HW 3: chap3 & chap. 4 Chap. 3

1. 교과서 3장 문제: R14 (Review Questions) (간단한 설명과 함께 T/F를 답할 것!)

R14. True or False?

a. Host A is sending Host B a large file over a TCP connection. Assume Host B has no data to send Host A. Host B will not send acknowledgments to Host A because Host B cannot piggyback the acknowledgments on data.

b. The size of the TCP rwndnever changes throughout the duration of the connection.

c. Suppose Host A is sending Host B a large file over a TCP connection. The number of unacknowledged bytes that A sends cannot exceed the size of the receive buffer.

d. 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.

e. The TCP segment has a field in its header for rwnd.

f. Suppose that the last SampleRTT in a TCP connection is equal to 1 sec. The current value of TimeoutInterval for the connection will necessarily be 1 sec.

g. Suppose Host A sends one segment with sequence number 38 and 4 bytes of data over a TCP connection to Host B. In this same segment the acknowledgment number is necessarily 42.

1. 교과서 3장 문제: R15 (Review Questions)

R15. Suppose Host A sends two TCP segments back to Host B over a TCP connection. The first segment has sequence number 90; the second has sequence number 110.

a. How much data is in the first segment?

b. Suppose that the first segment is lost but the second segment arrives at B. In the acknowledgment that Host B sends to Host A, what will be the acknowledgment number?

1. 교과서 3장 문제: P2

P2. Consider Figure 3.5. What are the source and destination port values in the segments flowing from the server back to the clients’ processes? What are the IP addresses in the network-layer datagrams carrying the transport-layer segments?

1. 교과서 3장 문제: P3

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?

1. 교과서 3장 문제: P33

P33. In Section 3.5.3, we discussed TCP’s estimation of RTT. Why do you think TCP avoids measuring the SampleRTT for retransmitted segments?

1. 교과서 3장 문제: P46

P46. Consider that only a single TCP (Reno) connection uses one 10Mbps link which does not buffer any data. Suppose that this link is the only congested link between the sending and receiving hosts. Assume that the TCP sender has a huge file to send to the receiver, and the receiver’s receive buffer is much larger than the congestion window. We also make the following assumptions: each TCP segment size is 1,500 bytes; the two-way propagation delay of this connection is 150 msec; and this TCP connection is always in congestion avoidance phase, that is, ignore slow start.

a. What is the maximum window size (in segments) that this TCP connection can achieve?

b. what is the average window size (in segments) and average throughput (in bps) of this TCP connection?

c. How long would it take for this TCP connection to reach its maximum window again after recovering from a packet loss?

Chap. 4

1. 교과서 4장 문제: R.30

R30. Compare and contrast the IPv4 and the IPv6 header fields. Do they have any fields in common?

1. 교과서4장문제:P.5

Consider a datagram network using 32-bit host addresses. Suppose a router 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 0

11100000 00000000 11111111 11111111

11100000 00000001 00000000 00000000

through 1

11100000 00000001 11111111 11111111

11100000 00000010 00000000 00000000

through 2

11100001 11111111 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:

11111000 10010001 01010001 01010101

11100000 00000000 11000011 00111100

11100001 10000000 00010001 01110111

1. 그림 4.20과 같은 구조의 네트워크에서 Router R1, R2, R3 각각의 Subnet을 Subnet A, Subnet B, Subnet C라 하자. (router 간의 subnet이 아닌 subnet) 그리고 각 subnet에서 수용하여야 하는 host의 수는 다음과 같다.
   * Subnet A: 400 hosts (or interfaces) 수용하여야 함.
   * Subnet B: 200 hosts (or interfaces) 수용하여야 함.
   * Subnet C: 100 hosts (or interfaces) 수용하여야 함.

이러한 network에서 사용 가능한 주소는 214.97.252.0/22이다.  
VLSM을 사용한다고 가정하였을 때, 각 subnet에 할당한 각 주소 영역을 적으십시오. (디자인 과정을 자세히 적어야 합니다.)

1. MTU의 크기가 1500 바이트인 IP 패킷을 MTU의 크기가 500바이트인 네트워크로 전송한 다고 하자. 그 때 각 fragment에서의 identification, more flag, offset 값을 적으십시오. 원 datagram의 identification 값은 100이라고 가정한다.