CS & IT ENGINEERING

COMPUTER NETWORKS

TCP & UDP

Lecture No-12

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Questions Practice

Discussion

Q $W_R = 128\,KB$

$MSS = 1\,KB$

No. of segments $= \frac{128\,KB}{1\,KB} = 128$

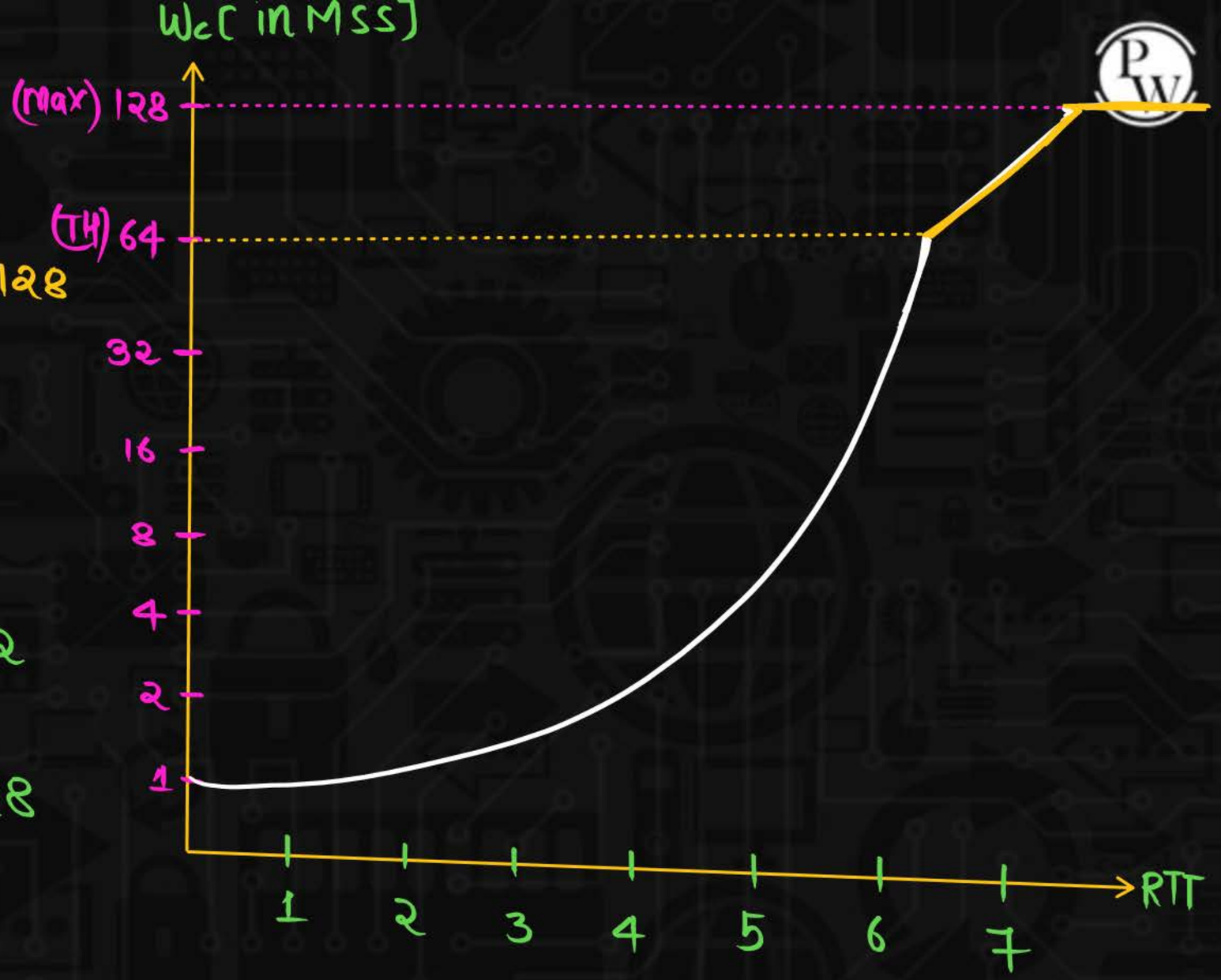
$TH = \frac{1}{2} W_R = 64$ segment

W_c: 1, 2, 4, 8, 16, 32

TH

64, 65, 66, 67, ... 128

128, 128, ...



