Spring 2024, CS 3611: Computer Networks

Homework 5

Problem 1 Please compare LSR and DVR, and explain each suitable usage scenarios. How Internet routing protocols deal with DVR count-to-infinity problem? (10 points)

Problem 2 What's the difference between Intra-AS Routing and Inter-AS Routing? (10 points)

Problem 3 True or false: When an OSPF route sends its link state information, it is sent only to those nodes directly attached neighbors. Explain. (10 points)

Problem 4 Consider the count-to-infinity problem in the distance vector routing. Will the count-to-infinity problem occur if we decrease the cost of a link? Why? How about if we connect two nodes which do not have a link? (15 points)

Problem 5 Consider the network shown below. Suppose AS3 and AS2 are running OSPF for their intra-AS routing protocol. Suppose AS1 and AS4 are running RIP for their intra-AS routing protocol. Suppose eBGP and iBGP are used for the inter-AS routing protocol. Initially suppose there is no physical link between AS2 and AS4.

1. Router 3c learns about prefix x from which routing protocol: OSPF, RIP, eBGP, or iBGP? (5 points)
2. Router 3a learns about x from which routing protocol? (5 points)
3. Router 1c learns about x from which routing protocol? (5 points)
4. Router 1d learns about x from which routing protocol? (5 points)

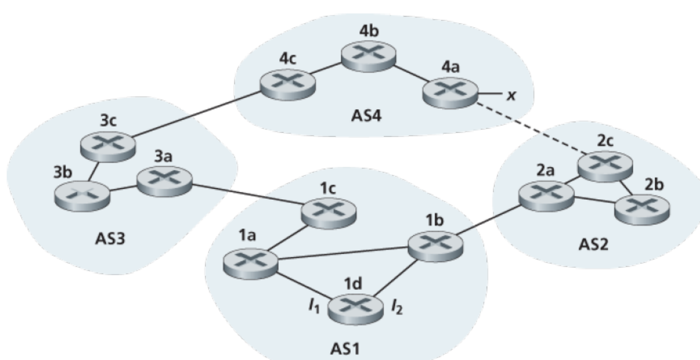

Figure 1: The network in P5

Problem 6 Consider the network shown below, and assume that each node initially knows the costs to each of its neighbors. Consider the distance-vector algorithm and show the distance table entries at node z. (15 points)

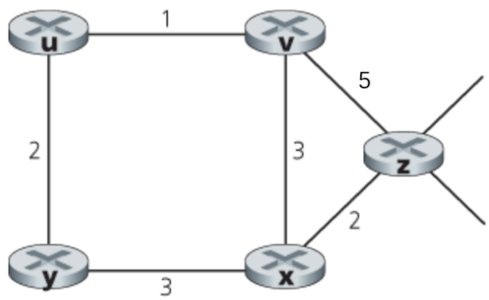

Figure 2: The network in P6

Problem 7 Consider the network fragment shown below. x has only two attached neighbors, w and y. w has a minimum-cost path to destination u (not shown) of 6, and y has a minimum-cost path to u of 7. The complete paths from w and y to u (and between w and y) are not shown. All link costs in the network have strictly positive integer values. (15 points)

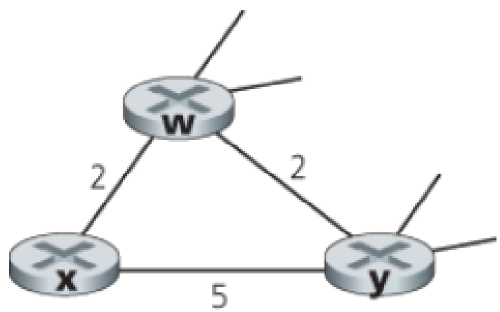

Figure 3: The network in P7

1. Give x's distance vector for destinations w, y, and u. (5 points)
2. Give a link-cost change for either c(x, w) or c(x, y) such that x will inform its neighbors of a new minimum-cost path to u as a result of executing the distance-vector algorithm. (5 points)
3. Give a link-cost change for either c(x, w) or c(x, y) such that x will **not** inform its neighbors of a new minimum-cost path to u as a result of executing the distance-vector algorithm. (5 points)