CS 6380 Computer Networks	Fall Quarter, 1997

Homework 4

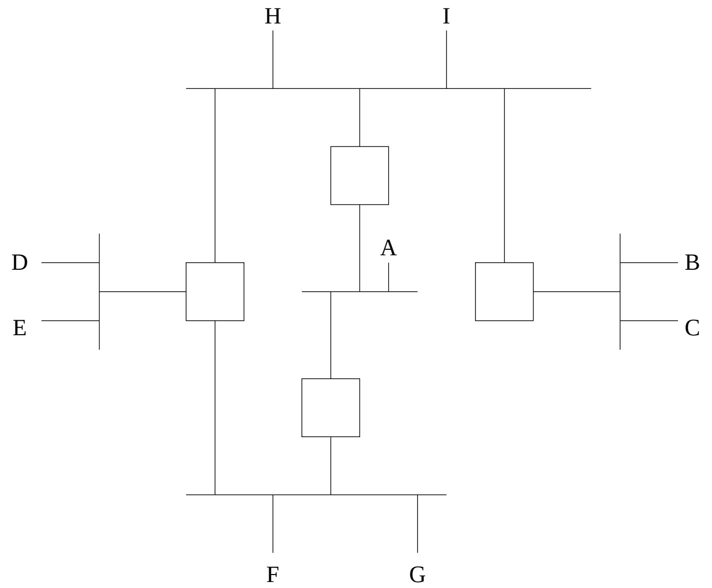
Assigned: November 6 — *Due: November 13*

Reminder: Late homeworks will NOT be accepted!

1. Tanenbaum, Chapter 4, problem 4.

2. A group of N stations shares a slotted-ALOHA channel. Each station generates a 1000-bit packet at an average rate of one every 100 seconds. What is the maximum useful value of N? (The maximum useful value of N is achieved when the throughput is maximized, since any further increase in N will decrease throughput.)

3. For the multi-LAN topology in the figure below, mark the ports on each bridge as a root port (R), a designated port (D) or a blocked port (B). Show the path of a frame that originates at host A.



4. Consider a token ring in which a station is allowed to hold the token for a maximum period of time, called the token holding time (THT). Let RL denote the ring latency, that is, the time it takes the token to make one complete rotation around the ring when no stations have data to send.

   (a) Express the efficiency of the ring, in terms of THT and RL, when only a single station has data to send.

   (b) What value of THT would be optimal for a network that had only one station with data to send?

   (c) In the case of N stations with data to send, give an upper bound on the time for the token to make a full trip (rotation) around the ring.

Turn the page over.......

5. Some applications are better suited for Ethernet, and some are better suited for token ring (with a limit on token holding time). Which LAN technology is better suited for a remote terminal application (e.g., telnet) and which is better for a file transfer application (e.g., ftp)? Does your answer depend on the relative speeds of the two technologies? Give a general explanation for the characteristics of these applications that suggest one technology is better suited than the other.

6. Read either of the following papers on current medium access control:

   (a) "A Protocol for Efficient Transfer of Data over Fiber/Cable Systems," J. Limb and D. Sala, Proceedings of Infocom '96.

   (b) "Solutions to Hidden Terminal Problems in Wireless Networks," C. Fullmer and J. Garcia-Luna-Aceves, Sigcomm'97.

   A pointer to both papers can be found on the web page. Write a concise evaluation of the paper. The first paragraph should summarize the paper, in your own words. The second paragraph should reflect on how this work is different than what you have seen in class.