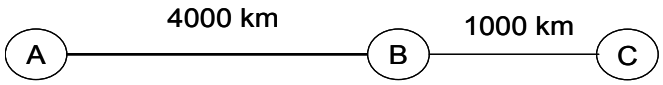
KFUPM - COMPUTER ENGINEERING DEPARTMENT

COE-540 – Computer Networks
Quiz 03 - December 21st, 2008

Student Name:
Student Number:

Question 1: (20 points) In the shown figure, frames are generated at node A and send to node C through node B. The following specifies the two communication links:

- The data rate between node A and node B is 100 kb/s
- The propagation delay is 5 μsec/km for both links
- Both links are full-duplex
- All data frames are 1000 bits long; ACK frames are separate frames of negligible length
- Between A and B sliding window protocol with a window size of 3 is used
- Between B and C, stop-and-wait is used.
- There are no errors (lost or damaged frames)



a) Calculate the utilization for link AB?

b) What is the throughput for link AB in bits per second? What is the throughput in frames per second?

c) Calculate the minimum rate required between nodes B and C so that the buffers of node B are not flooded.

d) What is the efficiency of the communication on link BC?