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CMPSCI 381 Lab 8

Due Date: 3/29/2016

Honor Code: *This work is my own unless otherwise cited.*

2)

A) What is the value of the acknowledgement number field for the first acknowledgement?

Solution: ack = 10

B) What is the value of the acknowledgement number field for the third acknowledgement?

Solution: ack = 30

C) Assume that the 3rd acknowledgement arrives before any of the segments' timers expire. What is the new value of cwnd?

Solution: cwnd = 60 bytes, since the cwnd value will double.

D) What will be the sequence number of the next segment sent by the sender?

Solution: seq = 30

E) Does the value of ssthresh change? If so, what is the new value?

Solution: No it does not change. The ssthresh value only changes if a timeout occurs or if a triple duplicate ACK occurs.

F) In which state of the congestion control algorithm are we after the events take place?

Solution: We will still be in slow start.

3)

A) What is the new value of cwnd?

Solution: the new value of cwnd is 1 byte

B) What is the sequence number of the next segment sent by the sender?

Solution: seq = 0

C) Does the ssthresh value change? If so, what is the new value?

Solution: Yes it does because a timeout occurs. The new value is 15.

D) In which state of the congestion control algorithm are we after the events take place?

Solution: We are still in slow start.

4)

A) After the last acknowledgement arrives, what is the new value of ssthresh?

Solution: The new value of ssthresh is 25.

B) What is the new value of cwnd?

Solution: The new value of cwnd is 55. Which is the value of ssthresh (25), + 3 * MSS, thus 25 + (3)(10) = 55.

C) What will be the sequence number of the next segment sent by the sender?

Solution: The sequence number of the next segment sent by the sender will be 10.

D) In which state of the congestion control algorithm are we after the events take place?

Solution: We will be in congestion avoidance.

5)

A) Give the times when TCP is in slow start, congestion avoidance, and fast recovery.

Solution: TCP is in slow start during the following time frames:

1-3
9-11
14-16
32-34

TCP is in congestion avoidance during the following time frames:

4-8
12-13
17-19
21-28
30-31
35-37

TCP is in fast recovery at time 20 and 29.

B) Give the times at which the first packet in the sent flight of packets is lost, and indicate whether the packet loss is detected via timeout, or by triple duplicate ACKs.

Solution: Packet loss detected via timeout occurs at times 8, 13, 31, and 38. Packet loss detected via triple duplicate ACKs occurs at times 19 and 28.

C) Give the times at which the value of ssthresh changes, and give the new value of ssthresh.

Solution: ssthesh changes at time 9 to a new value of 6, it changes again at time 14 to a new value of 4.5, it changes again at time 20 to a new value of 5, it changes again at time 29 to a new value of 8, it changes again at time 32 to a new value of 6.5, and it changes again at time 39 to a new value of 5.5.

6)

A) Can data packets ever arrive out of order at the receiver? Explain.

Solution: No because the sender will never send out a new packet until an acknowledgement has been received for the previous packet it sent out.

B) Describe a scenario in which the receiver could deliver the same data twice to the application layer.

Solution: The receiver could deliver the same data twice to the application layer if the receiver sends an ACK that gets lost. When the ACK gets lost, the sender will resend the packet since it never received an acknowledgment for it, and then the receiver will send another ACK, which is identical to the first ACK it sent.

C) What could be done to prevent the scenario in Part B?

Solution: In order to prevent the scenario in Part B, sequence numbers could be added to the packets. With sequence numbers, the sender will know what packets have already been acknowledged by the receiver.