Q. $W_R = 128KB$

$MSS = 1KB$

No. of segments $= 128$

$TH = \frac{1}{2} W_R$

$TH = 64$ segment

64, 65, ... 128, 128, ...

NTH = 10.5

21 ↑ 1, 2, 4, 8, 10

T.O

Problem Solving on Congestion control

Q 1. Consider the following statements regarding the slow start phase of the TCP congestion control algorithm. Note that cwnd stand for the TCP congestion window and MSS denotes the Maximum Segment Size.

i. The cwnd increases by 2 MSS on every successful acknowledgment.

ii. The cwnd approximately doubles on every successful acknowledgment.

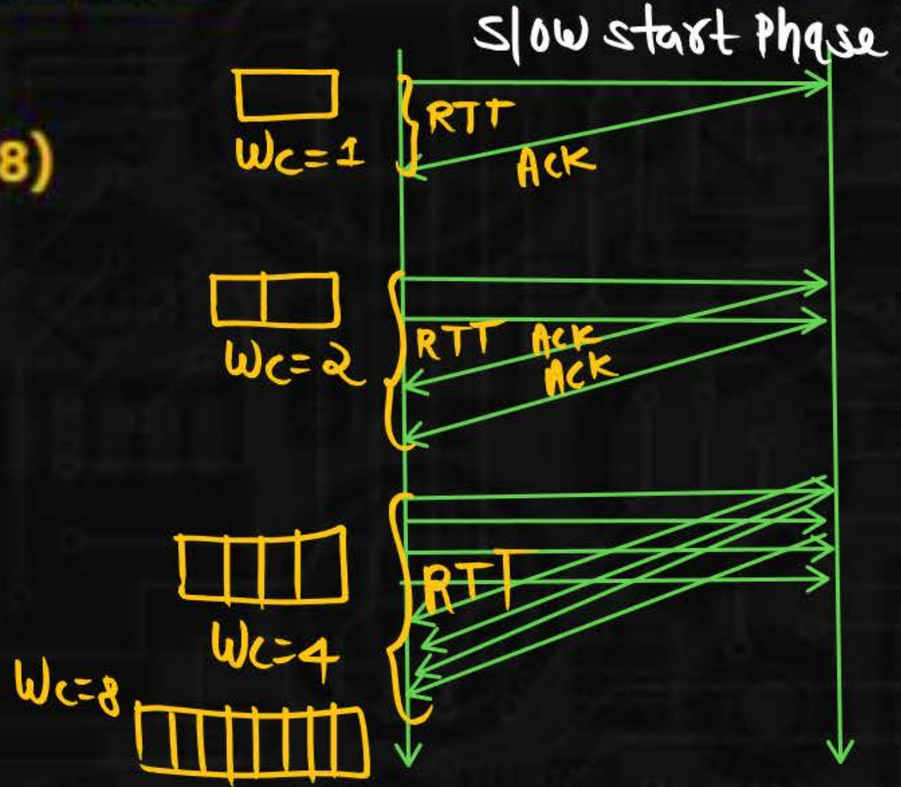
iii. The cwnd increases by 1 MSS every round trip time.

