KFUPM - COMPUTER ENGINEERING DEPARTMENT
COE-342 – Data and Computer Communication
Due Date: Monday March 1st, 2004 @ 11:00 am

Student Name:
Student Number:

1) We want to implement a packet-voice transmission. To do this we build an electronic board that groups bits arriving at 64 kbps into packets of 48 bytes. The packets are sent over a 230 km transmission line to a second board. The second board converts the packets into a 64 kbps bit stream. We assume that the packets are transmitted as soon as they are formed and that the second board converts each packet back into the bit stream as soon as it is fully received. The propagation time along the transmission line is 1 ms. What is the delay faced by the bit stream between the input of the first board and the output of the second board? Assume the data rate for the link between the first board and the second board is equal to R bits/second.

2) To transmit packets with virtual-circuit transport, we set up a virtual-circuit and then we transmit the packets. The network is lightly loaded, and our packets do not face any queueing delay at intermediate switching nodes. The virtual-circuit setup time is 400 ms. The packet travel over a path that goes through ten nodes, and the links transmit at 56 kbps. Each packet has 400 bits of data, a header of 5 bytes to indicate the virtual-circuit number and the packet sequence number, and a trailer of 2 bytes that contains bits used for error detection. When we use datagram transport (connectionless mode) no virtual-circuit is setup, but each packet needs a header of 10 bytes instead of 5 bytes to indicate the full destination address and source address, in addition to the packet sequence number. These packets also have to have the 2-bytes trailer. Assume datagrams also happen to follow the same path through ten nodes. How long does it take to transmit N packets using virtual-circuit transport and when using datagram transport? For what value of N is it faster to use virtual circuit transport?