CS224 (m): Computer Networks (minor)
Tutorial 06, 31 Aug 2016

Concepts tested: TCP congestion control, TCP Tahoe

1. When employing slow start (cwnd=1 at time t=0), at what time does cwnd exceed 20KB? Assume a RTT of 20ms and maximum segment size of 1500 Bytes.

2. Suppose the value of cwnd just before a time out was 24KB. What will the value of cwnd (in KB) be at the end of the next five transmissions? Assume MSS of 1KB.

3. Suppose value of cwnd just before a time out was 4 packets. What are the sequence number of packets sent out when an ack is received at sender acknowledging reception of packet with seqno 4. Assume sequence numbers start from 0 post timeout and only whole packets are sent. Also assume that in additive increase, the cwnd is incremented by delta for every valid ack (delta is set to 1/cwnd-at-end-of-previous-RTT).

4. Assume TCP version Tahoe. Draw the packet transmission timeline when packet with sequence number 5 is lost and answer the following series of questions. Assume that the sequence number of packets starts with 0.

   (a) How many duplicate acks are received by the sender before the timeout event for packet 5?

   (b) What is the value of ssthresh right after the timeout event.

   (c) Once the retransmitted packet is successfully received, the receiver asks for what packet?

   (d) Once the retransmitted packet is successfully received and the receiver acks this, what packets are transmitted by the sender on receiving this ack?