

**CS 455/555**  
**Introduction to Networks & Communication**  
**Spring 2008**  
**Homework 1: Solution**  
**Points: 20**  
**Due: January 22, 2008**

The following questions are selected from Chapter 1 (Pages 69-75).

**Problem 2.**

a) A circuit-switched network would be well suited to the application described, because the application involves long sessions with predictable smooth bandwidth requirements. Since the transmission rate is known and not bursty, bandwidth can be reserved for each application session circuit with no significant waste. In addition, we need not worry greatly about the overhead costs of setting up and tearing down a circuit connection, which are amortized over the lengthy duration of a typical application session.

**Problem 5**

- a)  $d_{prop} = m/s$  seconds.
- b)  $d_{trans} = L/R$  seconds.

**Problem 18**

- a) 40,000 bits
- b) 40,000 bits
- c) The bandwidth-delay product of a link is the maximum number of bits that can be in the link
- d) 1 bit is 250 meters long, which is longer than a football field
- e)  $s/R$

**Problem 22**

- a) 150 msec
- b) 1,500,000 bits
- c) 600,000,000 bits

**Problem 6**

Consider the first bit in a packet. Before this bit can be transmitted, all of the bits in the packet must be generated. This requires  $48.8/(64*10^3)$  sec = 6 msec

The time required to transmit the packet is  $48.8/(1*10^6)$  sec = 384  $\mu$ sec

Propagation delay = 2 msec.

The delay until decoding is 6msec + 384  $\mu$  sec + 2msec = 8.384msec

A similar analysis shows that all bits experience a delay of 8.384 msec.

Question 6: Show the trace and explain