iv. The cwnd approximately doubles every round trip time

Gate-2018

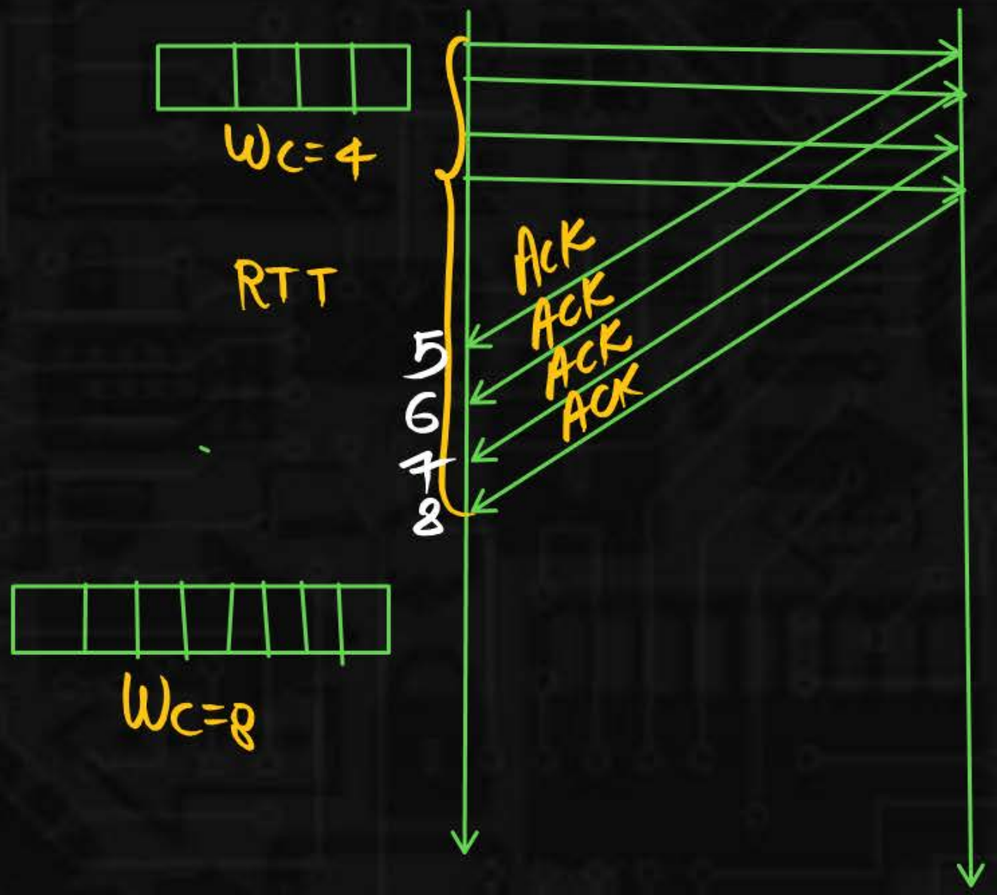
Which one of the following is correct? (GATE – 2018)

A. Only (ii) and (iii) are true
B. Only (i) and (iii) are true
C. Only (iv) is true
D. Only (i) and (iv) are true



Q 2. In slow start phase of TCP congestion control, current congestion window size (CWND) is 4 MSS and sender gets 4 successful ACK of segments (no any outstanding ACK) then what should be the value of CWND? (NIELIT)

A. 5 MSS
B. 8 MSS
C. 16 MSS
D. 64 MSS



Q 3. If receiver window size is 16000 Byte and maximum segment size is 1000 Byte then after how many RTT sender will send full window----------? (11 RTT)

$W_R = 16000$ Byte

Segment size = 1000 Byte

| → RTT

No. of segments = $\frac{16000B}{1000B} = 16$

$TH = \frac{1}{2} W_R = 8$ segment

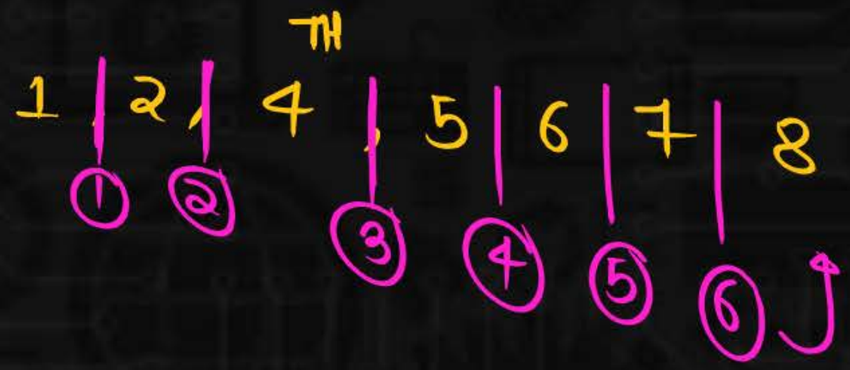
Q 4. If receiver window size is 8000 Byte and maximum segment size is 1000 Byte then after how many RTT sender will send full window ------- ? 6 RTT's

