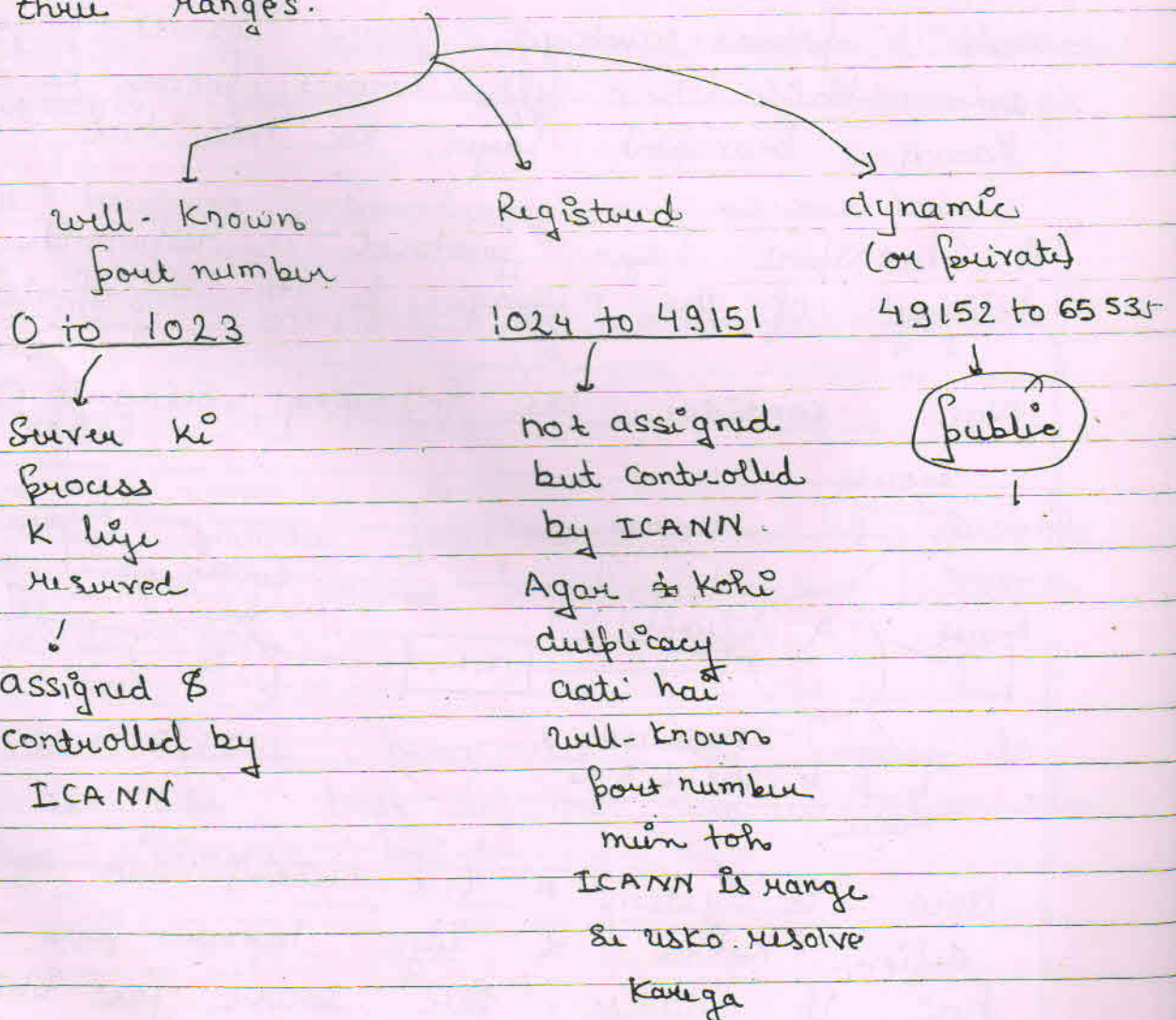saare process run horahai hai toh joh message recieve hua hai woh kisko dena hai, usko bhi number dena parega, matlab processes ki numbering karne paregi.

