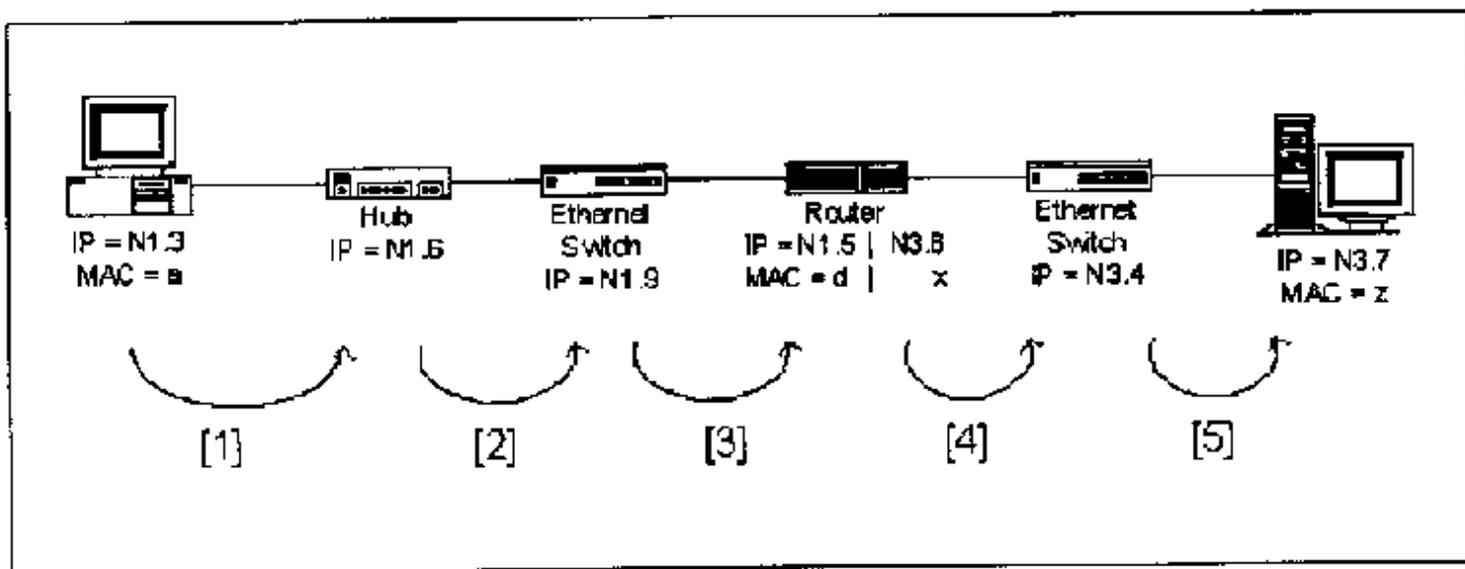# EECS 122 - COMMUNICATION NETWORKS - Spring 2001

Midterm #1, 2/16/01: SOLUTIONS

Professor Walrand

1. Packet Formats (5 out of 20)

The notation is as in the lectures and notes: For Ethernet, [EDA | ESA | ?] and for IP packets, [IPSA | IPDA | ?].


Computer N1.3 sends a packet to computer N3.7. Select the appropriate formats for the packet as it goes through the links [1]-[5] among the following choices:

P1: [N1.3 | N1.6 | data]
P2: [d | a | N1.3 | N3.7 | data]
P3: [d | a | N1.3 | N1.5 | data]
P4: [z | a | N1.3 | N1.5 | data]
P5: [d | a | N1.6 | N1.9 | data]
P6: [z | a | N1.6 | N1.9 | data]
P7: [d | a | N1.9 | N1.5 | data]
P8: [x | a | N1.3 | N3.6 | data]
P9: [x | a | N1.3 | N1.5 | data]
P10: [z | a | N1.3 | N3.4 | data]
P11: [z | a | N1.3 | N3.7 | data]
P12: [z | x | N3.6 | N3.4 | data]
P13: [z | x | N1.3 | N3.7 | data]
P14: [z | x | N3.6 | N3.7 | data]
P15: [z | x | N3.4 | N3.7 | data]

Your Answers:

