Homework 10

Problem 1:

An OC-192 network line has a bandwidth of up to 9.510912 Gbit/s. Ignoring delays through OLAs and routers, calculate the maximum number of <u>bytes</u> that can be in transit on a link from Milwaukee to New Orleans. (Show your assumptions. Look up the transmission delay in optical fiber.)

Problem 2:

A TCP connection is transferring a file of 7000 KB. The first byte is numbered 5500. Assume that the data is sent in seven segments, each carrying 1000 B. What are the sequence numbers and what are the acknowledgment numbers assuming that every segment is acknowledged?

Problem 3:

The additive increase multiplicative decrease adjustment for the congestion window in TCP uses the following formula for a time slot:

$$w(t + 1) = \begin{cases} w(t) + \alpha & \text{if no congestion is detected} \\ w(t)/\beta & \text{if congestion is detected} \end{cases}$$

Assume that α is the maximum segment size per round trip time and β is two. Assume a typical maximum segment size of 536 bytes and a roundtrip time of 1msec. Assume further that segments are lost if more than 10KB (10,240B) are sent per millisecond. Finally, assume that there are always bytes to send. Show the evolution of the congestion window for the first 100 milli-seconds. (You can use an excel spreadsheet or simpler a programming language of your choice to generate the congestion window sizes and / or graph the result.)