- To resolve this problem hum har process ko port number assign karte hai

- In TCP/IP, port number is of 16 bit long i·e port number varies from 0 to 65535.

- ICANN has divided the port number in three ranges.

| well-known port number | Registered | dynamic (or private) |
|---|---|---|
| 0 to 1023 | 1024 to 49151 | 49152 to 65535 |

well-known
port number
0 to 1023
↓
Surver ki
process
K liye
reserved
↓
assigned &
controlled by
ICANN

Registered
1024 to 49151
↓
not assigned
but controlled
by ICANN.
Agar to kohi
dulplicacy
aati hai
well-known
port number
mein toh
ICANN is range
se usko resolve
karega

dynamic
(or private)
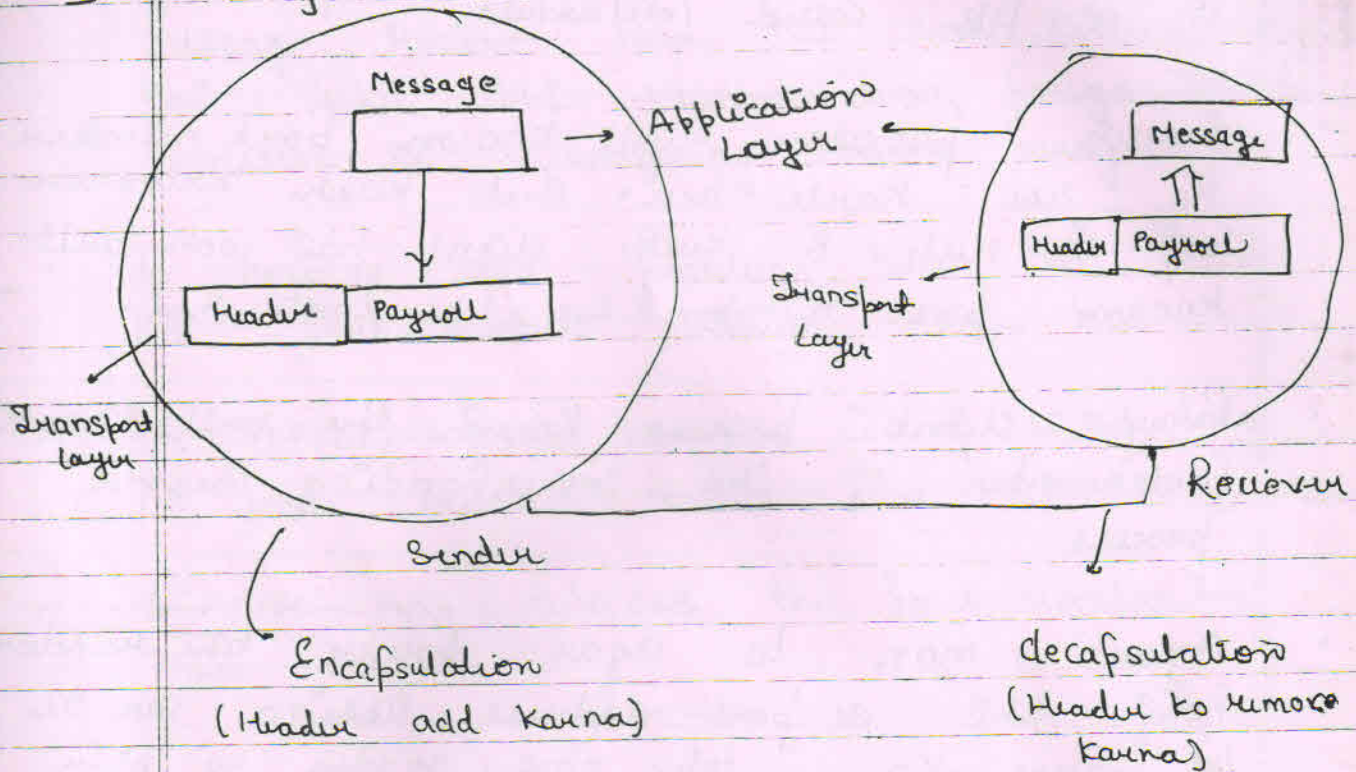49152 to 65535
↓
(public)

