CS5310.001/002, Fall 2020
Computer Networks and Communication Systems
Assignment 1

Issued: 09/23/2020
Due: 10/07/2020

1. (15 pts) Briefly explain using your own words why the transport layer is a first end-to-end layer?

2. (15 + 10 = 25 pts)

(1) Explain concisely using your own words why Internet is a connectionless packet switched network, and why it's not designed to be a circuit switched network?

(2) Briefly explain using your own words the benefit and weakness of choosing a single frame format in ATM networks.

3. (10+10 = 20 pts) Assume that packet-switched network with a 500ms worst case jitter is to be used for a number of application each of which involves constant bit rate information stream. Determine the minimum amount of memory that is required at the destination and a suitable packet size for each of the following two input bit rates. It can be assumed that the mean packet transfer rate of the network exceeds the equivalent input bit rate in each case.

a. 100 Mbps

b. 1000 Mbps

4. (8 + 12 = 20 pts)

(1) Assume that the velocity of propagation of an electrical signal is equal to the speed of light (i.e. is 300,000km/s). Assume also that the distance S between two DTEs is 2,500 meters and the number of bits in a frame is 12,000 bits. At what data rate R is the transmission delay equal to the the propagation delay?

(2) Assume that the velocity of propagation of an electrical signal is equal to 2/3 of the speed of light, determine the ratio of the signal propagation delay to the transmission delay, a, for the following types of data link and 12,000 bits of data:

(a) 400 m of UTP wire and a transmission rate of 10 Mbps;

(b) 50.0 km of coaxial cable and a transmission rate of 40 Mbps;

(c) A satellite link of 60,000 km and a transmission rate of 200 Mbps.

5. (10 + 10 = 20 pts) Consider an asynchronous transmission implementation where the desirable data rate is 56 kbps.

(1) If the an deviation of 1/8 to the nominal bit center is desired, what should be the clock rate of the receiver (in Hz)?

(2) If the clock rate is 56KHz, what is the deviation?