CS 356 Homework Assignments for Fall 2015.

All problems are from the textbook, and you can find information in the referenced chapter on how to do the assignment. However, the solutions manual is widely available on the Web, so I have changed the data in each assignment.

**Chapter 1 Computer Networks and Internet**

**Homework 1**

1. Propagation Delay and Transmission Delay. Consider two hosts, A and B, connected by a link of rate ***R*** bps. Suppose that the two hosts are separated by ***m*** meters, and suppose the propagation speed along the link is ***s*** meters per second. Host A sends a packet of ***L*** bits to Host B.
2. Express the propagation delay, ***dprop***, in terms of m and s.

m/s

1. Determine the transmission time of the packet, ***dtrans***, in terms of ***L*** and ***R***.

L/R

1. Ignoring processing and queuing delags, obtain an expression for the end-to-end delay.

Let N be the number of links between Host A and Host B

The end-to-end delay is N(dtrans + dprop)

1. If host A begins to transmit at time t = 0. At time ***dtrans***, where is the last bit of the packet?

The last bit is in the link a dtrans

1. Suppose ***dprop*** is greater than ***dtrans.*** At time = ***dtrans***, where is the first bit of the packet?

The first bit is in the link

1. Suppose ***dprop*** is less than ***dtrans.*** At time = ***dtrans***, where is the first bit of the packet?

The first bit is at Host B

1. Suppose ***s*** = 200,000,000, ***L*** = 220 bits, and ***R*** = 56 kbps. Find a distance ***m*** so that ***dprop*** equals ***dtrans***.
2. We are sending real-time voice from Host A to Host B over a packet switched network (VoIP) Host A converts analog voice into a digital 64 kbps bit stream on the fly. Host A then groups the bits into 56-byte packets. There is one link between Host A and B. Its transmission rate is 1 Mbps and its propagation delay is 10 msec. As soon as Host A gathers a packet, it sends it to host B. As soon as Host B receives an entire packet, it converts the packets bits into an analog signal. How much time elapses from the time a bit is created (from the original signal at Host A) until the bit is decoded (as part of the analog signal at Host B)?

Dtrans = 448/56000 = 0.000448 seconds

From the time the bit is created to the time it reaches host B is the transmission delay + the propagation delay = 10.000448