- In UNIX the well known ports number are stored in a file called /etc/services

- Server process, well known port number ka use karte hai. But kuch exception hai is rule k kuch client hai woh well-known port number ka use karte hai.

- Every client process known the well-known port number of the corresponding server process.

- Agar man lo agar server bhi randomly kohi bhi a port address assign kar de let process ko, toh now sender ko phir sabse pahale kuch special packet send karna parega, usse port number milega server ki us process ka jisse aapko communicate karna hai.

- But this create overhead. Toh is overhead ko remove karne k liye TCP/IP ne decide kiya universal port number ka concept called well-known port number.
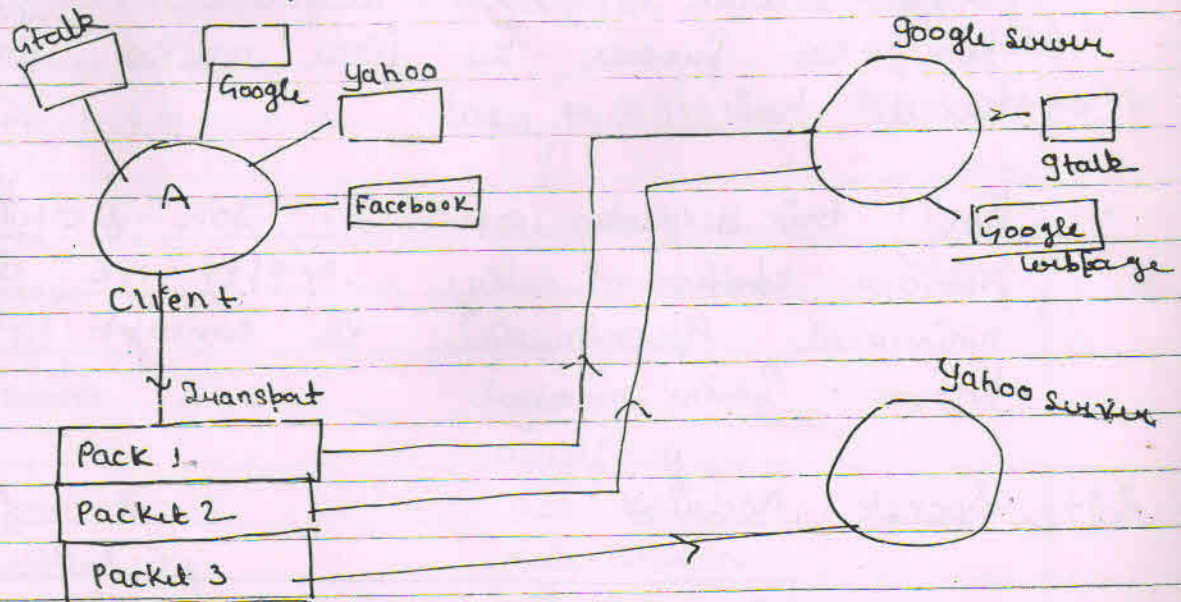
2.] → Socket Address :-

| Port Number + IP address = Socket Address |

## 3] Encapsulation and decapsulation :→



Sender

Encapsulation
(Header add Karna)

Receiver

decapsulation
(Header ko remove Karna)

## 4] Multiflexing and demultiplexing :-



Gtalk  Google  Yahoo

A

Facebook

Client

Transport

Pack 1
Packet 2
Packet 3

Google server

Gtalk

Google
webpage

Yahoo server

Suppose client xc / google

Sender end par multiplexing aur reciever end par demultiplexing.