LINK	Format (P1, P2,..., or P15)
[1]	P2
[2]	P2
[3]	P2
[4]	P13
[5]	P13
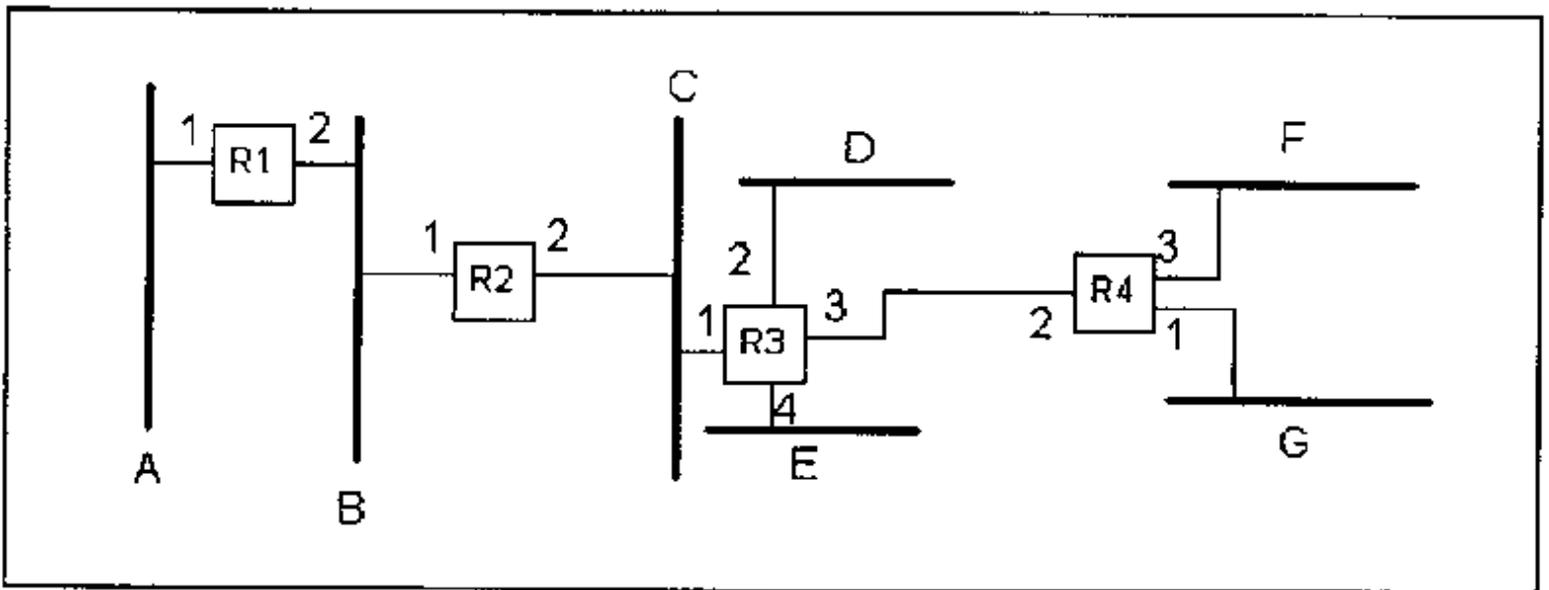
2. CIDR Addressing (5 out of 20)

The network above uses CIDR addressing. A-G are subnets separated by the routers R1-R4.

Assignment 1	Assignment 2	Assignment 3	Assignment 4	Assignment 5
A: 1011	A: 1001	A: 01	A: 10	A: 101
B: 1010	B: 1000	B: 010	B: 110	B: 101
C: 10101	C: 1010	C: 101	C: 1110	C: 110
D: 10100	D: 10110	D: 100	D: 11110	D: 011
E: 10110	E: 10111	E: 110	E: 111110	E: 010
F: 00	F: 110	F: 1110	F: 1111110	F: 001
G: 01	G: 111	G: 1111	G: 1111111	G: 000

Your task is to determine which of the following CIDR prefix assignments for A-G are feasible and which are not.

For each assignment (1 through 5), mark with a cross in the appropriate column whether it is feasible or unfeasible.

Your Answers:

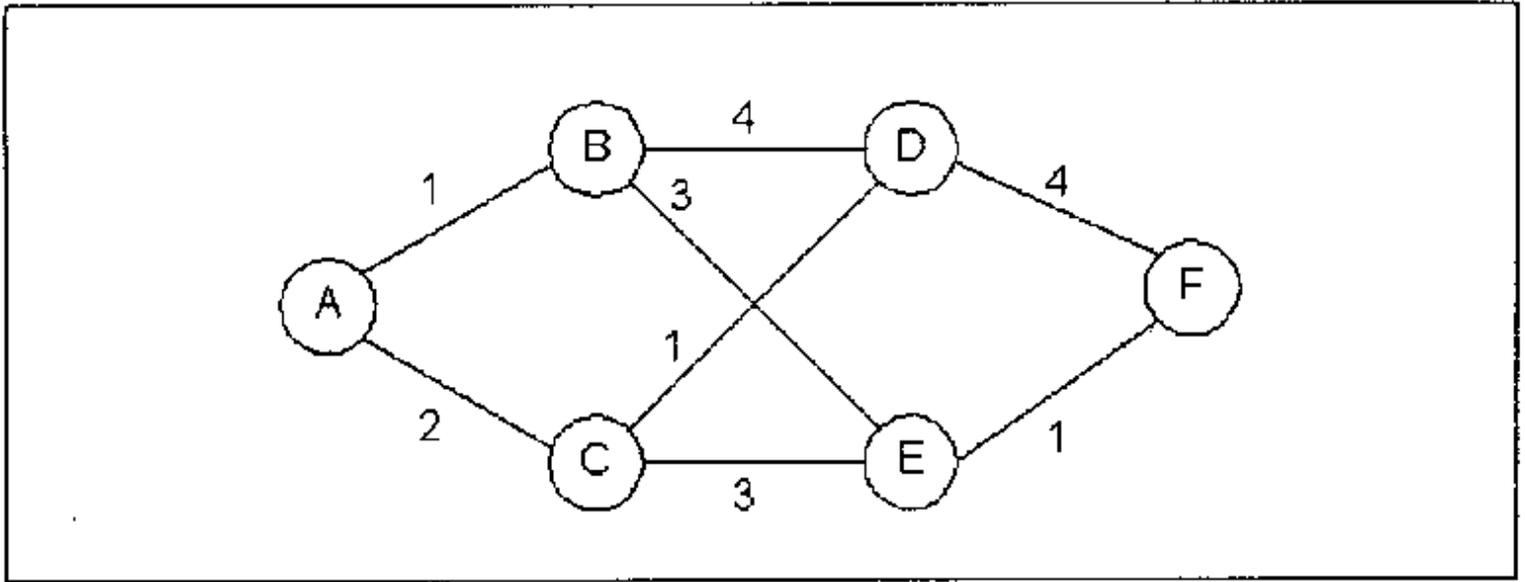| Assignments	Feasible	Unfeasible
1		X (n1)
2	X	
3		X (n2)
4	X	
5		X (n2)

