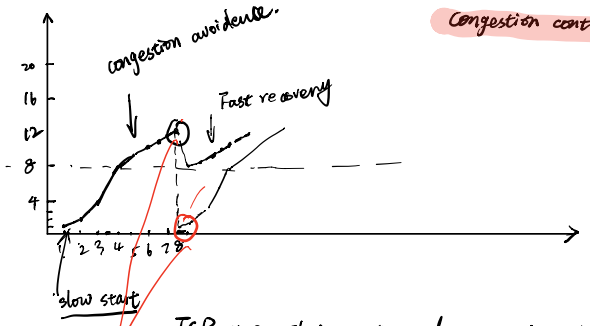
Congestion control

CNA 2015 Q2 b)

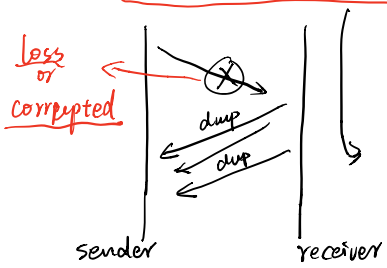


TCP use slow start and congestion avoidant for congestion control.

In slow start phase: the congestion window grows rapidly, when cwnd > ssthresh, it slow down the increase of cwnd
In congestion avoidance phase, cwnd = cwnd + 1/cwnd; so cwnd is increased by one if all cwnd segments have been acknowledged.
TCP assumes there is congestion if it detects a packet loss (retrasmition timer-out / duplicate Ack).
If 3 or more duplicate Acks are received, Tcp believes that a segment was lost. It will retransmit the segment, and enter slow start, set the ssthresh = cwnd/2 ;

CNA 2015 Q2 c)

when can receive 3 duplicate Acks. If the duplicate Acks can be received, which at least means there is no congestion on the way back to the sender.



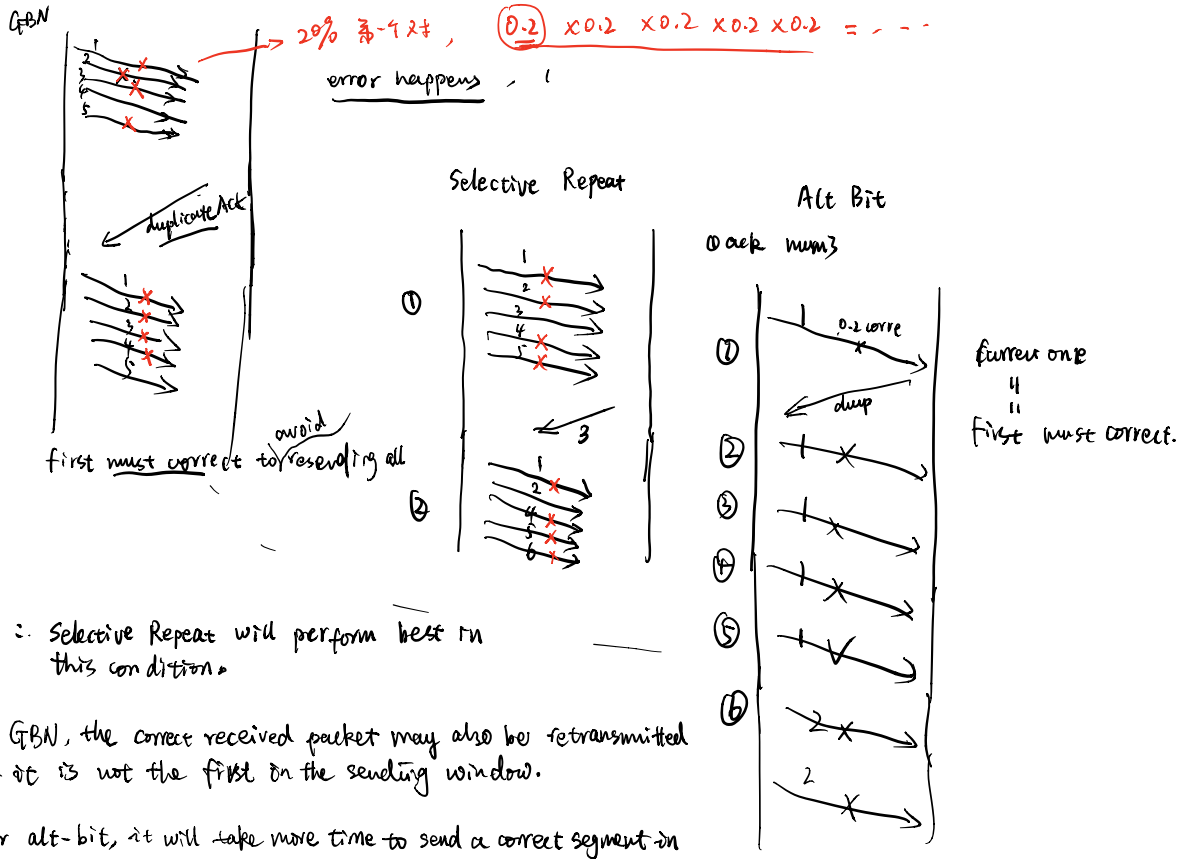
sequence number

$N = \text{window size} + 1$

CNA 2015 Q2 d)

	Sequence Num	Retransmit action
Alt-Bit	0/1	if there is packet loss, retransmit that packet
GBN	windowsize + 1	if there is packet loss, retransmit all segments
Selective Repeat:	windowsize×2	if packet loss, retransmit lost segments

i) assume error rate 80%



∴ Selective Repeat will perform best in this condition.

For GBN, the correct received packet may also be retransmitted if it is not the first in the sending window.

For alt-bit, it will take more time to send a correct segment in high error-rate condition.

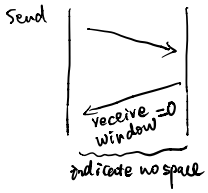
ii)

	Optimal Window size
for alt-Bit :	1
GBN :	bandwidth / segment size
Selective Repeat:	bandwidth / segmentSize.

iii)

	minimum sequence space.
alt-Bit :	W+1
GBN :	W+1
Selective Repeat :	2W-1

CNA 2015 Q2 e) available receive buffer



problem: send never send again / receiver will send acks so no Ack to indicate if there is buffer again

set timer ⇒ when get "receive window=0",
when timer out, send a packet to detect if any buffer available.