Transport Layer (L4)

Transport Layer acts like an intermediary between the application layer and the IP layer. For example, it needs to forward the data in packets to the correct application. This process is known as De-multiplexing. To do this, each application is assigned a port number.

* User Datagram Protocol (UDP) does exactly this, nothing more.

However, we might have a few problems if a large file transfer is being done. The data is divided into segments of size ~1500 Bytes.

Prob # 1) Segments may be lost

#2) Due to change in path, the segments arrive out of order

* Transmission Control Protocol (TCP)

TCP solves the following problems :-

1. Reliable transfer by retransmitting lost segments
2. Re-order segments
3. Congestion Control
4. Flow Control

TCP also allows bi-directional transfer of data.

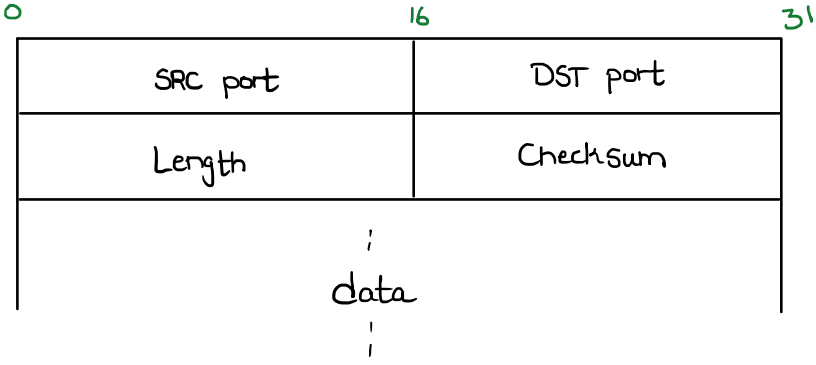
* L4 routers use "drop-tail" mechanism, that is, if the buffer is full then newly received packets are dropped. We say that the router is congested when this occurs. TCP solves this by reducing the input rate, freeing up the queue.

* Flow Control is just congestion control for the destination. As bi-directional communication is possible, DST tells SRC to reduce the data rate.

* Header Structure

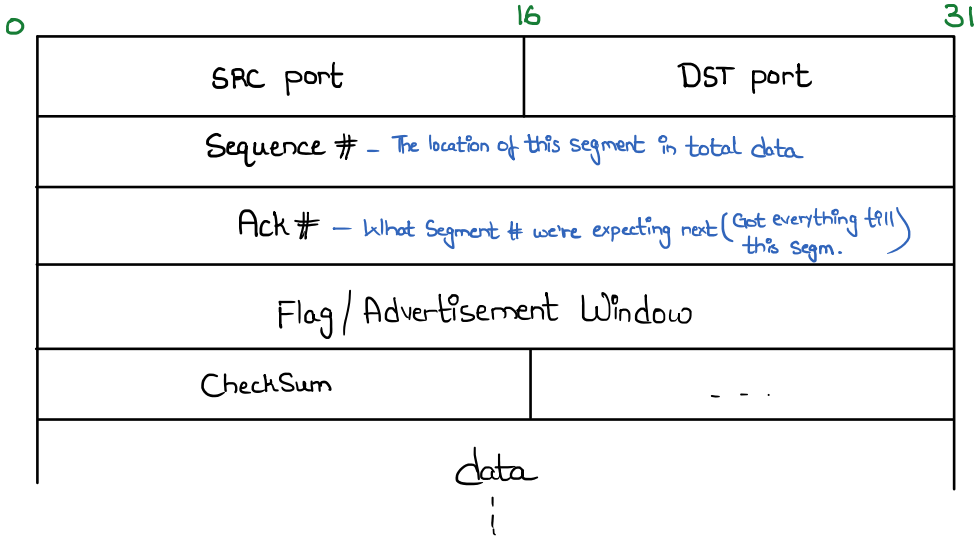
1. UDP header

8 Bytes long



2. TCP Header

20 Bytes long!



- Flags :- SYN / FIN / RESET / PUSH / URG / ACK

Start of connection — End of connection — Reset connection (Prone to attacks) — ACK is present in header

Represented by either a 0 or 1.

For example, a RESET flag is rep. as 001000.

* The Protocol Field at IP layer tells us whether TCP/UDP is used.

6 - TCP 17 - UDP