**CSc 4220/6220 – Spring 2017**
Assignment #1
Deadline: Wednesday, January 25th 11:59 pm
Late deadline: Sunday, January 29th 11:59 pm

Problem solving. Make sure to show ALL of your work and state any necessary assumptions.

1. Suppose we have a simple circuit-switched network consisting of four switches and four links. All links in the network have a capacity of 6 Mbps. Each user requires a fixed rate R=150 Kbps when transmitting. However, a given user is active only 10% of the time.
   a. How many users can be supported with this network?
   b. Assume FDM is used to support the maximum number of users. If the time to set up a circuit is 50msec, how long would it take a user to transmit a file of size 640KB?
   c. If there are a total of 100 users, and if packet switching is used, what is the probability that 20 users are transmitting simultaneously?

Node A
Node B
Node C
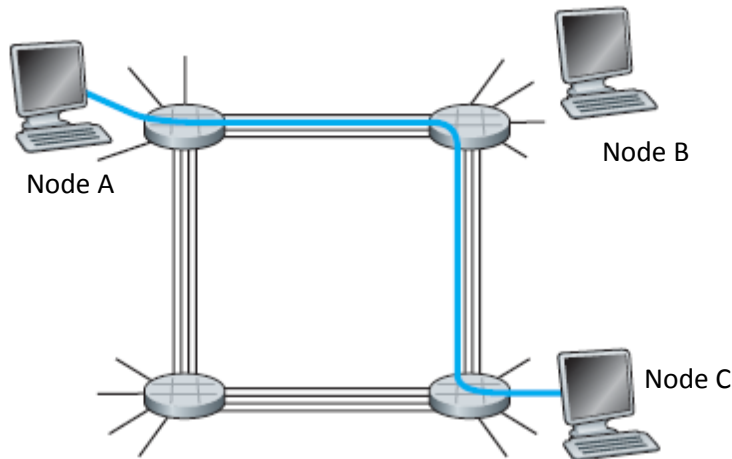
2. Consider the figure below. Suppose Host A has a packet of size S=1500B to send to Host B at time t=0. Let B_1=10 Mbps, B_2 = 20 Mbps, and B_3 = 30 Mbps be the bandwidth capacities of the three links respectively. Let D_1, D_2, and D_3 be the corresponding lengths of the three fiber links and let V denote the speed of light. Assume that processing and queuing delays are negligible and answer the following questions in terms of the variable names.
   a. At what time T_1 does the packet leave R_1? The packet is said to leave a router when it has been fully transmitted on to the next link.
   b. At what time T_2 does the packet leave R_2?
   c. At what time T_3 does the packet reach host B?
   d. Now suppose Host A has a second packet, also of size S, to be sent to Host B and sends the two packets back to back. At what time T_4 does the second packet reach R_1?

Host A
B1
R1
B2
R2
B3
Host B
S
D1
D2
D3
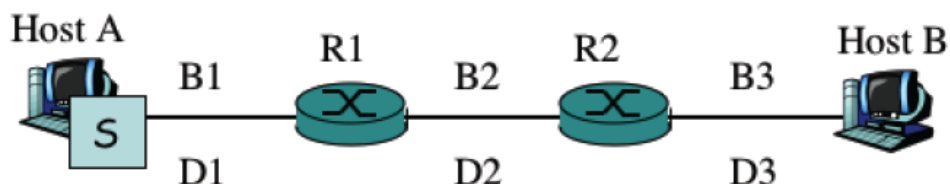
3. Consider the figure from Problem 2. Suppose B1=B2=B3=2 Mbps and D1=D2=D3=1000Km. The propagation speed for each link is 2.5x10^8 m/s. Assume Host A has a file of size 10MB to send to Host B. If packet switching is used and Host A divides the file into packets of size L=1500B, where 20 bytes of the packet are overhead for the headers. How long would it take to send the file from Host A to Host B? You can assume that nodal processing delays are negligible and that there is no other traffic in the network.

Wireshark problems.

Directions: Follow your textbook instructions to install Wireshark on your laptop. Answer all the questions that follow in this Assignment. Provide screenshots and typed answers in a PDF document with your name and panther ID. Upload the PDF document in iCollege dropbox to receive your grade.

Do a test-run of Wireshark using instructions at: http://gaia.cs.umass.edu/wireshark-labs/Wireshark_Intro_v7.0.pdf.

Q1. List 3 different protocols that appear in the Protocol column in the unfiltered packet-listing window in step 7 in the test-run.

Q2. How long did it take from when the HTTP GET message was sent until the HTTP OK reply was received? (By default, the value of the Time column in the packet listing window is the amount of time, in seconds, since Wireshark tracing began. To display the Time field in time-of-day format, select the Wireshark View pull down menu, then select Time Display Format, then select Time-of-day.)

Q3. a) What is the Internet address of the gaia.cs.umass.edu (also known as

wwwnet.cs.umass.edu)? What is the Internet address of your computer?

b) Briefly explain in 1 or 2 sentences, the entries in the Info column corresponding to

your request.

Q4. Print the two HTTP messages (GET and OK) referred to in question 2 above. To do so, select Print from the Wireshark File command menu, and select the "Selected Packet Only" and "Print as displayed" radial buttons, and then click OK.