# Computer Networks Homework

Due date: May 21, 2025

1. Consider the following scenario during the communication between sender and receiver. Suppose Packet0 through Packet4 are transmitted. Then, these packets are correctly received and acknowledged at the receiver, except Packet2 is lost. After sender receives the four acknowledgements from receiver, the Packet2 timeout.

   (a) Sketch the time diagram for above scenario with Go-Back-N protocol.

   (b) Redo above problem with Selective Repeat protocol.

2. Please briefly describe how TCP estimate the timeout interval?

3. If the TCP round-trip-time, RTT (and DevRTT), is currently 30 (and 8) msec, the following acknowledgements come in after 26, 32, and 24 msec, respectively, what is the new RTT estimate using the timeout estimating algorithm? Use $\alpha = 0.9$ and $\beta = 0.8$.

4. Consider the use of 1000-bits frame on a 1Mbps satellite channel with a 270ms delay. What is the maximum link utilization for

   (a) Stop-and-wait flow control?

   (b) Pipelined flow control with a window size of 7?

5. Please briefly describe the three-way handshaking of TCP.

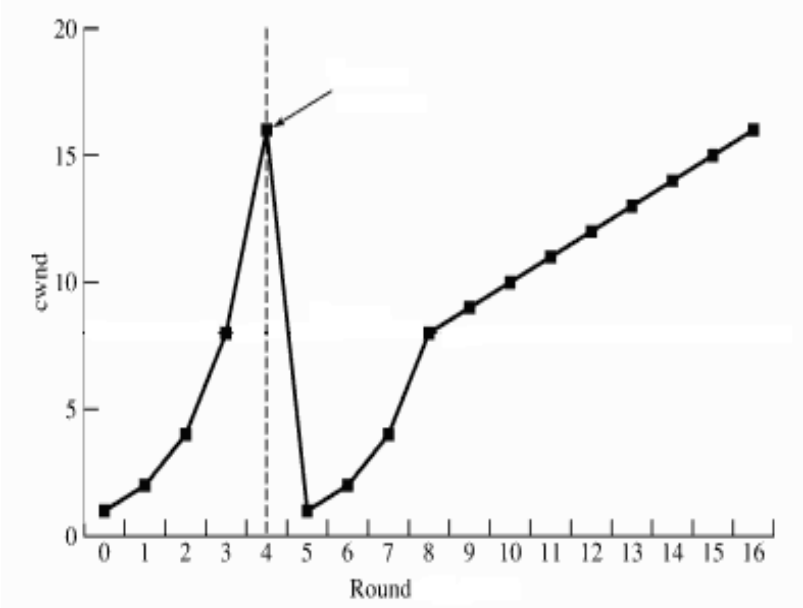
6. Consider the plot in the following of TCP window size as a function of time. Answer the following questions.

   (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 4th transmission round, is segment loss detected by a triple duplicate ACK or by a timeout?

   (d) What is the initial value of Threshold at the first transmission round?




(e) What is the value of Threshold at the 7th transmission round?

(f) During what transmission round is the 70th segment sent?