Notes:

(n1): Some addresses could be common for A and C (e.g., 1010***)
(n2): Some addresses could be common for A and B
(n3): A and B are the same.
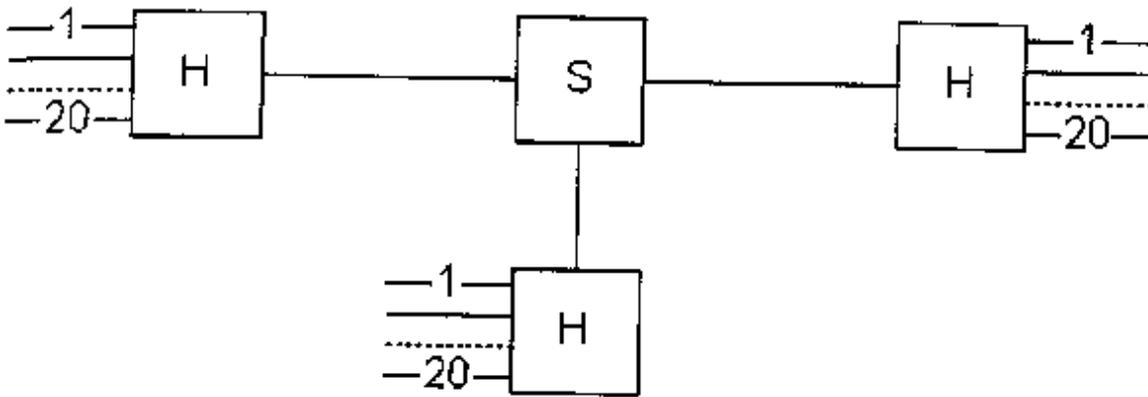
3. OSPF (5 out of 20)

In the graph above, the links go from left to right and have the lengths shown in the figure. We use Dijkstra's algorithm to find the tree of shortest paths from A to all the destinations. Your task is to indicate the list of labels of all the nodes at the successive steps of the algorithm. Initially, all the labels are 'infinity: Y', except the label of node A that is 0. Put a star (*) next to the label of a node whose children have been explored. For instance, label 2* for node D means that at the current step of the algorithm the shortest path from A to D has length 2 and all the children of D have been examined from node D. At each step, the algorithm examines only one node.

(Each column corresponds to one step of the algorithm. There may be more columns than actual steps until the algorithm completes.)

Your Answer:

Node\ Step ->	1	2	3	4	5	6	7	8	9	10	11	12	13
A	0	0	0*	0*	0*	0*	0*	0*					
B	¥	1	1	1	1*	1*	1*	1*					
C	¥	¥	2	2	2	2*	2*	2*					
D	¥	¥	¥	4	4	3	3*	3*					
E	¥	¥	¥	¥	4	4	4	4*					
F	¥	¥	¥	¥	¥	¥	7	5*					

4. Maximum Rate (5 out of 20)

In the network above, assume that all the links are 100-Mbps links and that all the devices want to transmit at an average rate of R bps. Every hub is attached to the switch and to 20 devices. We assume that the traffic is symmetric: Each device sends at the same average rate to every other device. As we have done so far, we assume that the MAC protocol is perfectly efficient. What is the maximum possible value of R?

(Be careful, no partial credit is given for this problem. Either you get it right or you don't. We accept a numerical error of up to 5%.)

Your Answer:

***** NO SOLUTION AVAILABLE FOR THIS PROBLEM *****