EECS 863

1. An ALOHA protocol is used to share a 100 kb/s radio channel. The system uses fixed length frames which are 10 kbits long.

a. Find the maximum packet arrival rate in packets/sec?
b. Would you operate the network using the rate found in part a)? Justify your answer

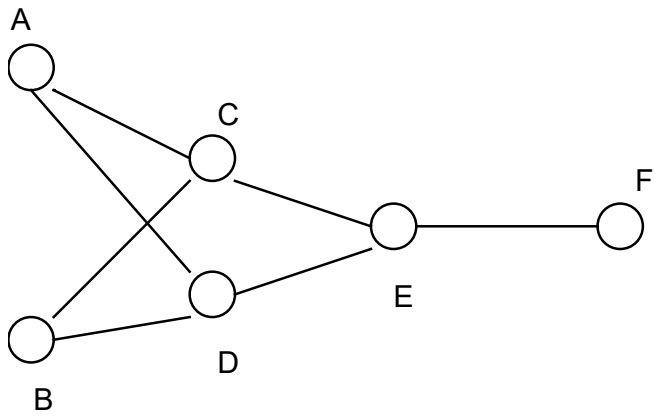
2. Use the result for Maximum Throughput for CSMA-CD given in Maximum Normalized Throughput for CSMA-CD Networks for this problem. Assume nodes are connected by coax cable. The propagation speed in coax is 0.88*(3X10*8) m/s.

a. Find the range of date rates which will result in a maximum throughput of greater than 0.6 for a packet size of 5000 bits and a distance of 700 m.
b. Find the range of packet lengths which will result in a maximum throughput of greater than 0.6 for a distance of 500m and a rate of 1.0 Gb/s.
c. Consider the result in part c), as the packet length increases the maximum throughput increases, then why not use a packet length of 100,000 bits?

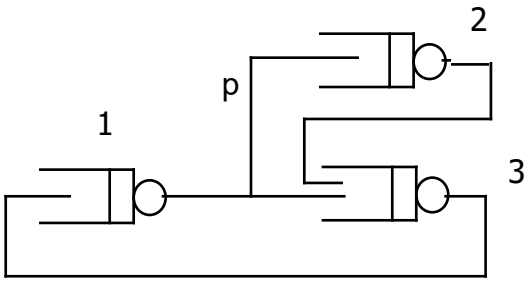
3. A reservation system has frame transmission time of 40 ms and uses a 4 ms minislot for reservations. What is the maximum throughput for the following cases:

a. One minislot used to make one frame reservation
b. One minislot used to make 5 frame reservation
c. Nodes contend for reservation minislots using Slotted ALOHA.

4. Consider the network shown below. There are four sessions: ACE, ADE, BCEF, and BDEF sending Poisson traffic rates 400, 800, 1500, and 2400 packets/sec, respectively. Packet lengths are exponentially distributed with mean 1000 bits. All transmission lines have capacity 10 Mb/sec. Find the average number of packets in the system, the average delay per packet (regardless of session), and the average delay per packet of each session.



5. The closed network below only contains two packets. Let p = 0.33.



Here $\mu_1=2$, $\mu_2=3$, $\mu_3=6$, and service times are exponentially distributed.

a) Find the average number in each node using the convolution algorithm and then confirm your results using MVA.

b) Find the average throughput in packets/sec for each node.

c) Confirm your results using simulation. (See http://www.ittc.ku.edu/%7Efrost/EECS_563/LOCAL/Extend_Models_2011/Close_Net_Example.mox as an example of an Extend model for a closed system)