Assignment 3

Duc Viet Le
CS536

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Problem 1.

a. In the second segment sent from Host A to B:

- Sequence Number: $127 + 80 = 207$
- Source-Port: 302
- Destination-Port: 80

b. If the first segment arrives before the second segment, in the acknowledgment of the first arriving segment:

- Sequence Number: 207
- Source-Port: 80
- Destination-Port: 302

c. If the second segment arrive before the first segment, in the acknowledgment of the first arriving segment:

- Sequence Number: 127

to tell A that it has received everything up to 126.

d. Draw:

Problem 2.

a. The intervals of the time when TCP slow start is operating is $[1, 6] \cup [23, 26]$

b. The intervals of the time when TCP congestion avoidance is operating is $[6, 16] \cup [17, 22]$

c. By a triple duplicate ACK. Otherwise, the *cwnd* would drop to 1

d. By a timeout as the *cwnd* dropped to 1

e. $ssthresh = 32$ because TCP congestion avoidance starts at that point

f. $ssthresh \approx 42/2 = 21$ since the *cwnd* is around 24 in the next round.

g. $ssthresh \approx 28/2 = 14$ since there is a time out when *cwnd* is around 28.

h. During 7^{th} round. As we can see, during slow start phase (i.e. round 1-6), there are 63 segments sent. the $64 - 96^{th}$ segments are sent in the next round (i.e. 7^{th} round).

i. $ssthresh = 4$ which is half of the current *cwnd*. And the *cwnd* for the next round is $ssthresh + 3 = 7$ as TCP enters the fast retransmit phase.

j. Suppose TCP Tahoe:

- $ssthresh = 42/2 = 21$
- $cwnd = 4$. Since the TCP slow-start begins at round 17^{th}, after two round, the *cwnd* has to be 4.

k. Suppose TCP Tahoe

- Round 17^{th} : 1 packets
- Round 18^{th} : 2 packets
- Round 19^{th} : 4 packets
- Round 20^{th} : 8 packets
- Round 21^{st} : 16 packets
- Round 22^{nd} : 21 packets (this is the current $ssthresh$)

Therefore, total packets sent are 52 packets.