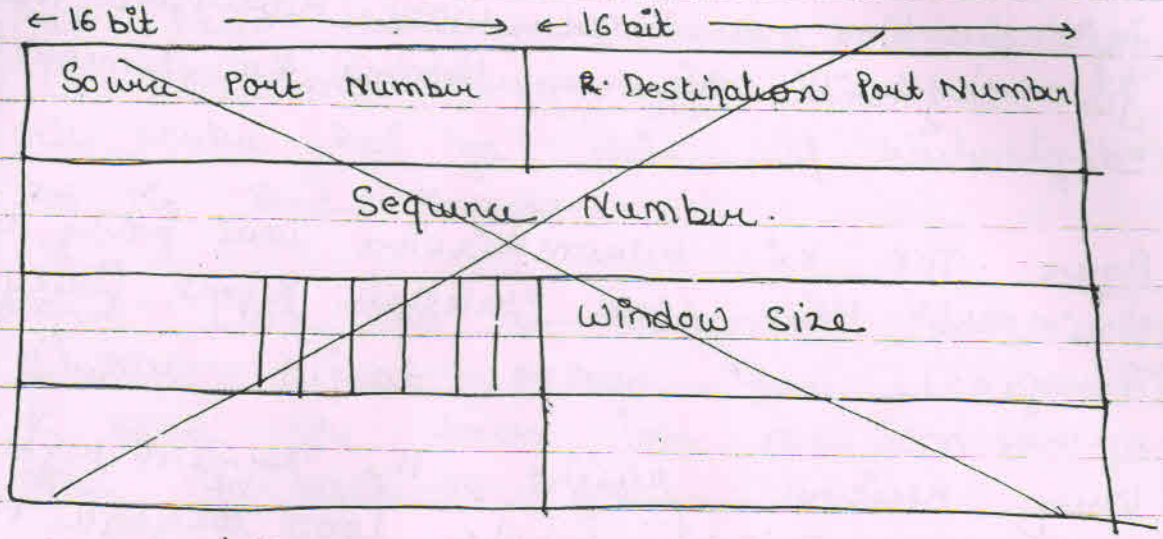
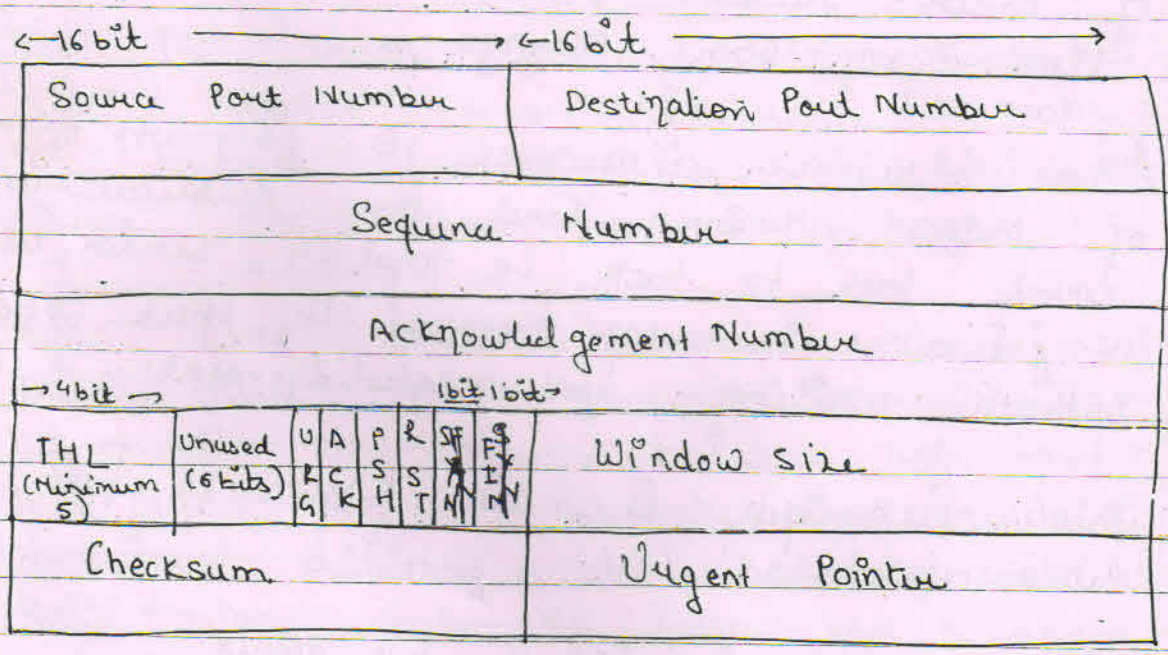
4 → TCP- Header format :→





- First 16 bit for source Port number of application and next 16 bit for destination Port number.
- Maximum port number of port is $2^{16}-1$ and minimum = 0.
- Suppose apko port number ko assign karna

hai Kisi networking based application Ko aur port number 60 jaha se Kisi aur application Ko assign hai ton TCP will reject that port number request.