$W_R = 8000$ Byte

segment size = 1000 Byte

No. of segments = $\frac{8000B}{1000B} = 8$

TH = $\frac{1}{2} W_R = 4$ segment



Q 5. Consider the effect of using slow start on a line with a 10-msec round-trip time. The receive window is 24 KB and the maximum segment size is 2 KB. How long does it take before the first full window can be sent? (BARC)

A. 20 ms

B. 40 ms

C. 90 ms ✓

D. 30 ms

RTT = 10msec

W_R = 24KB

segment size = 2KB

No. of segments = $\frac{24KB}{2KB}$ = 12

TH = 6 segment

9 RTT's

9 * 10msec = 90msec

OR

$W_R = 24$ KB , TH = 12KB

Segment size = 2KB , RTT = 10msec

9 RTT's

9 X 10msec = 90 Msec

Q 6. On a TCP connection, current congestion window size is Congestion Window = 4 KB. The window size advertised by the receiver is Advertise Window = 6 KB. The last byte sent by the sender is LastByteSent = 10240 and the last byte acknowledged by the receiver is LastByteAcked = 8192. The current window size at the sender is: (GATE 2005)

A. 2048 Byte

B. 6144 Byte

C. 4096 Byte ✓

D. 8192 Byte

$W_C = 4KB$

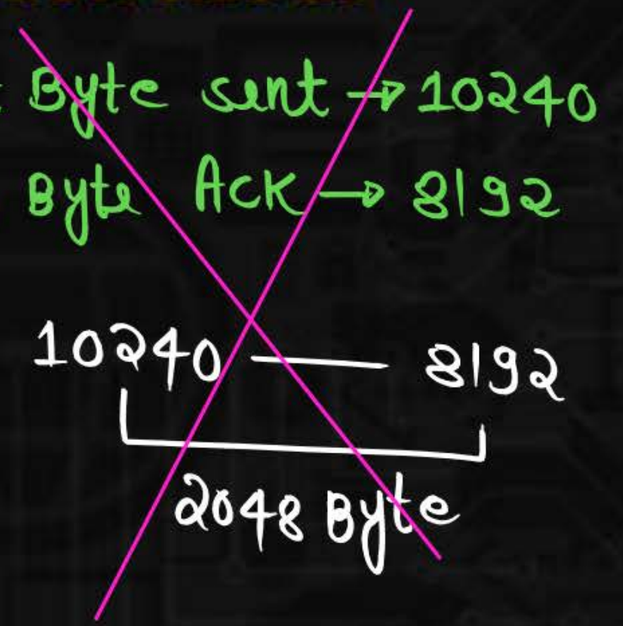
$W_R = 6KB$

$$W_S = \min(W_C, W_R)$$

