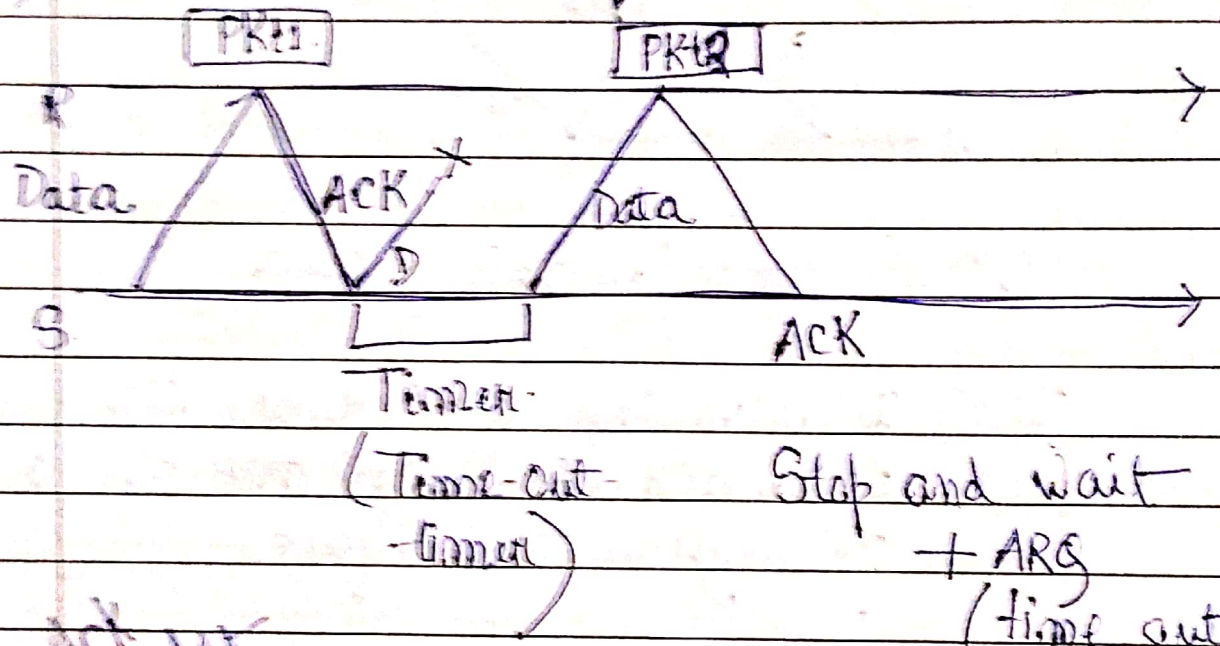
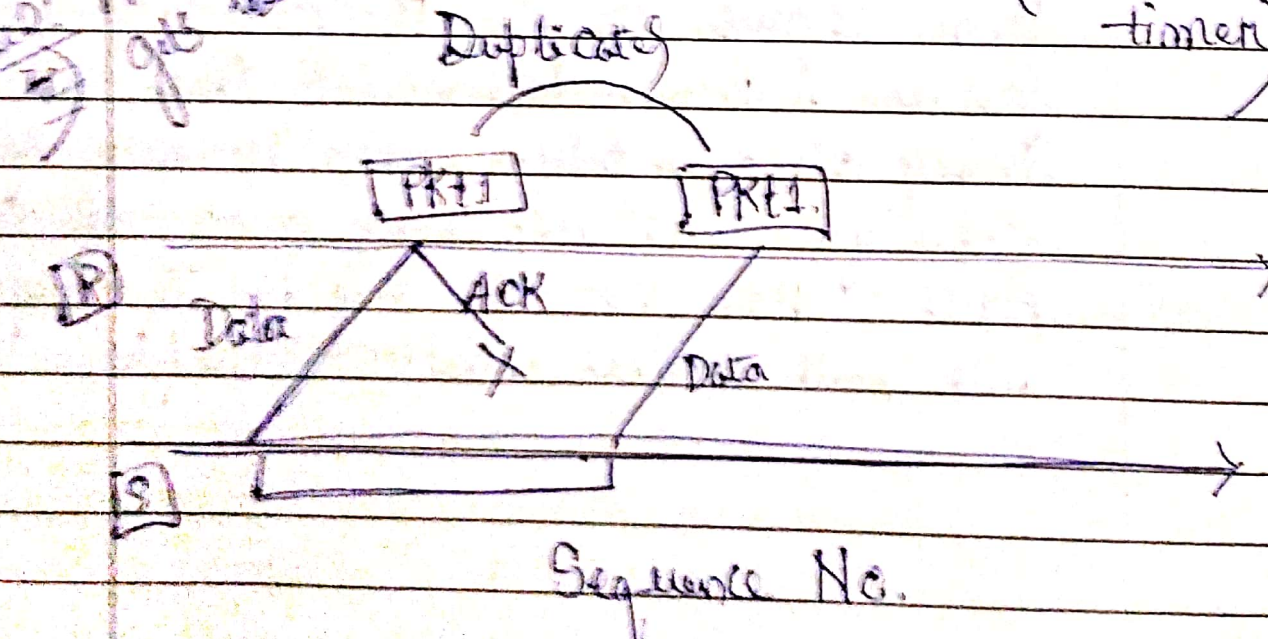
Ch. 1) STOP AND WAIT
2) STOP AND WAIT ARQ.

