EE450 Introduction to Computer Networks

Homework #8, Fall 2010

Due Thursday, November 7th, 2019 in class

Reading Assignment:

Chapter 3, 4

Problems to be solved:

1. Chapter 3, Page 294: P24 (15 points)

Answer true or false to the following questions and briefly justify your answer:

a. With the SR protocol, it is possible for the sender to receive an ACK for a packet that falls outside of its current window.
b. With GBN, it is possible for the sender to receive an ACK for a packet that falls outside of its current window.
c. The alternating-bit protocol is the same as the SR protocol with a sender and receiver window size of 1.
d. The alternating-bit protocol is the same as GBN protocol with a sender and receiver window size of 1.

2. Chapter 3, Page 297: P40 (20 points)

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?

3. Chapter 4, Page 362: R3 (15 points)

We made a distinction between the forwarding function and the routing function performed in the network layer. What are the key differences between forwarding and routing?

4. Chapter 4, Page 362: R8 (15 points)

What is meant by destination-based forwarding? How does this differ from generalized forwarding (assuming you have read Section 4.4, which of the two approaches are adopted by Software-Defined Networking)?

5. Chapter 4, Page 365: P3 (20 points)

In Section 4.2, we noted that the maximum queueing delay is *(n-1)D* if the switching fabric is *n* times faster than the input line rates. Suppose that all packets are of the same length, *n* packets arrive at the same time to the *n* input ports, and all *n* packets want to be forwarded to different output ports. What is the maximum delay for a packet for the (a) memory, (b) bus, and (c) crossbar switching fabrics?

6. Chapter 4, Page 366: P5 (15 points)

Consider a datagram network using 32-bit host addresses. Suppose a route has four links numbered 0 through 3, and packets are to be forwarded to the link interfaces as follows:

Destination Address Range	**Link Interface**
11100000 00000000 00000000 00000000 through 11100000 00111111 11111111 11111111	0
11100000 01000000 00000000 00000000 through 11100000 01000000 11111111 11111111	1
11100000 01000001 00000000 00000000 through	2

11100001 01111111 11111111 11111111

otherwise 3

a. Provide a forwarding table that has five entries, uses longest prefix matching, and forwards packets to the correct link interfaces.
b. Describe how your forwarding table determines the appropriate link interface for datagrams with destination addresses:

11001000 10010001 01010001 01010101
11100001 01000000 11000011 00111100
11100001 10000000 00010001 01110111