$W_S = \min(4KB, 6KB)$

$W_S = 4KB$

$W_S = 4 * 1024 Byte = 4096 Byte$



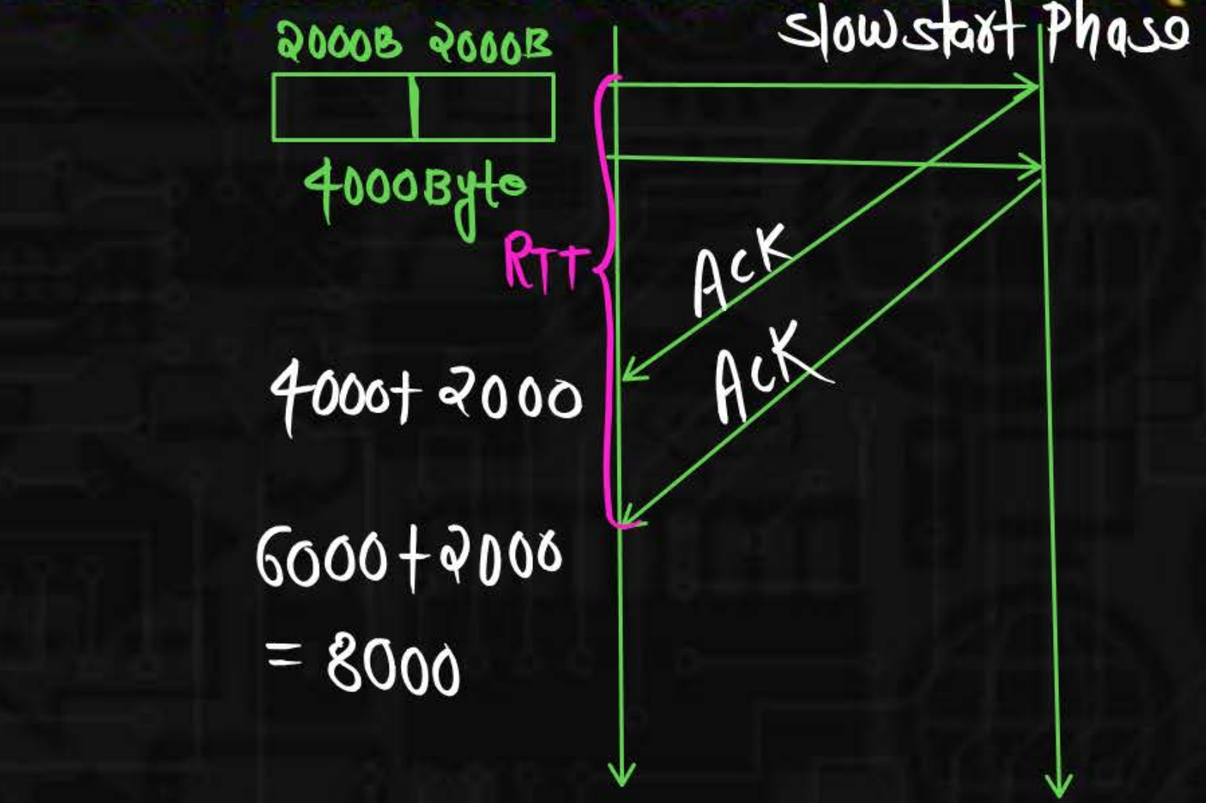
Q 7. Suppose that the maximum transmit window size for a TCP connection is 12000 bytes. Each packet consists of 2000 bytes. At some point of time, the connection is in slow-start phase with a current transmit window of 4000 bytes. Subsequently, the transmitter receives two acknowledgements. Assume that no packets are lost and there are no time-outs. What is the maximum possible value of the current transmit window? (GATE 2004)

A. 4000 bytes

B. 8000 bytes

C. 10000 bytes

D. 12000 bytes



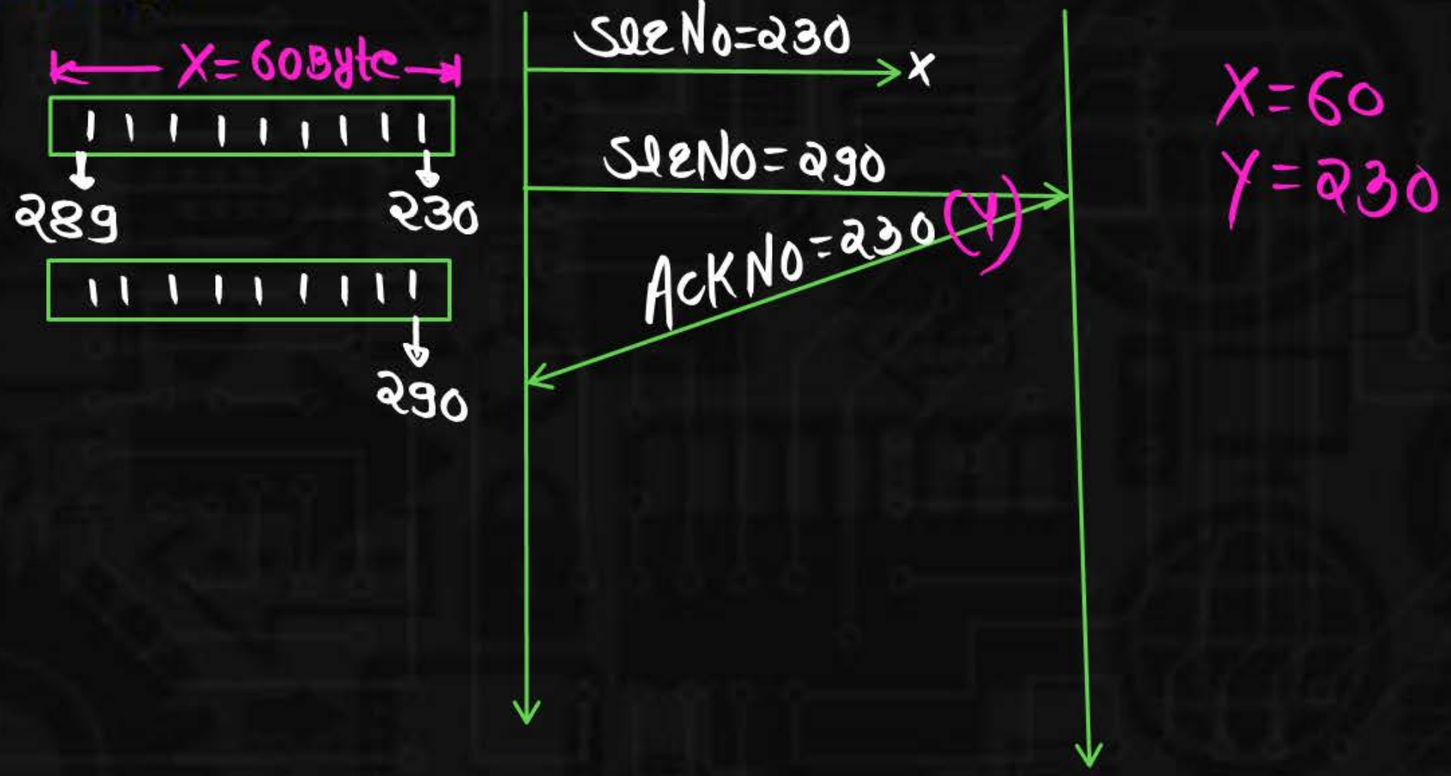
Q 8. Consider a TCP connection in a state where there are no outstanding ACKs. The sender sends two segments back to back. The sequence numbers of the first and second segments are 230 and 290 respectively. The first segment was lost, but the second segment was received correctly by the receiver. Let X be the amount of data carried in the first segment (in bytes), and Y be the ACK number sent by the receiver. The values of X and Y (in that order) are: (GATE 2007)

