UNI CS 3470, Section 1
Networking

Homework 2 (hand in 9/9/2016 in class)

Directions:
You must show your work to get full credit for any answer! Please circle your answers.

1. (Similar to Chapter 1, Question #4 in textbook, parts a and b): Calculate the total time required to transfer a 200MB file in the following cases, assuming an RTT of 60 ms, a packet size of 100 KB data, and an initial 2 x RTT of "handshaking" before data is sent (3pts):

   a) The bandwidth is 100 Mbps, and data packets can be sent continuously.
   b) The bandwidth is 100 Mbps, but after we finish sending each data packet we must wait one RTT before sending the next.

   When calculating your answer, let's stay with book conventions and compute file sizes using powers of 2. (So, 1KB is 2^{10} bytes, 1MB is 2^{20} bytes, and 1GB is 2^{30} bytes). However, network bandwidth is calculated in powers of 10. For example, 1Mbps is 10^6 bits per second. Look at the section "How Big Is a Mega?" on page 50 of your textbook for clarification.

2. What differences in traffic patterns account for the fact that STDM is a cost-effective form of multiplexing for a voice telephone network and FDM is a cost-effective form of multiplexing for television and radio networks, yet we reject both as not being cost effective for a general-purpose computer network? (2pts)

3. How "wide" is a bit on a 1-Gbps link? How long is a bit in fiber, where the speed of propagation is 2.0×10^8 m/s? (2pts)

4. (Similar to Chapter 1, Question #14, parts a, b, and d): Suppose a 10-Gbps point-to-point link is being set up between the Earth and a new lunar colony. The distance from the moon to the Earth is approximately 385,000 km, and data travels over the link at the speed of light – 3×10^8 m/s (3pts).

   a) Calculate the minimum RTT for the link.
   b) Using the RTT as the delay, calculate the delay x bandwidth product for the link.
   c) A camera on the lunar base takes videos of the Earth and saves them in digital format to disk. Suppose Mission Control on Earth wishes to download the must current image, which is 105 MB. What is the minimum amount of time that will elapse between when the request for the data goes out and the transfer is finished?