- Port number below 1500, reserved for standard public application. For example http, Ftp, Smtp Dns etc.

- Then next 32 bit for sequence number mean, largest sequence number is $2^{32}-1$ after $2^{32}-1$, wapas se counting start hoga. Kisi random number se, lowest se highest aur highest se lowest Ko hum wrap around kahate hai.

- Next 32 bit for Acknowledgement number. Acknowledgement number may contain ack, may not contain acknowledgement.

- After Acknowledgement next 4 bit for THL (TCP Header length)

- Minimum value of THL = 5
  below THL value = 5 shows error.

- Original/actual TCP Header = 4 * THL value.

- Then last se (right hand side se)

FIN	PSH	control bits
SYN	ACK	
RST	URG	

URG :→ (Urgent bit)

- If Urg bit is 1, it shows that this segment carries most urgent data.
- Generally TCP data ki order delivery karta hai but agar urgent bit one hai kisi segment ki toh woh wait nahi karega ordering hone ki jaisehi aaya waisehi application layer ko dedega.

ACK bit :-

ACK bit = 1 shows this segment carries acknowledgement and ACK = 0 shows this segment carries no acknowledgement.

PSH (Push)

Push bit = 1 ⇒ don't buffer it immediately summit to application layer.

Ques:- What is the difference between PSH bit & URG bit ??

Ans:- Push mein jasehi ordering hui wasehi application layer ko deliver kar dega but urgent mein ordering hona ka bhi wait nahi karega.

- Then next 16 bit for window size if it is receiver the only window size is then

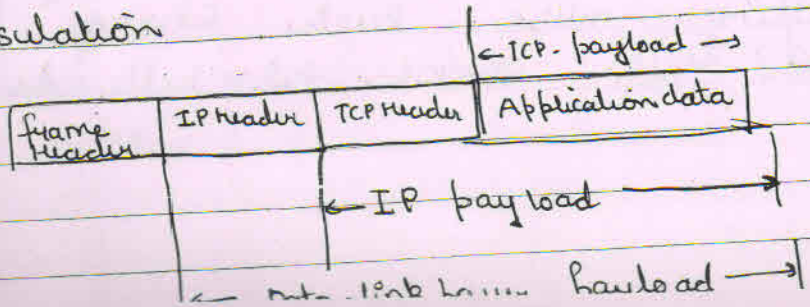
Sender ki kahi window size nahi hoti

- Receiver advertise its window size.
- Next 16 bit for checksum not only for Header but for whole segment data.
- Checksum ultimate host aur ultimate destination par check hota hai aur compute hota hai.
- Next 16 bit for urgent pointer :-

Urgent pointer points to urgent data, it repre-sent the end of the urgent data.

- It points ki is segment mein urgent data kaha end ho raha hai.
- Agar URG bit set hai tabhi urgent pointer field valid hai otherwise it is not valid.
- Yeh six field (bit), SYN, FIN, RST, URG, PUSH, ACK enables flow control, connection establishment and termination, connection absortion and mode of data transfer in TCP.