A. 60 and 290

B. 230 and 291

C. 60 and 231

D. 60 and 230



Q 9. Consider an instance of TCP's Additive Increase Multiplicative Decrease (AIMD) algorithm where the window size at the start of the slow start phase is 2 MSS and the threshold at the start of the first transmission is 8 MSS. Assume that a timeout occurs during the fifth transmission. Find the congestion window size at the end of the tenth transmission: (GATE 2012) [MTA]

A. 8 MSS

B. 14 MSS

C. 7 MSS ✓

D. 12 MSS

NTH = 5

TH

2 4 8 9 10 | 1, 2, 4, 5, 6 7 = 7 MSS

1st 2nd 3rd 4th 5th | 6th 7th 8th 9th 10th

T.O

OR

NTH = 5

TH

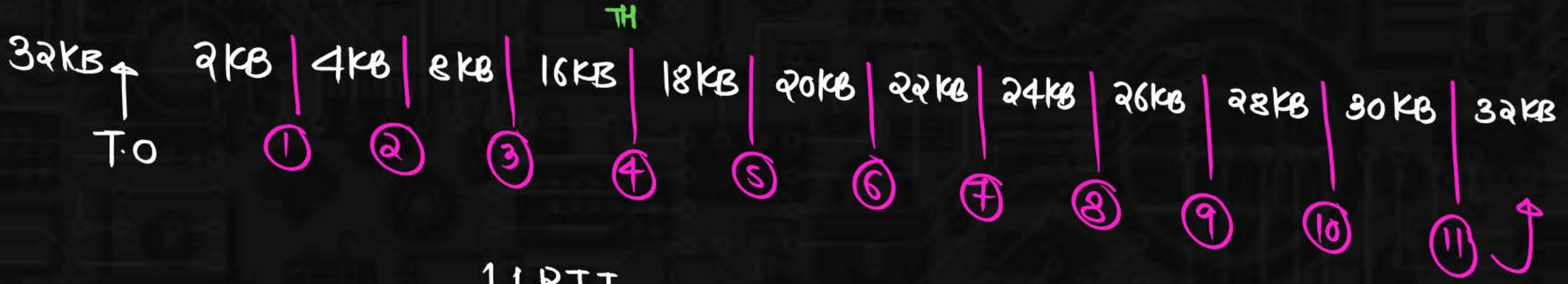
2 4 8 9 10 | 2, 4, 5, 6, 7 8 = 8 MSS

1st 2nd 3rd 4th 5th T.O 6th 7th 8th 9th 10th

Q 10. Let the size of congestion window of a TCP connection be 32 KB when a timeout occurs. The round trip time of the connection is 100 msec and the maximum segment size used is 2 KB. The time taken (in msec) by the TCP connection to get back to 32 KB congestion window is _____. (GATE 2014)

