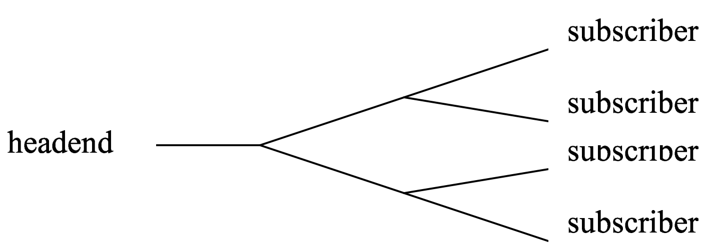
Homework 3 for CSE/EE 461 (Winter 2001)

Due: Friday, Feb 2, 2001, at the beginning of class. (Out: Wed, Jan 24, 2001.)

Note: be sure to show how you derived answers so that you are eligible for partial credit.

1. Cable Modems. Cable modems send data over the cable plant, which is modeled as a tree. Subscribers sit at the leaves of the tree and the root of the tree is the headend, which connects the cable plant the rest of the Internet. All communications between subscribers are sent via the headend. Transmissions from the headend are broadcast and reach all subscribers. Transmissions from each subscriber are not broadcast to other subscribers, but travel only to the headend along a path that is shared by different subscribers according to the structure of the tree. Your job is to design a feasible MAC protocol. It must use statistical multiplexing and make some attempt to improve efficiency by avoiding collisions. There are many possible solutions to this question, but the more efficient the MAC protocol, the better.

a) How does your protocol send a message from the headend to a subscriber?
b) How does your protocol send a message from a subscriber to the headend?



2. Learning Bridges. Peterson 3.14

3. Learning Bridges. Peterson 3.16 a), b)

c) Suppose that there are now three bridges, B1, B2, B3 joining the two LANs. Describe what happens when M sends to L.

4. Spanning Trees. Peterson 3.12 a), b) c)

5. Distance Vector. Peterson 4.12 a), b), c)

d) How many further iterations are needed before all routing tables are stable?
e) For any network, describe how many iterations are needed before all of the routing tables are stable. Give your answer in terms of the properties of the network graph.

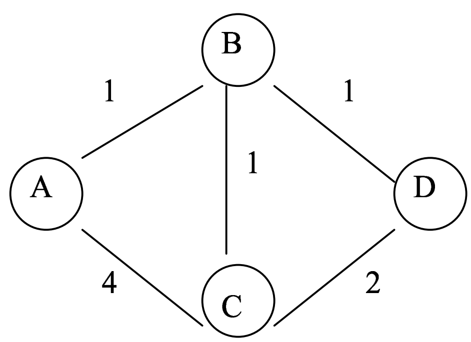
6. Count to Infinity. Peterson 4.17

7. Split Horizon / Poison Reverse. Peterson 4.19

8. Split Horizon / Poison Reverse. Keshav 11.5

Consider the network shown with stable routes. Now assume link BA goes down so that B routes to A through C. If B uses split horizon, it will report to C an infinite distance to A, since B uses C to reach A. Similarly, D also reports to C an infinite distance to A. Now, suppose that link CA goes down.

a) What distance to A will C report to B and D?
b) What is the distance to A that D reports to B?
c) What does B think the shortest path to C is?
d) What does B tell C about its distance to A?
e) What is C's route to A now?
f) What does C tell D?
g) When does this cycle end?



□□□