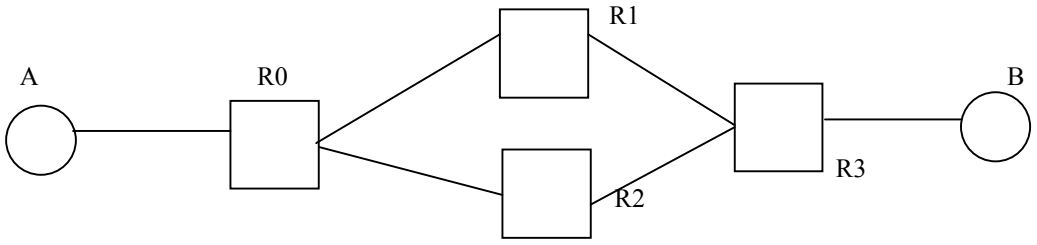
EECS 325/425
Homework 5 – Due November 30 before 11:59pm
28 pts

1. **(6 points)** Chapter 4,
    a. Problem 5a. Note: There is a bit of a logical gap in this problem formulation because the existing forwarding table listed in the problem formulation already stipulates localized (not globally) unique VC numbers. So, just assume that the existing VCs use the localized numbers as defined in the forwarding tables but the new VCs are to have globally unique numbers.
    b. Problem 5b
    c. Picking one combination of allowable VC numbers from problem 5b, draw an example topology of routers and links corresponding to the four links in the problem, highlight the path taken by the new VC introduced in problem 5b, and write down the entry in the forwarding table of each router that corresponds to this VC.

2. **(6 points)** This problem considers fragmentation.

    a. Consider host A sending a 3,000-byte UDP datagram (including all IP and UDP headers) to host B via router R. The link between A and R has an MTU of 1500 bytes while the link between R and B has an MTU of 576 bytes. Describe the fragments arriving at the router R and host B. Describe the values of their relevant IP header fields and show the location of the UDP headers.
    b. To save on the size of the offset field in the IP header, the fragment offset counts 8-byte chunks rather than bytes. But we could save more space by counting 16-byte chunks, or 32-byte chunks, etc. Where is a "push-back"?
    c. Now assume that A and B are connected via two alternative paths as shown below. Assume all links except R1-R3 have 1500 MTU and link R1-R3 has 500 MTU. Assume router R0 load-balances its packets between R1 and R2 by alternating between the two. Assuming the router R0 chooses R1 for the first fragment, describe the fragments arriving at host B (again, provide the number of fragments and values of relevant IP header fields).



3 Consider a computer with IP address 154.16.52.16 and subnet mask 255.255.240.0.

(a) What is the address of the subnet this computer is on? (Use the standard notation: x.x.x.x/x) **(2 points)**
(b) What is the range of addresses on this subnet? **(2 points)**
(c) How many different subnets can there be with the same mask? **(2 points)**

4 **(2 points)** Chapter 4, Problem 11.

5 **(2 points)** Chapter 4 problem 27a

6 **(2 points)** Chapter 4, Problem 28. Consider rounds of distance vector algorithm similar to fig. 4.30. Show the distance table entries in each iteration of the algorithm assuming that initially each node knows only the costs to its immediate neighbors.

7 **(2 points)** Chapter 4, Problem R24 (they mean the routing table in fig. 4.36 here). 2 points. Note: this is from review problems (the problem number starts with an "R"!).

8 **(2 points)** Consider the network from problem (Ch. 4, Problem 26). Draw the multicast distribution tree resulting from reverse path forwarding with pruning, when the sender is node t and the members of the multicast group (besides t) are nodes u and z.