Range: 1100-1300

NTH = 16KB



11 RTT

11 * 100 MSEC = 1100 MSEC

Q 11. Consider a TCP connection between a client and a server with the following specifications; the round trip time is 6 ms, the size of the receiver advertised window is 50 KB, slow-start threshold at the client is 32 KB, and the maximum segment size is 2 KB. The connection is established at time t = 0. Assume that there are no timeouts and errors during transmission. Then the size of the congestion window (in KB) at time t + 60 ms after all acknowledgements are processed is __(44)__ . (GATE CS 2020)

RTT = 6 msec

W_R = 50 KB

slow start threshold = 32 KB

t = 0

(t + 60) msec = ?

At $t = 0 \rightarrow 2KB$

At $t+6 \rightarrow 4KB$

At $t+12 \rightarrow 8KB$

At $t+18 \rightarrow 16KB$

At $t+24 \rightarrow 32KB$ (TH)

Slow start Phase

At $t+30 \rightarrow 34KB$

At $t+36 \rightarrow 36KB$

At $t+42 \rightarrow 38KB$

At $t+48 \rightarrow 40KB$

At $t+54 \rightarrow 42KB$

At $t+60 \rightarrow 44KB$

OR

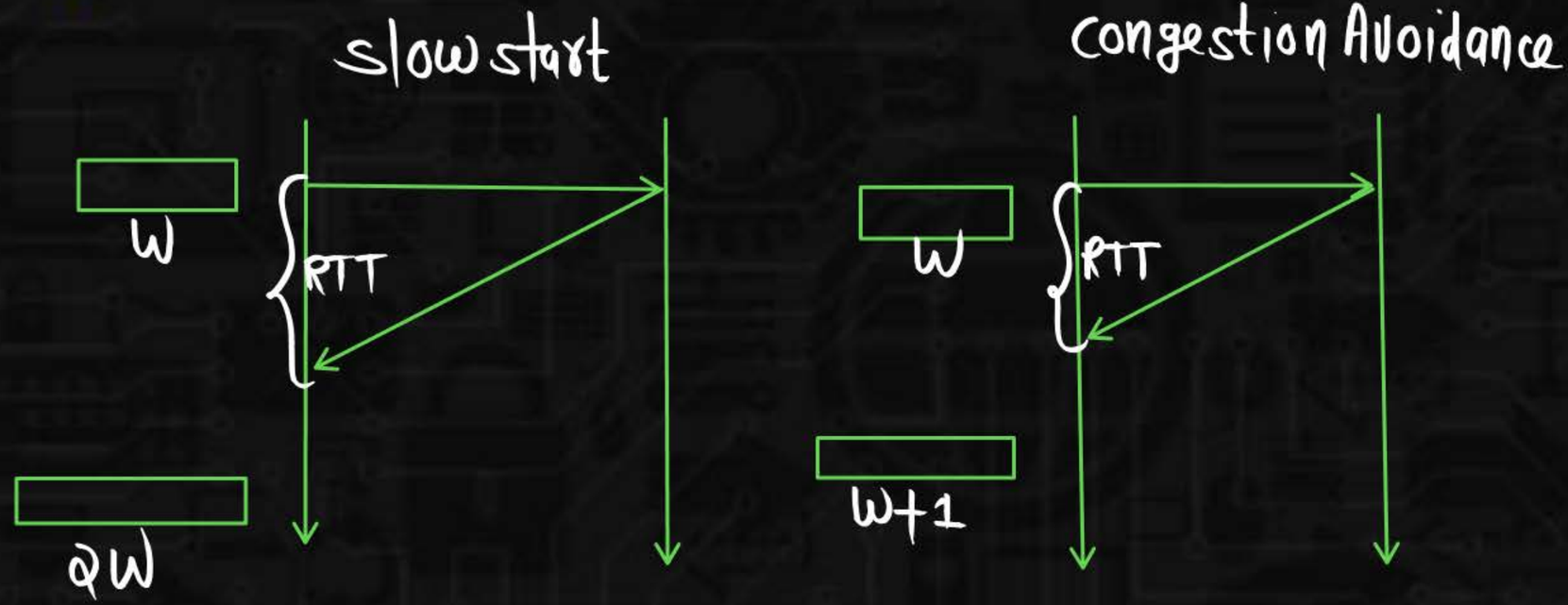
Q 12. Let the window size be a 'w' at the beginning of RTT. Assuming there are no losses in the RTT. What are the respective window sizes for 'slow start' and congestion avoidance after completion of RTT ?

