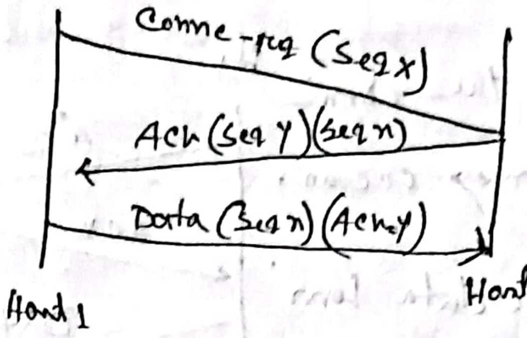
Tcp uses 3 way handshake to establish reliable connection.

Normal Connection Setup :

① host 1 sends Connection req with Sequence x no to Host 2

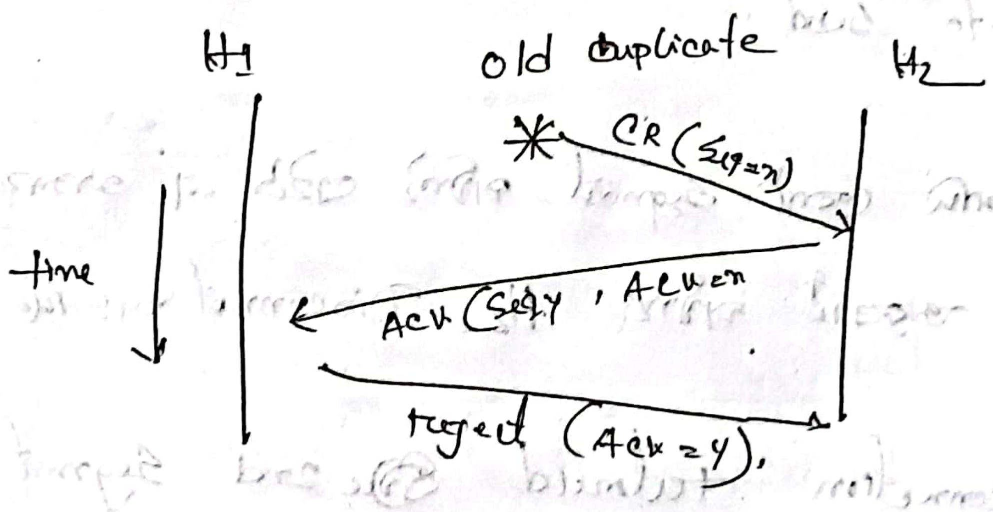
② Host 2 replies with Ack x and ~~seq~~ send its own sequence no y.

③ Host 1 Ack y with Ack and st sending data.



If delayed duplicate Connetion request arrive Host 2. without host 1 knowLedge.

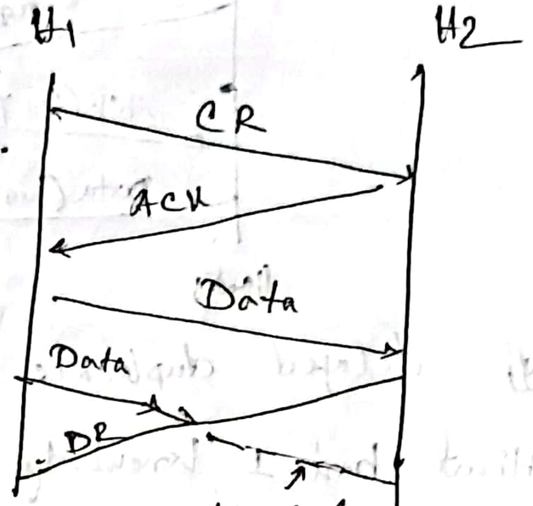
- H2 sends an Ack to H1 for verification.
- H1 rejects invalid request
- H2 Cancel the Connetion.
- process ensure delayed duplicate Causes no harm



Connection Release

(i) If 1 host release the connection data loss may occour.

(*) one disconnect occur data loss



No data are delivered after a disconnect req

(*) Connection release is the process of terminating a communication link between 2 devices after data transfer is compleate.

→ Host sends with the FIN bit, indicate no more data send.

H1 যদি একটি segment পাঠিয়ে দেওয়ার না আবার.
আরো একটি পাঠিয়ে H2 Disconnect এবং সেটা

So connection released ~~[illegible]~~e 2nd segment lost -