

Due in class on Thursday, October 11th, 2001

Please be sure to show all your work and write down any assumptions you make.

1. Link-State Routing (15 points):

For the network given in Figure 3.38, page 236 (Peterson & Davie, 2nd edition), show how the link-state algorithm builds the routing table for node D.

2. Distance-Vector Routing (15 points):

For the same network above, show the sequence of routing tables (one for each update cycle, presuming that each node transmits at exactly the same instant) that would be created by the distance-vector algorithm.

3. Spanning Tree Algorithm (15 points):

Problem 3.12 from Peterson and Davie, 2nd edition. Show your work.

4. ATM (15 points):

Problem 3.23 from Peterson and Davie, 2nd edition.

5. Building a Corporate Intranet (40 points):

You are a senior engineer at AAAA Corp., a medium-sized nuts&bolts company. The CEO has decided that it would boost productivity if they installed a corporate Intranet connecting all of the companies PCs. In addition, he has decided that he would like to add some servers to improve network performance. He has already bought two in anticipation of the new network installation. Since you are the only employee with any knowledge of computer networks, you have been asked to come up with a design for networking your entire company, and optionally, a price. Since this is the CEO's current pet project, you want to look good - so don't blow it!!

AAAA has two main offices, one in Rochester and one in Boston. There are fourteen PCs in Rochester, and six in Boston. In addition, one new server has been added to each office. The CEO has decided to lease a T1 line between Rochester and Boston to provide enough bandwidth for file sharing and teleconferencing. He has also decided to hook up the Rochester office to an ISP (Internet Service Provider) using a leased ISDN line. Assume that the PCs are running some variety of Windows software, and that for future Internet connectivity, you have been told that you will use the Internet protocol stack (i.e., TCP/IP) to connect your machines.

For the purposes of this assignment, you need consider only the networking hardware cost, and not other important costs like the cost of reconfiguring the operating systems, network management tools, the new servers, the T1 line, the need for a firewall or gateway, or the cost of cabling the office¹. You **do** need to consider **all** of the networking hardware costs, however, including LAN interface boards, LAN repeaters, bridges or switches, and routers to connect the Rochester and Boston offices, etc. Finally, assume that the CEO has mandated an all-Cisco solution (to make it easier to grade the assignment). Use Cisco's web site to look up the specifics of which hardware can solve the various networking requirements you have (e.g., routers, LAN switches, WAN interface cards, ISDN connectivity, etc.). Their URL is <http://www.cisco.com>. Remember that the important criteria are to specify all hardware requirements, assess bandwidth needs, and avoid wastage while leaving room for expansion/growth. Explain all of your design decisions, such as:

- What type of LAN network are you opting to install?
- How did you organize the two LANs?

¹Note that cabling is often one of the most expensive components. Also, software configuration and network management tools, things that you're allowed to overlook for this assignment, are the hardest part of the job!

Hints on how to proceed:

- (a) First, sketch the desired network configuration (e.g., a LAN at each site, a pair of routers connecting them, an ISDN line from Rochester to an ISP, etc.).
- (b) Annotate your sketch to indicate what hardware you need to purchase. Don't forget the interface cards! At the WAN level, the routers must be able to connect to T1 serial lines. At the LAN level, the PCs need to be able to connect to whatever LAN technology you chose.
- (c) Search the web site for some real hardware descriptions. You will probably have to read through a couple of the "Networking Solutions" product descriptions to find the right hardware to solve all of your networking infrastructure problems. Remember, overkill is not a good thing - you're wasting the company's money and resources (e.g., selecting a switch that can handle 128 100-base-T links is overkill).
- (d) List all the hardware you think you need to buy, including model numbers.

You can, optionally, price your solution as well.