↓

Automatic Repeat Request.

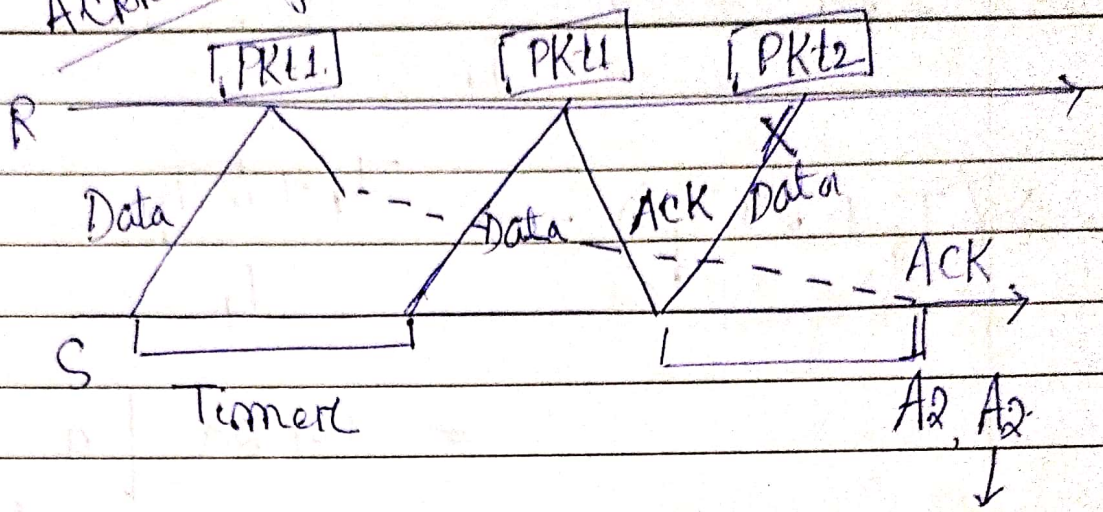


Stop and wait + ARQ (time out timer)



__/__/____

Case 3: Duplicate Acknowledgement:



Sequence No. on 'Ack' too.

1) Stop and Wait
2) Stop and wait Automatic Repeat Request
3) Time-out timer.
4) Data Packet gets lost. (Sequence No. on the Data Packets)
5) Acknowledgement gets lost (Sequence No on the Acknowledgement.

