EECS 563
Homework 11

1. Since UDP is connectionless what is the purpose of UDP over IP, i.e., why is UDP needed?

2. Explain the difference between a socket and a TCP port.

3. The TCP window is measured in packets. TRUE or FALSE.

4. Given the maximum TCP window size in IPv4 what is the efficiency of a 10 Gb/s link with a one-way propagation delay of 1 ms. This is a case of a large a bandwidth*delay product path. Given this result look at RFC 1323 and discuss how the TCP Window Scale Option improves performance over large bandwidth*delay product paths.

5. TCP checks only the header for bit errors. TRUE or FALSE.

6. How does TCP provide a reliable communications service over IP which does provides an unreliable service?

7. A TCP connection operates over a 10 Gb/s link with a one-way propagation time of 10 ms. Assume a maximum segment (packet) size of 1 Kbyte. How much data is sent to the destination at the end of the first 80 ms of data transfer?
Assume the connection has been established.

8. Assume a TCP server expects to receive byte 2001, but is receives a segment with sequence number 2200. What is the reaction of the TCP server to the event. Justify this reaction?

9. Assume a TCP server expects to receive byte 2001, but is receives a segment with sequence number 1201. What is the reaction of the TCP server to the event. Justify this reaction?

10. MPLS is a uses virtual circuit switching techniques. TRUE or FALSE and explain your answer.

11. In an MPLS domain, rank the following three flows in terms of their level of aggregation: (a) all packets destined to the same host; (b) all packets with the same egress router; (c) all packets with the same CIDR address.

12. The internet can only support one transport protocol. TRUE or FALSE and explain your answer.

13. TCP reduces its transmission rate upon the occurrence of a timeout. Transmission errors frequently result in lost packets in the wireless segment of the end-to-end path.

a. Is reducing the transport layer transmission rate an appropriate action for every occurrence of a timeout? YES or NO. Justify your answer.

b. How would you cope with lost packets in the wireless segment of the end-to-end path?

14. The packet loss rate P_L is can be approximated by $N P_e$, (for $P_e << 1$) where N is the packet size in bits and P_e is the bit error rate. Find the average TCP (Reno) throughput in Mb/sec for a connection with

a. MSS = 1500 Bytes, one way propagation delay = 50 ms bit error rate = 10^{-9}.

b. MSS = 1500 Bytes, one way propagation delay = 50 ms bit error rate = 10^{-12}.

c. Comment on the impact of P_e on the average TCP (Reno) throughput