

✓ DL → EC (Flow Control) ✓
 ✓ EC (Error Control ") ✓
 ✓ Framing
 ✓ Access-Control ✓
 Stop-and-wait + Go-Back-N + SR (Selective Repeat)

SR:

4 3 2 1 0 →

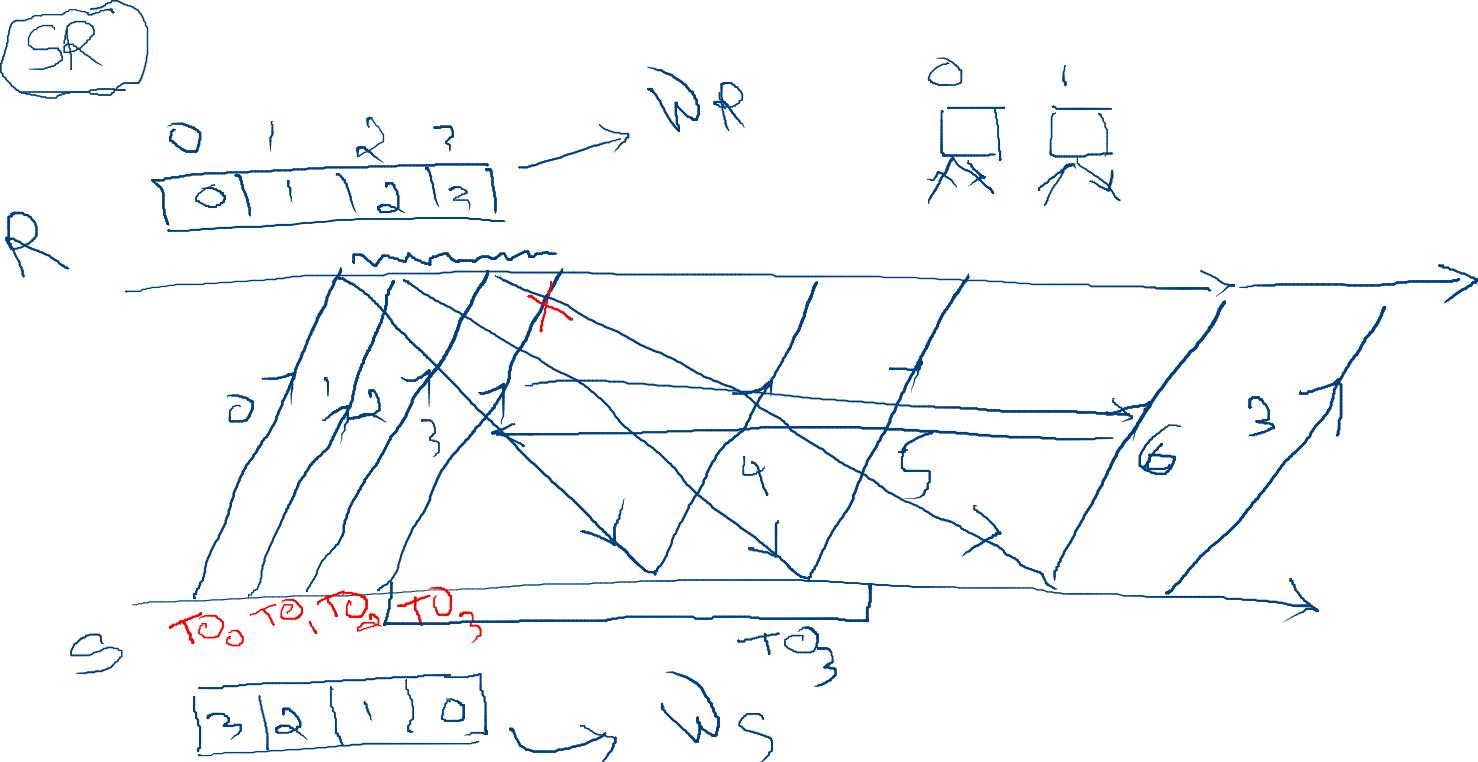
Stop-and-Wait Protocol

$$w_S = 1, w_R = 1$$

$$\underline{GBN} = w_S = N, w_R = 1$$

