

## Sliding Window ARQ (Go-Back-N)

- \* SWS = Max # of unacknowledged frames the sender can send (back-to-back).

$$SWS \leq 2^m - 1$$

$m$  = # of bits used for sequencing.

RWS = Max # of frames the receiver is willing to accept in any order.

$$RWS = 1$$

ACKs could be individual or accumulative

Throughput & Link utilization  
of Sliding Windows ARQ in  
an error-free environment.

~~Case~~

$$RTT \leq 2T_p$$

Reminder

$$\text{BW} \times \text{Delay Product} \\ (\text{bps}) \quad \underbrace{\text{sec}}_{\text{bits}}$$

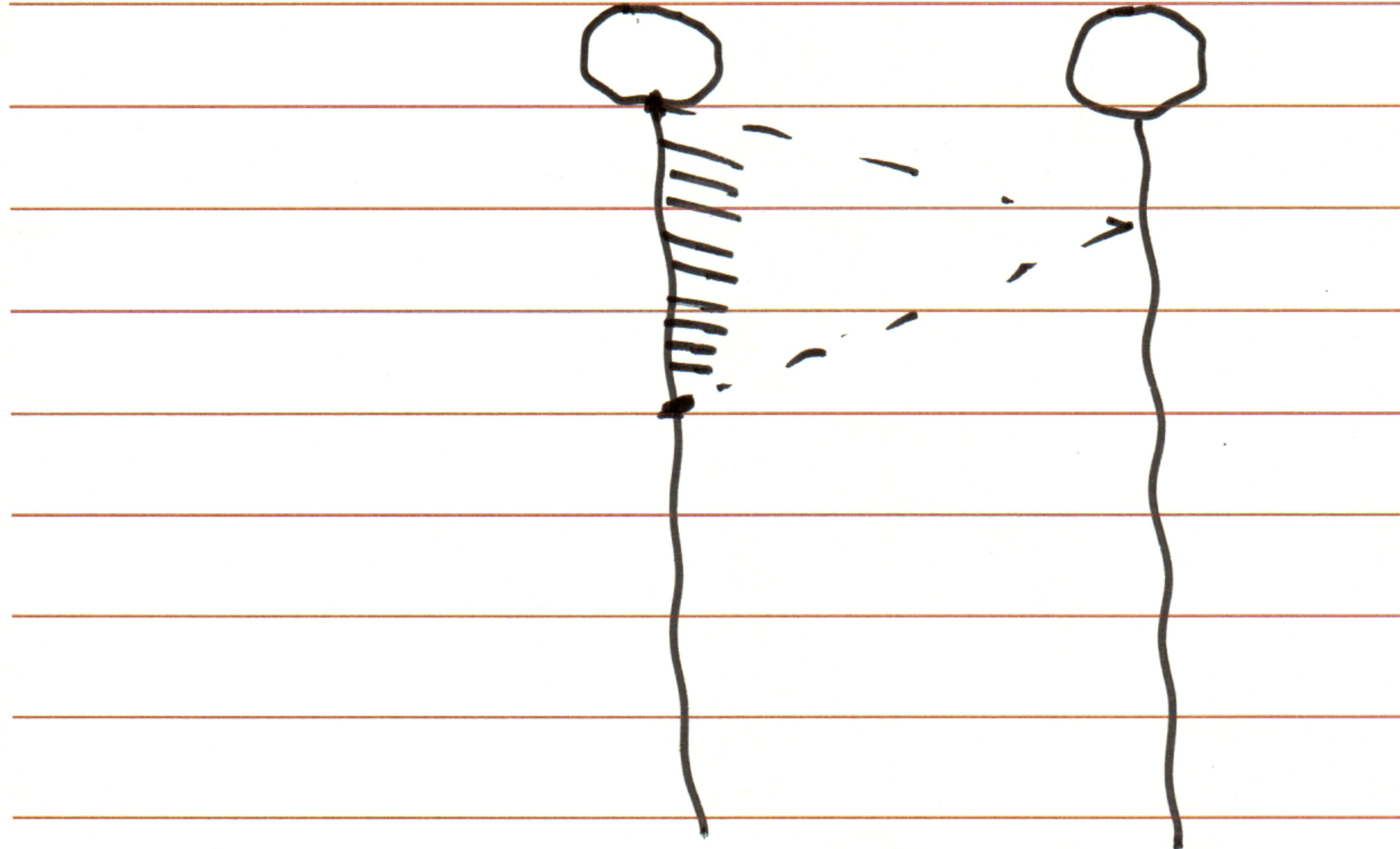
This is the Max # of unacknowledged frames (or bits) that can be on the Link.

Case 1 : If SWS > BW  $\times$  Delay Product!

Link utilization  $\approx 100\%$

(Sender will never stop)

Throughput  $\approx$  ~~max~~ BW.



Case 2 SWS / BIK x Delay Product

Link utilization

$$= \frac{(SWS) T_f}{T_f + Z T_p}$$

Thus neglect

$$= \underline{(SWS) \times (\text{length of frame})}$$



## In Selection (Repeat) Reject

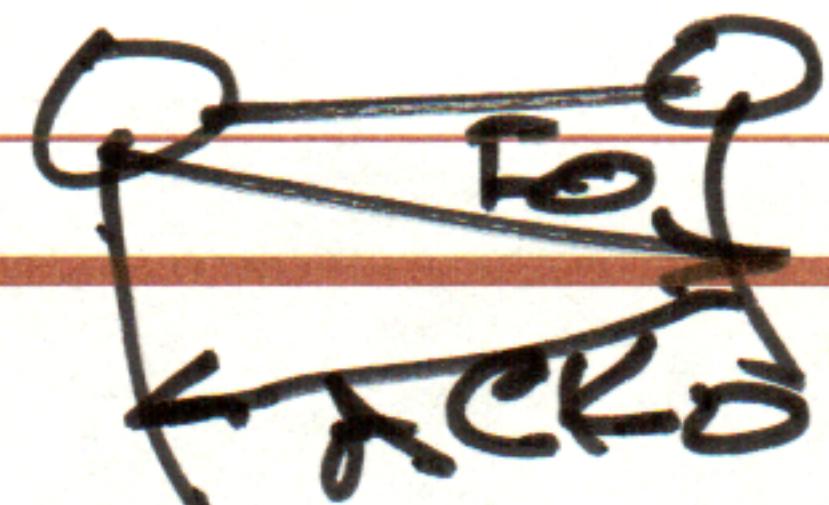
The receiver is willing to accept out-of-order frames up to RWS

RWS is usually taken equal to SWS.

$$RWS \leq SWS$$

Upon receiving an out-of-order frame or a received frame is found to be in error, the receiver asks the sender to retransmit that frame ONLY.

ACKs are individual and they are sequenced for the frame just received



$$SWS \leq 2^{m-1}$$

why?

$$RWS = SWS$$

In SR, the receiver also has the option of sending Selective ACKs

(SACK)

Sending ACKs for frames that

are out of order.

