National University of Computer and Emerging Sciences, Karachi

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CS3001-Computer Networks

Practice Questions

1. a) Describe why an application developer might choose to run an application over UDP rather than TCP.
   b) Is it possible for an application to enjoy reliable data transfer even when the application runs over UDP? If so, how?

2. a) Why is it that voice and video traffic is often sent over TCP rather than UDP in today's Internet?
   b) Assume Host A is streaming a video from Server B using UDP. Also assume that the network suddenly becomes very congested while Host A is seeing the video. Is there any way to handle this situation with UDP? What about with TCP? Is there any other option?

3. a) Suppose a process in Host C has a UDP socket with port number 6789. Suppose both Host A and Host B each send a UDP segment to Host C with destination port number 6789. Will both of these segments be directed to the same socket at Host C? If so, how will the process at Host C know that these two segments originated from two different hosts?
   b) Suppose that a Web server runs in Host C on port 80. Suppose this Web server uses persistent connections, and is currently receiving requests from two different Hosts, A and B. Are all of the requests being sent through the same socket at Host C? If they are being passed through different sockets, do both of the sockets have port 80? Discuss and explain.

4. In our rdt protocols,
   a) why did we need to introduce sequence numbers?
   b) why did we need to introduce timers?
   c) Suppose that the roundtrip delay between sender and receiver is constant and known to the sender. Would a timer still be necessary in protocol rdt 3.0, assuming that packets can be lost? Explain,

5. 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?
   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?

6. a) Why sender TCP reduces its transmission speed? Assume application is generating data at a steady rate.
   b) In protocol rdt3.0, the ACK packets flowing from the receiver to the sender do not have sequence numbers (although they do have an ACK field that contains the sequence number of the packet they are acknowledging). Why is it that our ACK packets do not require sequence numbers?

7. Answer true or false to the following questions and briefly justify your answer.
   a) With the SR protocol, it is possible for the sender to receive an ACK for a packet that falls outside of its current window.
   b) With GBN, it is possible for the sender to receive an ACK for a packet that falls outside of its current window.

8. a) Assume a TCP sender transmits 5 TCP segments with respective sequence numbers 1200, 2000, 2800, 3600, 4400. The sender receives five acknowledgements with the following sequence numbers, 2400, 2800, 2800, 2800, 2800. Complete the Figure #1 to show what TCP segments are exchanged between sender and receiver.
b) Assume a TCP sender transmits 5 TCP segments with respective sequence numbers 200, 1000, 1800, 2600, 3400. The sender receives five acknowledgements with the following sequence numbers, 1000, 1800, 2600, 2600, 2600. Draw the window diagram to show what TCP segments are exchanged between sender and receiver.

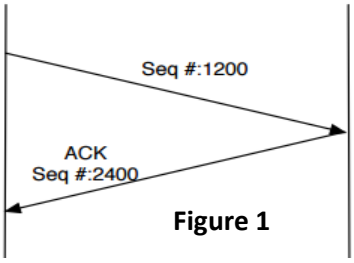

Figure 1

9. a) TCP connection has currently estimated RTT of 15 ms with a deviation of 1.9 ms. What is the value of the retransmission timer after the next acknowledgement coming in after 20 ms?
b) TCP connection has currently estimated RTT of 25 ms with a deviation of 2.8 ms. What is the value of the retransmission timer after the next acknowledgement coming in after 30 ms?

10. Assuming TCP Reno is the protocol experiencing the behavior shown in Figure # 2, answer the following questions. In all cases, you should provide a short discussion justifying your answer.
a) Identify the intervals of time when TCP slow start is operating?
b) Identify the intervals of time when TCP Congestion avoidance is operating?
c) After the 16th transmission round, is segment loss detected by a triple duplicate ACK or by a timeout?
d) After the 22nd transmission round, is segment loss detected by a triple duplicate ACK or by a timeout?
e) What is the initial value of threshold at the first transmission round?
f) What is the value of threshold at the 18th transmission round?
g) What is the value of threshold at the 24th transmission round?
h) During what transmission round is the 70th segment sent?
i) Assuming a packet loss is detected after the 26th round by the receipt of a triple duplicate ACK, what will be the values of the congestion window size and of threshold?

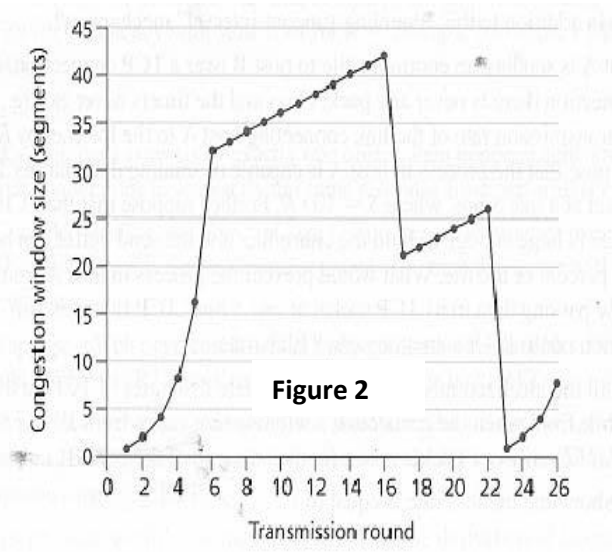

Figure 2

11. A packet is to be forwarded to a network with MTU of 1020 bytes. The packet has an IP header of 20 bytes and a data part of 5960 bytes. Find number of fragments as shown in the given table.

	Total Length	Flag	Fragment's Offset
Original Packet			
Fragment # 1			
Fragment # 2			
Fragment # 3			