

Computer Networking Midterm
10/23/2008

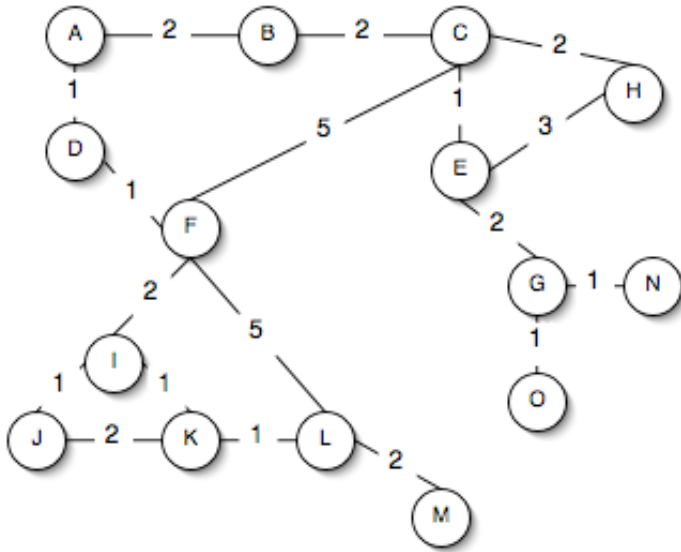
THE PHYSICAL LAYER (25 pts)

1. What are the five layers in the Internet network model? (1pt each)
2. What is the difference between a signal element and a data element? (1pt)
3. What three parameters uniquely describe any sine wave? (1pt each)
4. What is bandwidth? (1pt)
5. What is the difference between baseband transmission and broadband transmission? (1pt)
6. Give an example of one medium that uses baseband transmission and one that uses broadband transmission (1pt each).
7. Show how the bit string 011001001100 would be encoded in each of the following digital to digital coding schemes: (2pts each)
 - a. NRZ-I
 - b. Manchester
 - c. AMI
 - d. BASK
 - e. BPSK
8. What is the purpose of block coding in the physical layer? (2pts)

THE DATA LINK LAYER (30 pts)

9. What is the purpose of block coding in the data link layer? (2pts)
10. Take the bit string 0010110101110101111100011001 and show the code words for each of the following coding schemes:
 - a. Simple parity (2 pts)
 - b. Two-dimensional parity (3pts)
 - c. Hamming codes (5pts)
 - d. CRC (use divisor 1011) (5pts)
11. Take the bit string 0010111100101111111001101000101001. Treat it as a Hamming code and decode the codewords. If any of the codewords have errors, indicate the errors and indicate which bit had the error (5pts).
12. Take the bit string 00101101001110111011101100000111010. Treat it as a CRC code and decode the codewords. If any of the codewords have errors, indicate which ones. Use divisor 1011. (6pts)
13. Take the bit string 0110010110101100000010111101000100010111. This was encoded with two dimensional parity. Extract the datawords and determine if there was an error. If so, can you determine where the error was? (2pts)

THE NETWORK LAYER (45 pts)



Above, you see a network.

14. For DISTANCE VECTOR routing, treat each hop as a distance of 1 and complete each of the following:
 - a. Show the initial routing table for node F (2 pts)
 - b. Show the final routing table for node F (6pts)
 - c. Assume that all nodes broadcast their routing tables simultaneously, and that all nodes update their routing tables simultaneously from these received broadcasts. How many updates will it take node F to determine its final routing table from its initial one? (2pts)
15. For LINK STATE routing, the numbers on each link indicate the cost of using that link. Complete each of the following:
 - a. Use Dijkstra's algorithm to find the shortest path tree for node F. Show all of your steps (10pts).
 - b. Use the shortest path tree you generated in (a) to generate the routing table for node F. (5pts)
 - c. Assume that the links between C and E and between I and K both fail. What is the new shortest path tree and final routing table? (10pts)
16. What is the difference between physical addressing and logical addressing? (2pts)
17. How does DHCP differ from BOOTP? (1pt)
18. What are the rules for how IP address blocks assigned to Internet sites? Why these rules? (2pt)
19. What is NAT and how does it work? (5pts)