$$\underline{SR}: w_S = N, w_R = N$$

Min
 No. of Seq n m.
 $= w_S + w_R$



Q: SR : $\omega_s = 10 \times 4$
T_t : 6 ms, T_p = 15 ms, Band Width
= 10 mbps

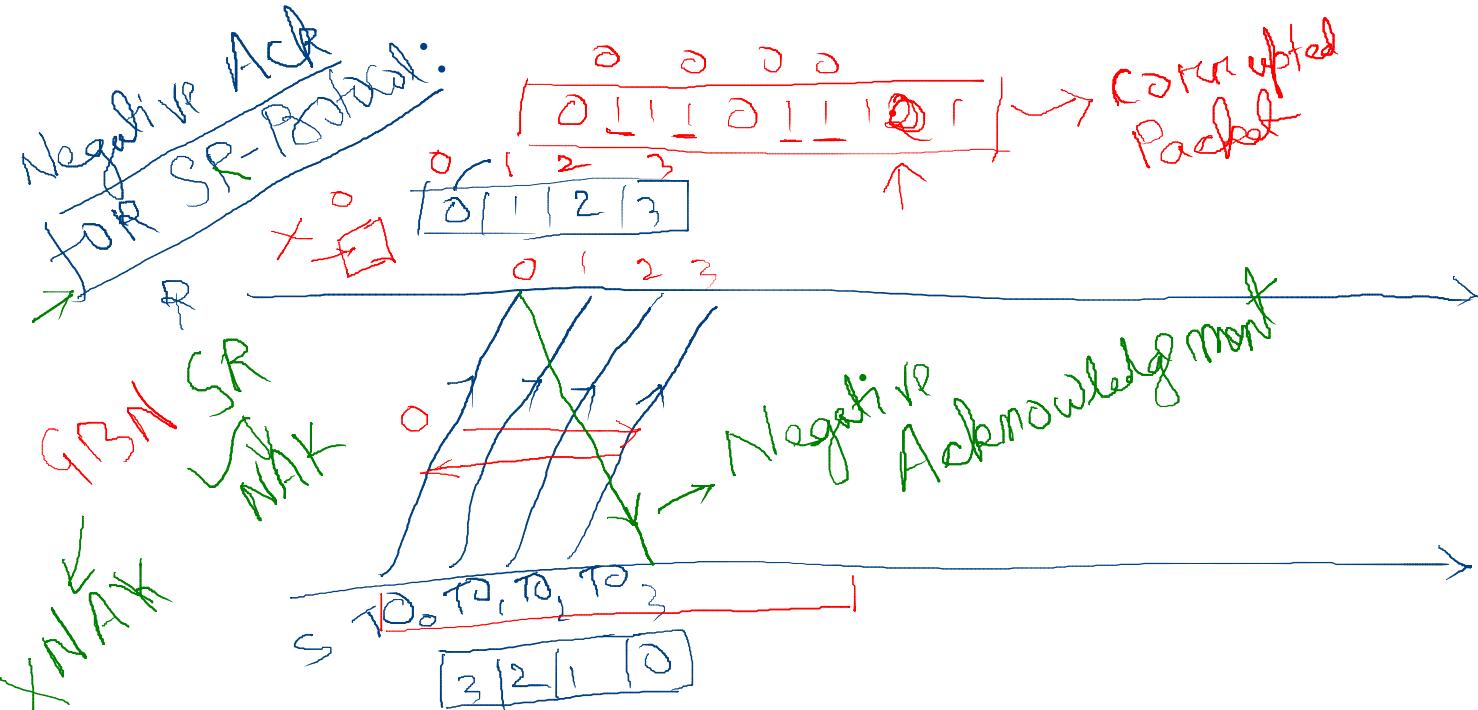
\Rightarrow Throughput : Effective
Bandwidth