Capacity of Pipe and Pipelining:

H.D. → C = B × Propagation Delay

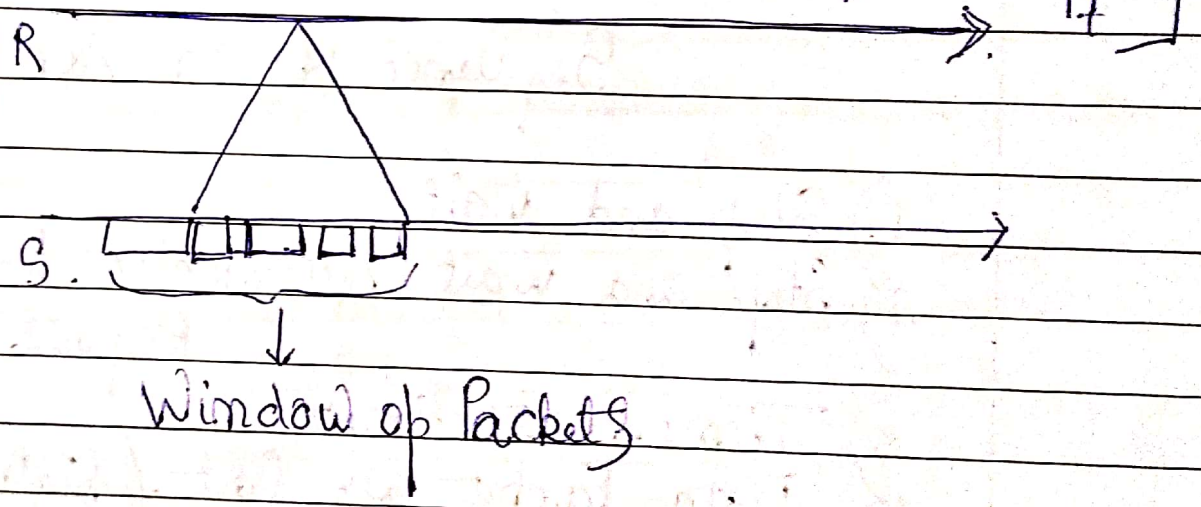
F.D. → C = 2 × B × Propagation Delay

T_t Sec ⟶ 1 Packet

1 Sec ⟶ $\frac{1}{T_t}$ Packets

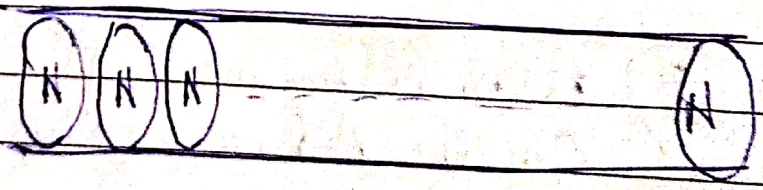
$\Rightarrow (T_t + 2 * T_p)$ ⟶ $\frac{T_t + 2T_p}{T_t}$

$= 1 + 2a \quad \left[a = \frac{T_p}{T_t} \right]$



Window of Packets

Capacity



(N) bps N x Propagation Delay

Thick Pipe

Thin Pipe

$$\eta = \frac{1}{1+2a} = \frac{1}{1+2*\frac{T_p}{T_t}}$$

$$= \frac{1}{1+\frac{(2*T_p*B)}{L}}$$

$$\eta \propto \frac{1}{2*T_p*B}$$

Pipelining :→

* Window of Many Packets.

References :-

[48]

IPO [95.6, 92.8, 93.7]

GWO [96.3, 94.6, 95.8].

CN:

