

Practice Problem 1) (Computer Networking: A Top-Down Approach 6th Edition: Chapter 3 P1)

Suppose Client A initiates a Telnet session with Server S. At about the same time, Client B also initiates a Telnet session with Server S. Provide possible source and destination port numbers for:

- a. The segments sent from A to S.
- b. The segments sent from B to S.
- c. The segments sent from S to A.
- d. The segments sent from S to B.
- e. If A and B are different hosts, is it possible that the source port number in the segments from A to S is the same as that from B to S?
- f. How about if they are the same host?

Practice Problem 2) (Computer Networking: A Top-Down Approach 6th Edition: Chapter 3 P3)

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 is it that UDP takes the 1s 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?

Practice Problem 3) (Computer Networking: A Top-Down Approach 6th Edition: Chapter 3 P5)

Suppose that the UDP receiver computes the Internet checksum for the received UDP segment and finds that it matches the value carried in the checksum field. Can the receiver be absolutely certain that no bit errors have occurred? Explain.

Practice Problem 4) (Computer Networking: A Top-Down Approach 6th Edition: Chapter 3 P14)

Consider a reliable data transfer protocol that uses only negative acknowledgments. Suppose the sender sends data only infrequently. Would a NAK-only protocol be preferable to a protocol that uses ACKs? Why? Now suppose the sender has a lot of data to send and the end-to-end connection experiences few losses. In this second case, would a NAK-only protocol be preferable to a protocol that uses ACKs? Why?

Practice Problem 5) (Computer Networking: A Top-Down Approach 6th Edition: Chapter 3 P19)

Consider a scenario in which Host A wants to simultaneously send packets to Hosts B and C. A is connected to B and C via a broadcast channel—a packet sent by A is carried by the channel to both B and C. Suppose that the broadcast channel connecting A, B, and C can independently lose and corrupt packets (and so, for example, a packet sent from A might be correctly received

by B, but not by C). Design a stop-and-wait-like error-control protocol for reliably transferring packets from A to B and C, such that A will not get new data from the upper layer until it knows that both B and C have correctly received the current packet. Give FSM descriptions of A and C. (Hint: The FSM for B should be essentially the same as for C.) Also, give a description of the packet format(s) used.

Practice Problem 6) (Computer Networking: A Top-Down Approach 6th Edition: Chapter 3 P22)

Consider the GBN protocol with a sender window size of 4 and a sequence number range of 1,024. Suppose that at time t , the next in-order packet that the receiver is expecting has a sequence number of k . Assume that the medium does not reorder messages. Answer the following questions:

- a. What are the possible sets of sequence numbers inside the sender's window at time t ? Justify your answer.
- b. What are all possible values of the ACK field in all possible messages currently propagating back to the sender at time t ? Justify your answer.

Practice Problem 7) (Computer Networking: A Top-Down Approach 6th Edition: Chapter 3 P25)

We have said that an application may choose UDP for a transport protocol because UDP offers finer application control (than TCP) of what data is sent in a segment and when.

- a. Why does an application have more control of what data is sent in a segment?
- b. Why does an application have more control on when the segment is sent?

Practice Problem 8) (Computer Networking: A Top-Down Approach 6th Edition: Chapter 3 P28)

Host A and B are directly connected with a 100 Mbps link. There is one TCP connection between the two hosts, and Host A is sending to Host B an enormous file over this connection. Host A can send its application data into its TCP socket at a rate as high as 120 Mbps but Host B can read out of its TCP receive buffer at a maximum rate of 50 Mbps. Describe the effect of TCP flow control.