Encapsulation



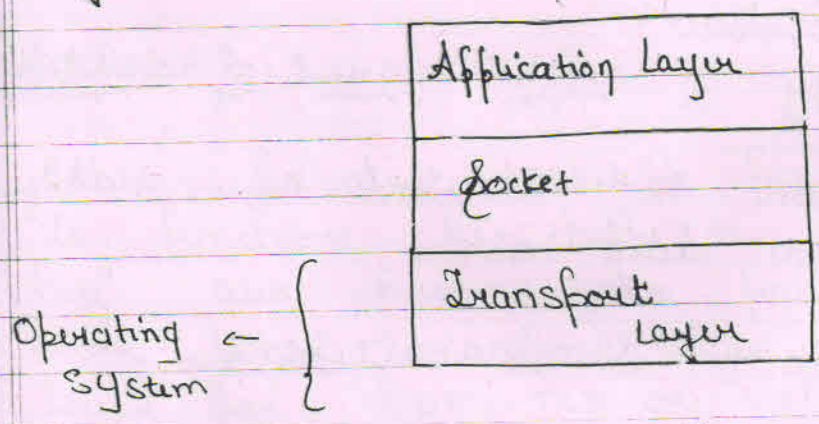
SOCKET PROGRAMMING

- Socket is defined as port number plus ip address.
- Socket is cover over the ports matlab jab bhi ports se data lena hai ya dena hai toh aap socket ka use karogey.
- Agar application layer se data apko transport layer ko dena hai toh aap yeh transfer karne k liye socket ka use karogey. Aur transport Layer se application layer ko dena hai tab bhi.
- Matlab hum yeh kaha sakte hai ki socket is the intermediate between application layer and transport layer.
- Electrical sockets hote hai uske ander wire hote hai agar aapko fan ki speed fast ya slow karna hai toh aap wire mein kuch change nahi karte ho but socket ki help se change karsakte ho.
- Same logic applicable here agar apko port ki setting mein kuch change karna hai toh woh aap socket ki help se karsakte ho.

- In simple language sockets are API's (Application program interface).

* Socket are nothing but a function. Socket are the end point of communication.

- Transport Layer par data aayega, transport layer ne ek socket create karliya, us socket ki help se transport layer ne data application layer ko forward kar diya.

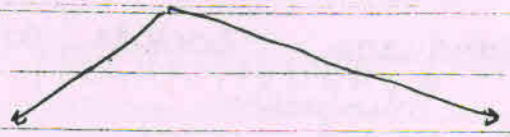


Layout of Socket position.

- TCP is connection oriented protocol so first task is to establish connection to kya hum randomly kisi bhi system ko connection ki request send kar sakte hai ya nahi??

Ans→ Randomly hum kisi bhi system par data transmission start nahi karsakte.

- Network mein two types ki application hoti hai



Client Application Server Application

- Client Application :→
Yeh hamesa ready nahi hota hai jab connection ki requirement hogi toh yeh application connection ki request send karegi server ko. Therefore it is called Active open.

- Server Application :→
Always ready to accept request of connection.

- So connection ko establish karne k liye client initiation leta hai.

Ques:→ How to create Server Application:-

Ans:-

Jis client ko connection ki request bhejni hai use server ka ip-address aur us server par running application ka port number pata hona chahiye.

- Uske liye port number aur ip address of server is well known hona chahiye.

- Now we are discussing some function of C which are used to establish connection (we are having parameter of these function)

Creation of Server based Application:

→ Flow :→

SOCKET ();
BIND ();
LISTEN ();
ACCEPT ();
Send/ recieve
close();

Socket () :→

→ Sabse pahale socket() function call hota hai, is function ki help se socket create hota hai aur hum yaha par specify karte hai hum konsi transport layer use karenge, transport layer par, UDP, TCP or SNTP etc).

- By using this function we specify protocol family : (IP K protocol bhi specify karte hai)

BIND () :→

- Is function ki help se hum, server aapne application k liye port number reserve karta hai.
- It will regenerate an error if jo port number generate hua hai woh already reserved by some other application.
- This function will return -1 if any error come during in this function.

3] LISTEN ():→ It is called only by TCP servers.

Listen se hum queue maintain karte hai. Matlab atmost kitani request server handle karsakta hai at a time.

4] ACCEPT:→

→ Yaha par aa kar ruk jayega. It is a blocking command.

→ Aur jab tak rukha rahaiga jab tak connection ki request nahi aajati.

5] → Send | Recieve :→
For sending and recieving data.

6] Close ():- Connection terminate
Above server accept only one request agar 2 request accept karani ho toh aapka accept() ko while ka part banana pauga.

Creation of Client Application:→

```
Socket()
Connect()
While(1)
 { Send/Recieve
 }
Close()
```

Connect() se hum connection ki request send karte hai server ko. Is packet mein hum source port no. and source ip address bhi send karte hai so that server hamse communicate kar sake.

- Connect() kab error generate karta hai ya toh server exist nahi karta ho ya fir server ready na ho request handle karne k liye.

Ques:- Client toh bind execute karta hai hi nahi hai, toh client ka kohi port no nahi hota hai kya??

Ans:- Port number to the client is assigned randomly by TCP.

- Server application bind() tak execute hua aur client ne connect ki request send kar di toh is case mein connect() will result in error.

- But agar server application listen() execute karra hai aur client ki connect ki request aagayi toh connect will be blocked for some time.

~~Error~~ :

- A server program is infinite program because usse request accept karne hai aur client program is finite program because usse kuch processing karke terminate hona hi hai.