

sssthresh = 4

new_ssthresh = 3 ✓

cwnd =

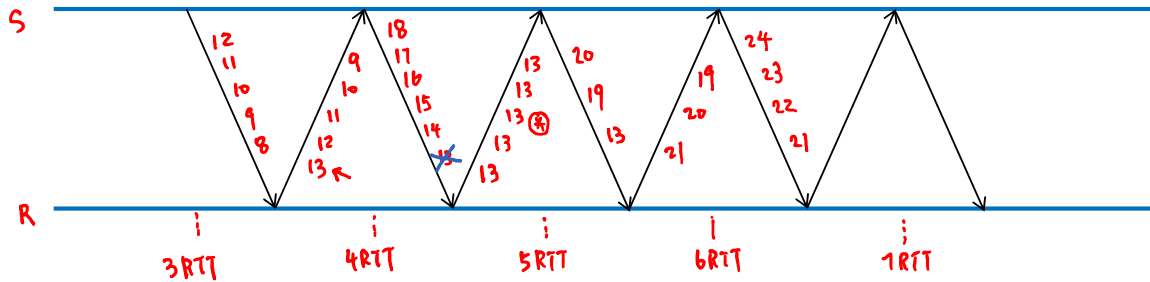
5
[8,9,10,11,12]

6
[13,14,15,16,17,18]

3
[13,14,15]

4
[21,22,23,24]

ss/cA ↔ Reno ↔ CA



At 5 RTT :

1st dup A13 : } do nothing
2nd dup A13 : }

3rd dup A13 : Congestion Detected. Enter Fast Recovery
Retransmit #13
new_cwnd = 3 ← [13,14,15,16,17,18]
new_ssthresh = 3

4th dup A13 : #ops = 6 - 3 = 3 ← = new_cwnd
#ops = 6 - 4 = 2 < 3 = new_cwnd
M=1 : xmit #19 (even if 19 is outside sswnd range)

At 6 RTT :

A19 : non-dup ACK
cwnd = 3 * 3/4 : [19,20,21]
xmit 21

A20 : cwnd = 3 * 3/4 : [20,21,22]
xmit 22

A21 : cwnd = 4 : [21,22,23,24]
xmit 23,24

5th dup A13 :

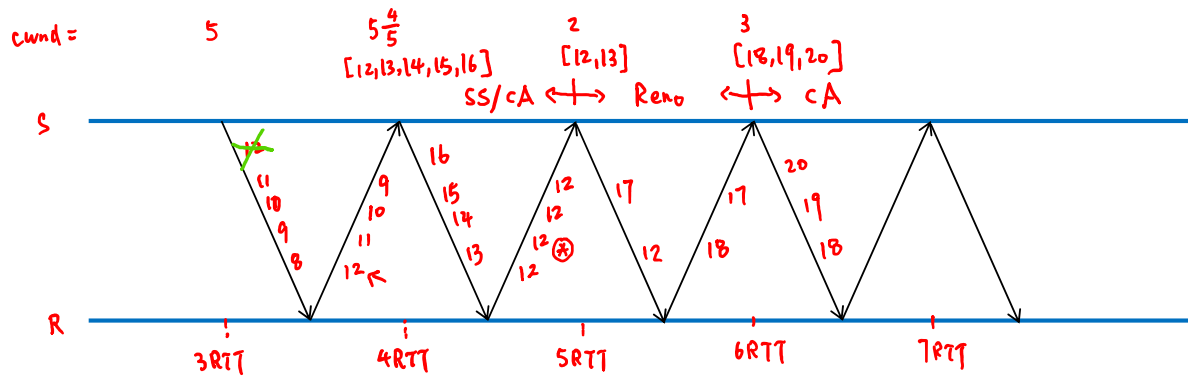
#ops = 6 + 1 - 5 = 2 < 3 = new_cwnd
M=1 : xmit #20

