Computer Networks IT 304 assignment I

TCP-Numericals Solutions

1. When both the client and the server are prepared to communicate, i.e., that the server is listening on the port to which the client sends its SYN segment, a TCP connection can be easily established. Now, consider what happens when a host receives a TCP segment whose port numbers or source IP address do not match with any of the incoming sockets in the host. For example, suppose a host receives a TCP SYN packet with destination port 80, but the host is not accepting connections on port 80 (that is, it is not running a Web server on port 80). What will happen in this case?
   Then the host will send a special reset segment to the source. This TCP segment has the RST flag bit set to 1. Thus, when a host sends a reset segment, it is telling the source "I don't have a socket for that segment. Please do not resend the segment.

2. Host A and B are communicating over a TCP connection, and Host B has already received from A all bytes up through byte 126. Suppose Host A then sends two segments to Host B back-to-back. The first and second segments contain 80 and 40 bytes of data, respectively. In the first segment, the sequence number is 127, the source port number is 302, and the destination port number is 80. Host B sends an acknowledgment whenever it receives a segment from Host A.

   (a) In the second segment sent from Host A to B, what are the sequence number, source port number, and destination port number?

   SN:207; S_PORT: 302; D_PORT:80

   (b) If the first segment arrives before the second segment, in the acknowledgment of the first arriving segment, what is the acknowledgment number, the source port number, and the destination port number?

   ACK_N=207; S_PORT: 302; D_PORT:80

3. Suppose Host A sends two TCP segments back to 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?

   20 BYTES

   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?

   ACK_N = 90

4. Consider the Telnet example discussed in class. A few seconds after the user types the letter 'C,' the user types the letter 'R.' After typing the letter 'R,' how many segments are sent, and what is put in the sequence number and acknowledgment fields of the segments?
   3 segments.
   First segment: seq = 43, ack =80
   Second segment: seq = 80, ack =44
   Third segment; seq = 44, ack = 81

5. Suppose Client A initiates a Telnet session with Server S. At about the same time, Client B also initiates a Telnet session with Server S. Provide possible source and destination port numbers for
   a. The segments sent from A to S.
   b. The segments sent from B to S.
   c. The segments sent from S to A.
   d. The segments sent from S to B.
   AS LONG AS telnet port num is correct, any source port num is acceptable on paper.

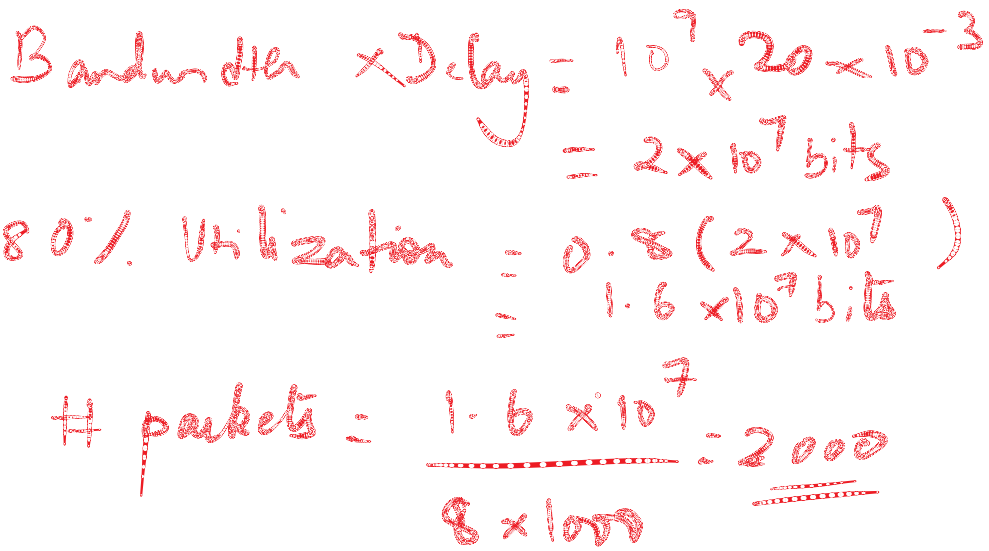
   e. If A and B are different hosts, is it possible that the source port number in the segments from A to S is the same as that from B to S?
   YES , if the IP addresses of A and B are same

   f. How about if they are the same host
   NO

Week 7-Lec 2 numericals Solutions

Suppose host A is sending a large file to host B over a TCP connection. The two end hosts are 10msec apart (20msec RTT) connected by a 1Gbps link. Assume that they are using a packet size of 1000 bytes to transmit the file. Also assume for simplicity that ACK packets are extremely small and can be ignored.

At least how big would the window size (in packets) have to be for the channel utilization to be greater than 80%.



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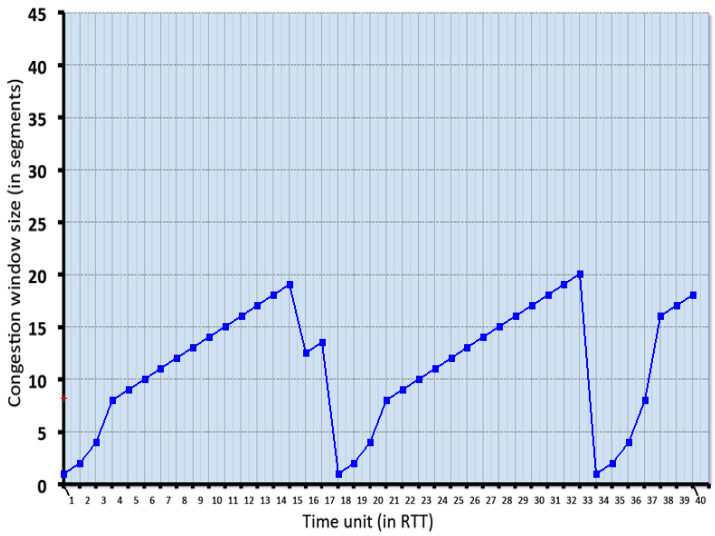
- Suppose that TCP's current estimated values for the round trip time (*estimatedRTT*) and deviation in the RTT (*DevRTT*) are 270 msec and 45 msec. Suppose that the next three measured values of the RTT are 230 msec, 390 msec, and 290 msec respectively.
  What is the estimatedRTT after the first RTT?

$$ERTT_1 = ERTT_0(1-\alpha) + MRTT_1(\alpha)$$
$$= 270(1-0.125) + 0.125(230) =$$
$$= 236.25 + 28.75$$
$$= 265\ ms$$

What is the RTT deviation after first RTT?

$$DevRTT_1 = (1-\beta)DevRTT_0 + \beta|MRTT_1 - ERTT_1|$$
$$= (1-0.25)45 + 0.25|230-265|$$
$$= 33.75 + 0.25(35)$$
$$= 42.5\ ms$$

TCP congestion behaviour problem



1. indicate the slow start tx rounds as range (x-y) : 1-3
2. indicate the CA rounds as range (x-y) : 4-14
3. Indicate the Fast recovery phases 15-16

You can practise more problems similar to the calculating estimatedRTT, congestion control behaviour based on this link https://gaia.cs.umass.edu/kurose_ross/interactive/index.php under topics

- TCP sequence and ACK numbers, with segment loss
- TCP RTT and timeout
- TCP congestion window evolution
- TCP retransmissions (reliable data transmission with ACK loss)