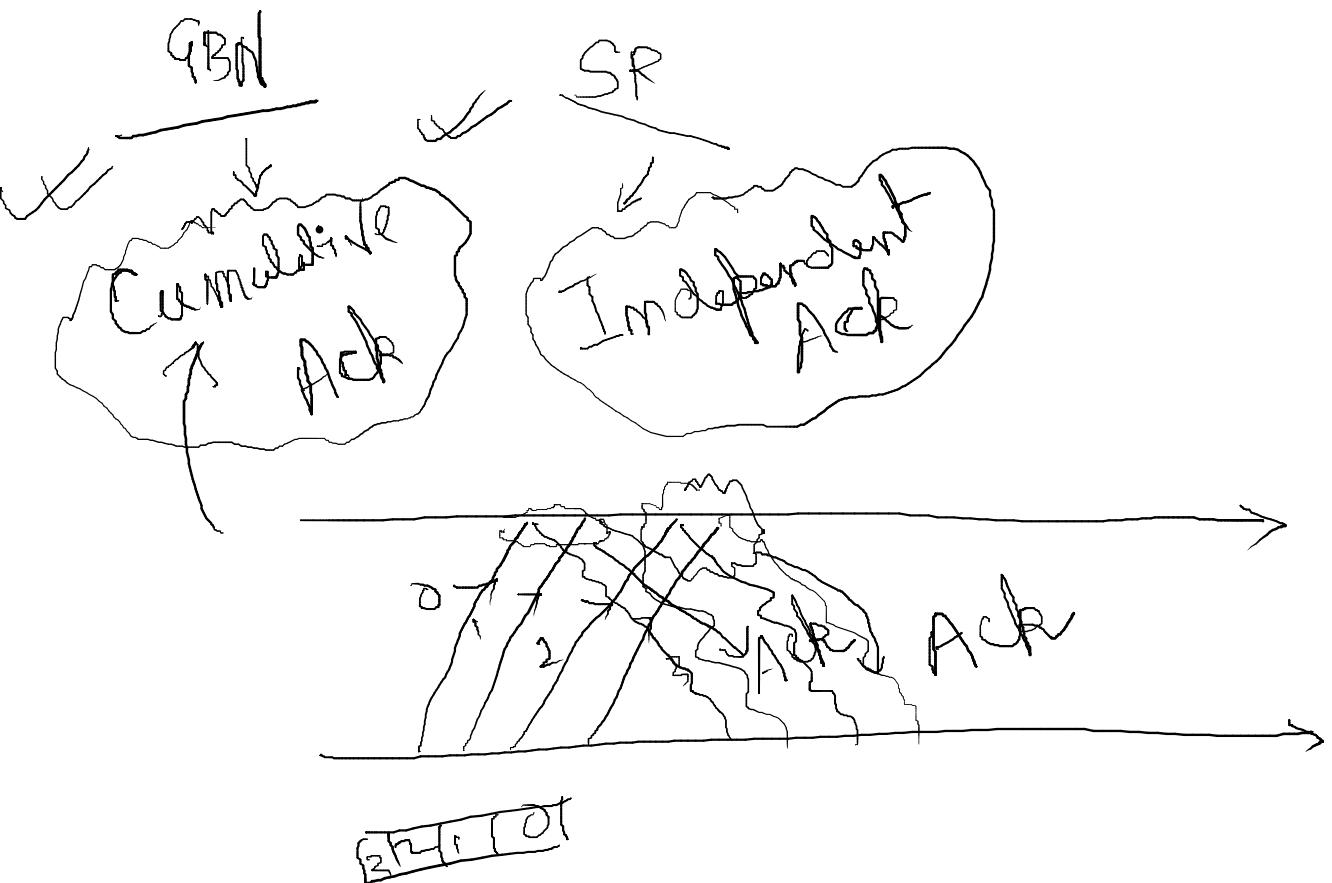
$$1 + 2a = 1 + 2 \cdot \frac{15 \text{ ms}}{6 \text{ ms}}$$

$$= 1 + 2 \cdot 5$$

$$2 = \cancel{\frac{6}{10}} \quad 2 = \cancel{\frac{6}{10}}$$

$$\text{Th} = 10 + \frac{1}{6} \text{ mbps}$$



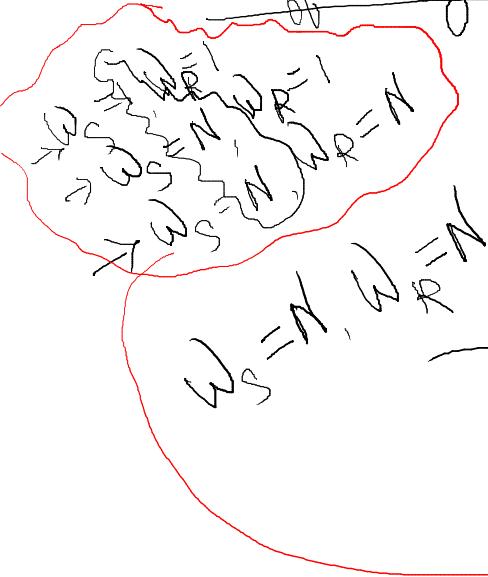


Efficiency: i) Stop-and-wait

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

Sender Window Size

in case of
SAW



ii) GBN

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

iii) SR

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

Seq no: i) Stop-A-Wait: $\omega_S + \omega_R$
 $= 1 + 1 = 2$

ii) GBZ: $\omega_S + \omega_R$
 $= (2 + 2) = 2 + 2$

iii) SR: $\omega_S + \omega_R = 2 + 2$

Retransmission

$\frac{3}{4} \rightarrow 56$

- i) SAR: If 1 pkt lost
→ 1
- ii) GBN: If 1 pkt lost
→ N
- iii) SR: If 1 Kt lost
→ 1
- Pipelining* → iii)

Q:  To Packets, $w_s = 4$,
If Every 5th pkt is getting lost, then
how many total no. of transmission
will be there:

\Rightarrow 0 1 2 3 4 4 5 6 7 8 8 9 ~~10~~ ~
0 1 2 3 3 4 5 6 6 7 8 9 9 10 11 12 12
↑ 13 14 19