5] Flow control :→

6] Error control :-
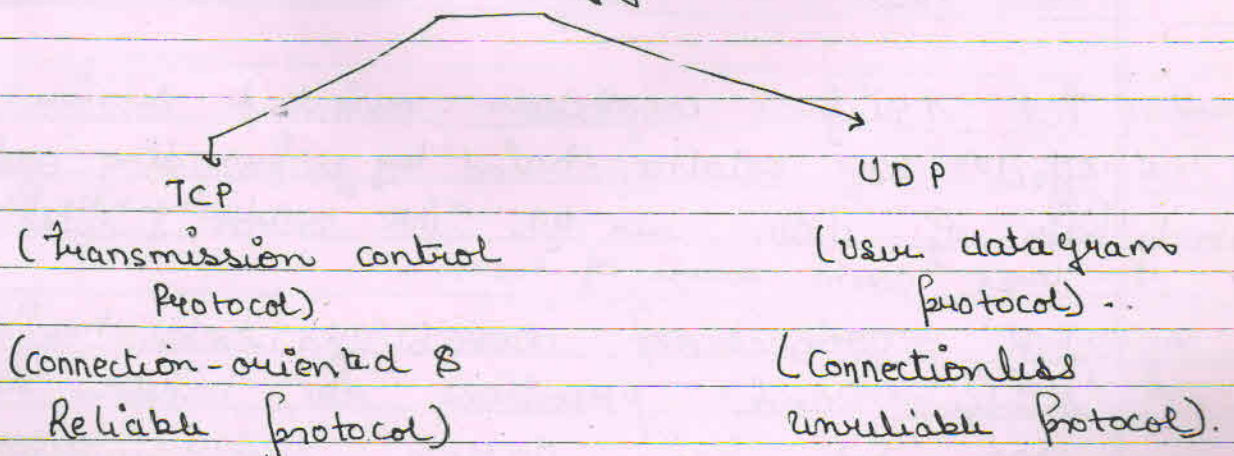   ↳ Iske liye sequence number use hote hai?

7] Acknowledgement :-
   ↳ use both positive & negative acknowledgement

8] Quality of service :→
   ↳ If what is expected from lower-Layer, Lower Layer Layer don't implement that service, that service should be implemented by transport Layer.

•.# TCP/IP ki transport Layer par hum bahut saare protocol ko use karsakte hai. But hum yaha do discuss karegy

TCP                                    UDP
(Transmission control            (User datagram
      Protocol)                        protocol)..
(Connection-oriented &           (Connectionless
  Reliable protocol)              unreliable protocol).

- TCP is stream-oriented protocol.
- TCP k packets to usue datagram tahate hai.

- Hum general transport layer k baare mein discuss nahi karegey. Hum TCP/IP suit ki transport layer ko discuss karegey.

\# TCP:- (Transmission Control Protocol)

- TCP connection-oriented protocol hai, iska kya matlab, connection-extablish hota hai iska kya matlab ??

- Connection extablish matlab ki sender y insure kare ki reciever data recieve karne k liye ready hai ki nahi.

Ques:→ Now TCP k niche IP Layer aur IP-Layer kaise connectionless aur TCP connection oriented toh TCP k pass data IP-Layer se aayega joh ki connectionless- Joh how TCP provide Connection oriented recieve over IP-Layer ?

Ans:- Joh TCP par aake, packet ki ordering hote hai, then Application layer ko send hote hai.

- TCP sirf connection-oriented survice ke effect ko dalta hai by providing ordered delivery base of data. aur yeh joh reordering hote hai IP Layer doesn't aware of them.

- Tab connection extablish hota hai, tab Sender and reciever ek window size par agree hote hai. Matlab reciever advrtise its window size-

- Suppose window size = 100 bole reciever ne toh transport Layer par window size ka matlab hota ki 100 bytes send karsakte ho aap without waiting for acknowledgement.

