JAYPEE INSTITUTE OF INFORMATION TECHNOLOGY

COMPUTER NETWORKS (15B11CI511)
BTECH 5TH SEM 2019

TUTORIAL-4

Q.1 [CO2] Explain TCP flow control. Describe Fast retransmit and 3 duplicate ACK techniques.

Q.2 [CO2] Suppose host A is sending a large file to host B over a TCP connection. If the sequence number for a segment of this connection is m, then the sequence number for the subsequent segment will necessarily be m+1?

Q.3 [CO3] What will happen when we double the size of window in TCP congestion control? Consider the case when connection begins and having **CongWin, W** = 1 MSS of 500 bytes & RTT = 200 msec initial rate = 20 kbps. Find out the average throughput for only these two consecutive TCP connections, first having window size W and next one 2W.

Q.4 [CO3] Two neighboring nodes (A and B) use a sliding-window protocol with a 3-bit sequence number. As the ARQ mechanism, Go-back-N is used with a window size of 4. Assuming A is transmitting and B is receiving, show the window positions for the following succession of events at A:

- **a**. Before A sends any frames.
- **b.** After A sends frames 0, 1,2 and B acknowledges 0, 1 and the ACKs are received by A.
- **c.** After A sends frames 3, 4, and 5 and B acknowledges 4 and the ACK is received by A.

Q.5 [CO3] A client sends a 128-byte request to a server located 100 km away over a 1-gigabit optical fiber. What is the efficiency of the line during the remote procedure call?

Q.6 [CO3] Consider the effect of using slow start on a line with a 10-msec round-trip time and no congestion. 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?

Q.7 [CO3] Suppose that the TCP congestion window is set to 18 KB and a timeout occurs. How big will the window be if the next four transmission bursts are all successful? Assume that the maximum segment size is 1 KB.

Q.8 [CO3] If the TCP round-trip time, RTT, is currently 30 msec and the following acknowledgements come in after 26, 32, and 24 msec, respectively, what is the new RTT estimate using the Jacobson algorithm? Use $\alpha = 0.1$.

Q.9 [CO2] UDP and TCP use 1s complement for their checksums. Suppose you have the following three 8-bit bytes: 01010011, 01100110, 01110100. What is the 1s complement of the sum of these 8-bit bytes? (Note that although UDP and TCP use 16-bit words in computing the checksum, for this problem you are being asked to consider 8-bit sums.) Show all work. Why it that UDP takes the 1s is complement of the sum; that is, why not just use the sum? With the 1s complement scheme, how does the receiver detect errors? Is it possible that a 1-bit error will go undetected? How about a 2-bit error?

Q.10 [CO3] Consider Figure 3.58. Assuming TCP Reno is the protocol experiencing the behavior shown above, answer the following questions. In all cases, you should provide a short discussion justifying your answer.

a. Identify the intervals of time when TCP slow start is operating.
b. Identify the intervals of time when TCP congestion avoidance is operating.
c. After the 16th transmission round, is segment loss detected by a triple duplicate ACK or by a timeout?
d. After the 22nd transmission round, is segment loss detected by a triple duplicate ACK or by a timeout?
e. What is the initial value of ssthresh at the first transmission round?
f. What is the value of ssthresh at the 18th transmission round?
g. What is the value of ssthresh at the 24th transmission round?

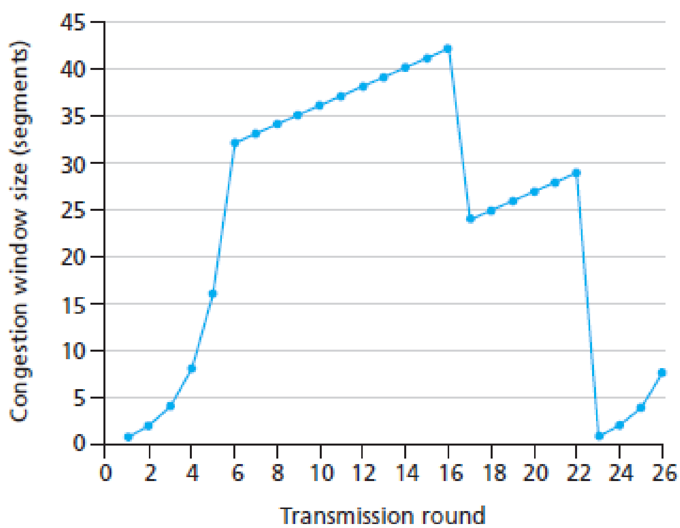

Figure 3.58 ♦ TCP window size as a function of time