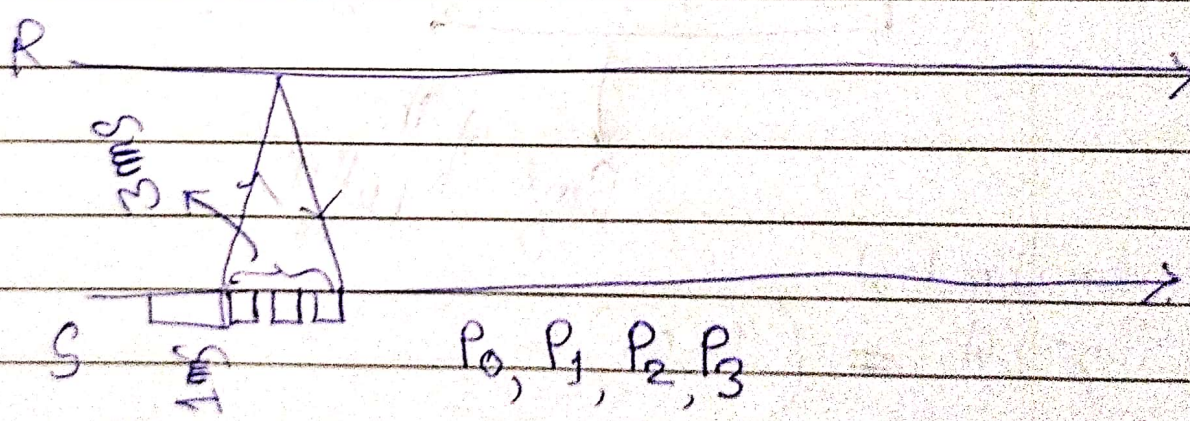
Flow control Mechanism:-

Given the

Transmission time (T_t) = 1 msec

Propagation time (T_p) = 1.5 msec

$$\eta = \frac{1}{1+2a} = \frac{1}{4}$$



Total time = (1+3) = 4ms

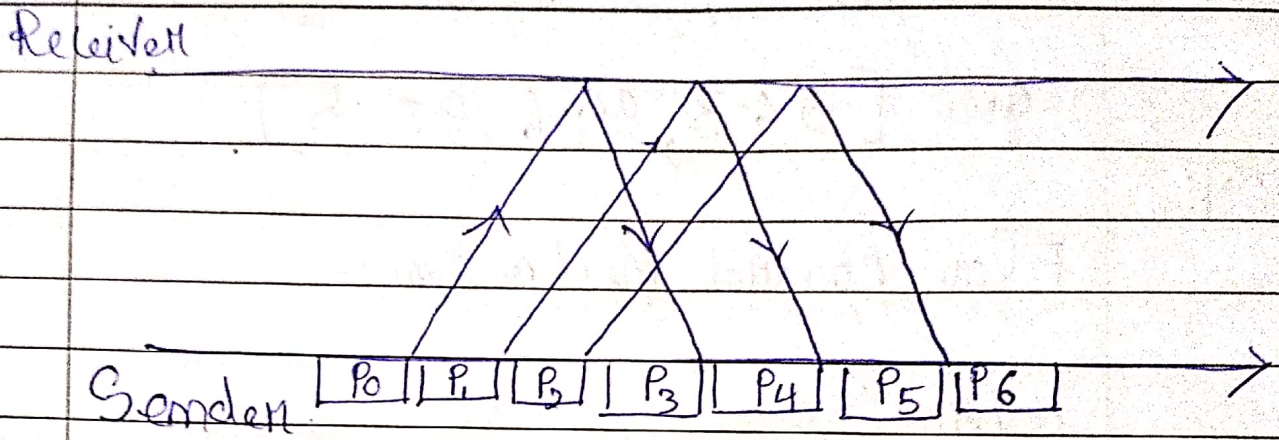
Efficiency = $\frac{1}{4}$

Sender Buffer:

P_3	P_2	P_1	P_0	
P_4	P_3	P_2	P_1	P_0

$P_5\ P_4\ P_3\ P_2\ P_1\ P_0$.

__/__/____



The Window is Sliding

$P_9\ P_8\ P_7$ [$P_6\ P_5\ P_4\ P_3$] $P_2\ P_1\ P_0$

↓ Size of the buffer

Sender Window Size (W_s) = $(1+2a)$

Sequence No Required:

3 2 1 0 3 2 1 0

Seqn No. field in Header = 2 bits.

Sending Window Size (W_s) = $1 + 2a$

Minm of Seq. no.
$= 1 + 2a$

Bits required = $\log(1 + 2a)$