- Jab reciever connection extablish hona ka Acknowledgement send karta hai tab reciever us ack mien aapni window size bhi batata hai.

- Window size set karna matlab ki aap kitane segment ek sath send karsakte ho without waiting for acknowledgement.

- Window size = 100 hai toh 100 bytes jitane bhi segments mien aajaye, 1, 2 or 3 --- kitane bhi.

- Now, segment ko merge karne k liye hum sequence number ka use karte hai.

- Now, TCP kaise sequence number assign karta hai hai segment ko.

Ans- Sequence number assign karne k TCP perform byte numbering, har byte ko yeh ek number assign karta hai.

- Byte numbering starts from some random number, not necessary ki woh 0 or 1 de assign ho.

• Saare Segment same size k ho jaruri nahi hai

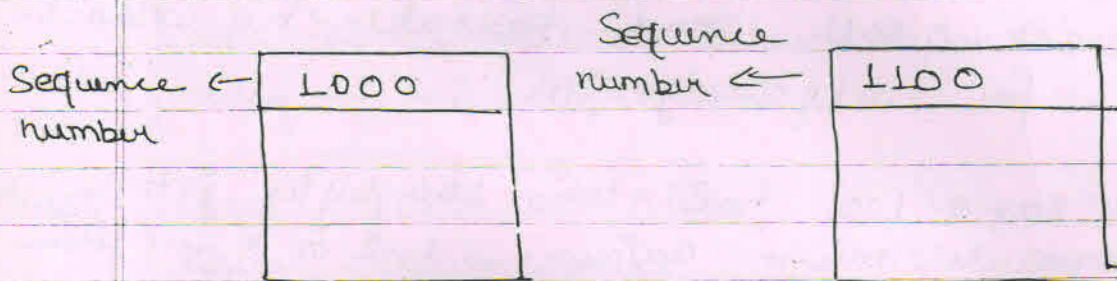• Now suppose woh random number hai 1000. So first byte of first segment is 1000 and second byte of that segment is 1001 and so on. --.

• Sequence number of a segment is the number of first byte that segment carries.

• Suppose hamare byte numbering 1000 se start ho rahai hai then sequence of first segment is 1000.

| | | |
|---|---|---|
| Sequence ← | 1000 | Sequence number ← | 1100 |

Sequence number

• Agar 1st segment ki size 100 bytes hai toh second sequence ka sequence number kya hoga. 1100

| | |
|---|---|
| 1000 | |

1099 byte

(1100)
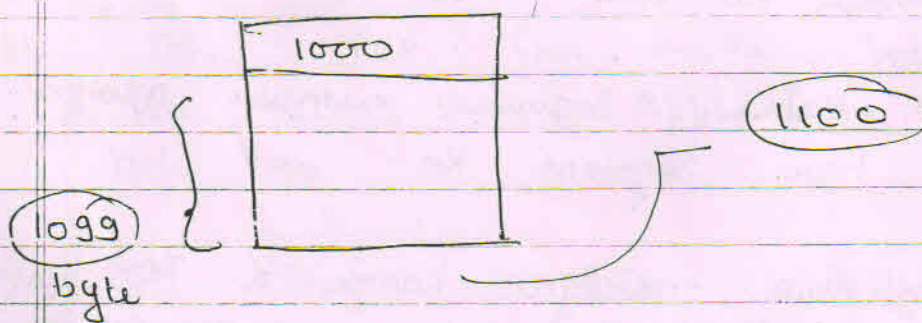
• Suppose 2nd segment ki size 50 bytes hai toh sequence number of 3rd segment is 1150.