A. $2w - 1, \frac{2w+1}{2}$

B. $w + 1, \frac{2w}{2}$

C. $W + 1, w - 1$

D. $2w, w + 1$



Q 13. Suppose that the TCP congestion window is set to 18 K bytes and a timeout occurs. How big will the window be in the fifth transmission if the next four transmission bursts are all successful? Assume that the maximum segment size is 1 KB. (ISRO)

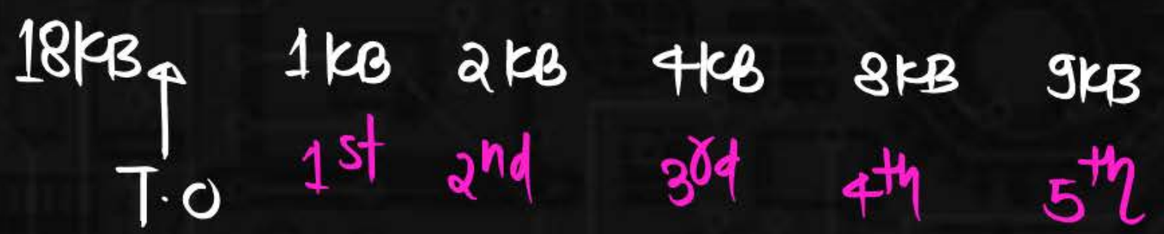
NTH = 9 KB

A. 7 KB

B. 8 KB

C. 9 KB

D. 10 KB



Q 14. Let the size of congestion window of TCP connection be 64 KB when a time out occurs. The round trip time of a connection is 80 msec and maximum segment size used is 4 KB. The time taken by the TCP connection to get back to 64 KB congestion window is (BARC)

H.W

A. 1100

B. 880

C. 440

D. 600

Q 15. While establishing TCP connection both Ws and Wr are established as 48,000 bytes. Maximum segment size (MSS) is 3,000 bytes. At one point if sender receives 4 acknowledgments, the window size in next transmission is (24000) bytes.

H.W

Q 16. In TCP congestion control, the congestion window

A. Increases exponentially

B. Increases exponentially up to threshold value after that increases linearly

C. Increases exponentially up to threshold value after that increases linearly up to the sender's window size

D. None of the above

Q 17. In TCP congestion control AIMD algorithm current congestion window size is 16 MSS. Timeout occurs at sender end, then what is the congestion window size at sender end during fifth transmission ?

H.W

A. 8 MSS

B. 9 MSS

C. 16 MSS

D. 32 MSS

Q 18. The initial congestion window size over a TCP is 1. If slow start algorithm is used and the size of congestion window is increased by 1 when ever an ACK is received i.e. after 1st RTT congestion window size is 2 segments. Assume connection never leaves slow start. Find the no. of RTT's to send 3999 segments.

H.W

Q 19. Let the size of congestion window (CWND) of a TCP connection be 8MSS when timeout occurs. The round trip time (RTT) of the connection is 200 msec, the time taken (in msec) by the TCP connection to get hack to 8 MSS congestion window is _____ .

HW

Q 20. In TCP congestion control (AIMD) algorithm, sender sending threshold (SSthresh) is 12 MSS and congestion window size (Cwnd) is 1 MSS. If round trip time (RTT) is 100 ms then what amount of time required to start congestion avoidance phase? (Assume No any timeout occur at sender end)

H.W

A. 300 ms

B. 400 ms

C. 500 ms

D. 800 ms


THANK YOU
GW
SOLDIERS !