Homework 2 Solutions

1) TCP sends a segment at 5:30:20. it receives the acknowledgement at 5:30:25. What is the new value of RTT if the previous value of RTT was 4 seconds. Assume alpha is 0.8.

alpha = 0.8, RTT = 5

SRTT = alpha * SRTT + (1 - alpha) * RTT

By substitution:

newRTT = 0.8 * 4 + (1 - 0.8) * 5

newRTT = 3.2 + 1 = 4.2 seconds

2) TCP sends a segment at 4:30:20. it times out for the first time and retransmits at 4:30:25. it receives an ack at 4:30:27. What is the new value for RTT according to back off algorithm, if the previous value of RTT was four seconds. Assume alpha is 0.8.

RTT remains at 4 seconds because TCP does not update RTT for retransmitted packets.

3) A TCP Client sends 16 bytes to a server. What is just the TCP overhead for this transfer. define overhead as the ratio of total bytes sent by the TCP layer to the actual data sent.

TCP Header is 20 bytes. Thus, TCP header + message = 20 + 16 = 36 bytes.

Overhead ratio is 36 / 16 = 2.25

4) A TCP Client sends 16 bytes to a server. What is just the TCP + IP overhead for this transfer. define overhead as the ratio of total bytes sent by the TCP + IP layer to the actual data sent. Assume IPv4 header

IP Header is 20 bytes. Thus, IP header + TCP header + message = 20 + 20 + 16 = 56 bytes.

Overhead ratio = 56/16 = 3.5

5) A TCP client uses an Initial Sequence Number of 14,534 and the server ISN is 21,732. Show the three TCP segments during the Three way handshake.

-> syn seq = 14534

<- syn + ack = 21732
<- ack = 14535

-> ack seq = 14534
-> ack = 21733

6)
1. Why does TCP use slow start? Give two reasons.

- to prevent congestion by regulating the amount of data sent when transmission begins.

- It sets and caps the amount of data that can be transmitted as a load balance between client and server.

2. Identify regions where TCP is operating under slow start

 (1 to 6), (7 to 11), and (23 to 26)

3. Identify regions where TCP is operating under congestion avoidance or linear phase

 (11 to 15), (16 to 22), and (26 to 32)

4. Why should linear phase be used in these regions (given in your answer to Question 3)?

The Linear Phase is slows the growth of slow start so that congestion is avoided allowing the network to continue to run smoothly.

5. Identify points at which timeout has occurred and fast retransmit has occurred.
Timeout: 6, 22
Fast retransmit: 16