Ques:- Suppose sequence number of 4th packet is 1300 then what is the size of third packet/segment?
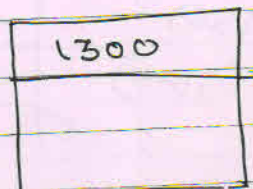
Ans:- 1300 - 1150 = 150 bytes
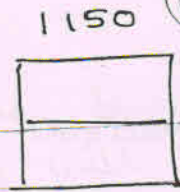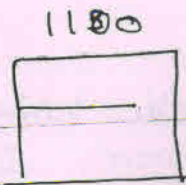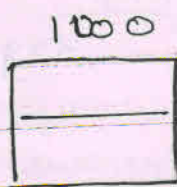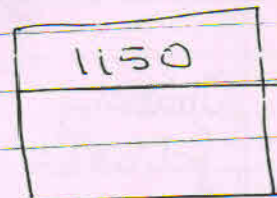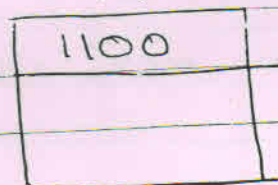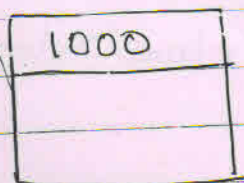
1000       1100       1150       1300

Ques:- What reciever send in the acknowledgement
of some segment number ??
Ans→ Reciever y send nahi karta hai, what is
recieved it send what is expected ??

Seq: 1000       Seq: 1100       seq-1150       1300
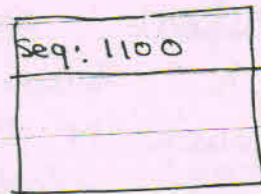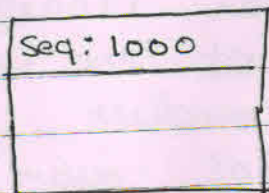
- Reciever ne segment with sequence number
1000, 1100, 1150 send kiye back to back send
kiye without waiting for acknowledgement.

- Reciever har segment ka ack send kare koi
jaruri nahi hai.

- Agar higher order ka ack mila matlab
lower order ack saare acknowledged hogaye
hai.

1000       X 1100       1150

1300

- I recieved, II - Lost, III - Hata
Recieved toh reciever ack mein kya
send karega agar 1300 kar diya
toh sender yth samajga ki pahali wale saare

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Segment recieve ho chuke hai.

- Aab 1100 retransmit karna k baad kya 1150 ko send karega, joh ki reciever ko mil chuka hai ya phir sirf selectively 1100 ko hi send karega.

- Agar 1100 ko hi retransmit karega toh selective repeat aur agar 1100 aur 1150 k baad k saare jo Send karega, toh go-back N policy.

Ques:- Now TCP error aane par kya karta hai?
Ans:→ Jo resolve this problem TCP make use of hybrid protocol joh kabhi selective repeat hoga toh kabhi Go-back N hoga.

- Kya 1100 sequence Number wala segment nahi mila toh kya woh immedialy 1100 ko retransmit kar dega, hosakta woh baad mein mil jaye, kyoki network layer packets ki unordered dilivery dete hai, kya pata 1100 kohi long route ko follow kar k aaraha ho.

- Thatwhy TCP make use of two retransmission policies:-

(SR) ⊢→ Retransmission on Time-out  selective repeat
(GB-N) └→ Retransmission on three - dulplicate acknow-
                                                ledgement.
                          Go-back-N

Sequence number 1100 wala segment immedilily retransmit nahi hoga, It will wait for time-out jaisihi time-out hoga woh retransmit hoga, Jis segment sequence number ka timeout hua hai.

Agar TCP Ki retransmission wali policy timeout wali hai toh woh selective Repeat policy use karega.

When reciever recieve the segment highly out of order. Jaisihi pahale 1000 aagega then 1200 then 1600 aayega.

When reciever, recieves the segment highly out of order, reciever send three duplicate acknowledgement back to back i.e total = 4, Sender Go-back N jaisa behave karega in that condition without waiting for acknowledgement.

This technique is also known as fast-retransmission.

Communication in TCP is full duplex.

‡