

CPSC 460/560 Homework Assignments #1

Submission: Turn in a **hard copy** of your solutions by 3:40PM, Monday, 1/14/2013.

1. Consider two packet switches directly connected by a link of 5000km, propagation speed 2.5×10^8 m/s, and transmission rate 1Mbps. How long does it take to move the packet of length 1000 bytes from one packet switch to the other packet switch? Generally, how long does it take to move the packet of length L over a link of distance d , propagation speed s , and transmission rate R bps? (4 points)
2. Suppose N packets arrive simultaneously to a link at which no packets are currently being transmitted or queued. Each packet is of length L and the link transmission rate R . What is the average queuing delay for the N packets? (2 point)
3. Suppose users share a 1Mbps link. Also suppose each user requires 500kbps when transmitting, but each user transmits only 10 percent of the time. (8 points)
 - i) When circuit switching is used, how many users can be supported?
 - ii) For the remainder of this question, suppose packet switching is used. Why will there be essentially no queuing delay before the link if two or fewer users transmit simultaneously? Why will there be a queuing delay if three users transmit simultaneously?
 - iii) Find the probability that a given user is transmitting.
 - iv) Suppose there are 3 users. Find the probability that at any given time, all three users are transmitting simultaneously. Find the fraction of time during which the queue grows.
4. Give the definition of protocol. (2 point)
5. Give a 3-5 sentence summary of your understanding of the Internet. (4 points)