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ops

Time	Packet Received	Action Taken	List of unACKed packets	Total # dup ACKs	Estimated # outstanding packets	sssthresh value	cwnd size	cwnd / sswnd range	# new packets to send
4 RTT	A9		9,10,11,12			4	5+1/5	9,10,11,12,13	1: #13
	A10		10,11,12,13			4	5+2/5	10,11,12,13,14	1: #14
	A11		11,12,13,14			4	5+3/5	11,12,13,14,15	1: #15
	A12		12,13,14,15			4	5+4/5	12,13,14,15,16	1: #16
	A13		13,14,15,16			4	6	13,14,15,16,17,18	2: #17, #18
5 RTT	1st dup A13		13,14,15,16,17,18			4	6	13,14,15,16,17,18	0
	2nd dup A13		13,14,15,16,17,18			4	6	13,14,15,16,17,18	0
	3rd dup A13	Retransmit 13 (13) Enter Fast Recovery	13,14,15,16,17,18	3	6-3 = 3	3	3	13,14,15	0
	4th dup A13		13,14,15,16,17,18	4	6-4 = 2	3	3	13,14,15	1: #19
	5th dup A13		13,14,15,16,17,18,19	5	7-5 = 2	3	3	13,14,15	1: #20
6 RTT	A19	Exit Fast Recovery	19,20			3	3 * 3/4	19,20,21	1: #21
	A20		20,21			3	3 * 3/4	20,21,22	1: #22
	A21		21,22			3	4	21,22,23,24	2: #23,24

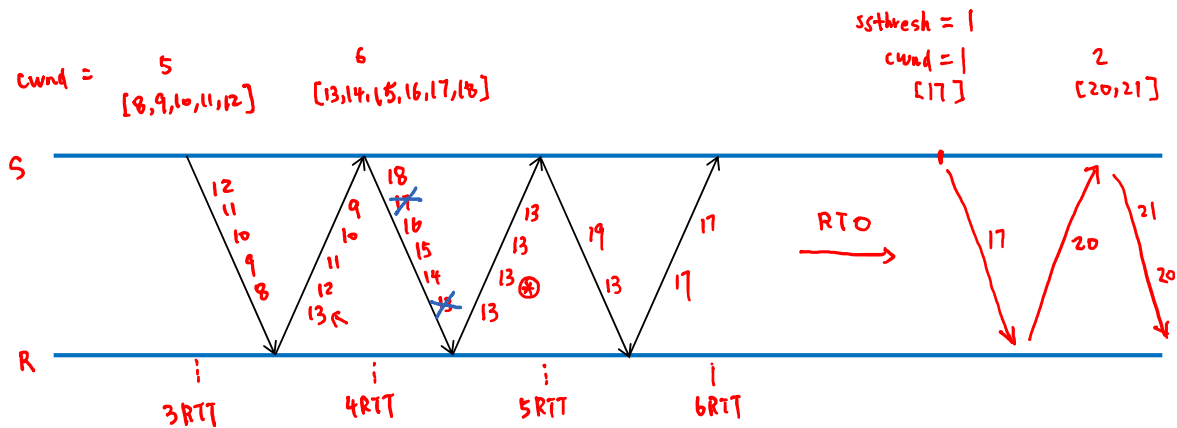
Cpr E 489 -- D.Q.



At 5 RTT: 3rd dup A12: retransmit 12
 new_ssthresh = new_cwnd = 2
 #ops = 5 - 3 = 2
 4th dup A12:
 #ops = 5 - 4 = 1 < 2 = new_cwnd
 xmit M=1 pkt: #17

At 6 RTT:
 A17: cwnd = 2.5: [17, 18]
 xmit #18
 A18: cwnd = 3: [18, 19, 20]
 xmit #19, #20

Cpr E 489 -- D.Q.



At 5 RTT:
 1st dup A13 } do nothing
 2nd dup A13 }
 3rd dup A13: C.D. unacked pkts: [13, 14, 15, 16, 17, 18]
 retransmit #13
 new_ssthresh = new_cwnd = 3
 #ops = 6 - 3 = 3
 4th dup A13: #ops = 6 - 4 = 2 < 3 = new_cwnd
 M=1: xmit #19

At 6 RTT:
 A17: non-dup Ack (partial) Ack
 Exit Fast Recovery
 cwnd = 3 1/3
 [17, 18, 19]
 do nothing
 1st dup A17: do nothing

Cpr E 489 -- D.Q.