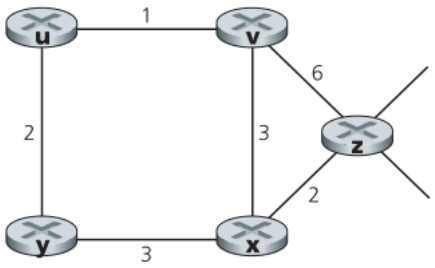
Computer Networking Homework 6

Due date: 2019/01/05 13:00 PM (Please upload your homework before deadline, you will get 0 point once you missed the deadline.)

Please Upload your homework via CEIBA system

The file should be in pdf format and named with YourSchoolNumber_hw#.pdf

1. (20%) 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.




Answer:

| | | Cost to u | v | x | y | z |
|---|---|---|---|---|---|---|
| | v | ∞ | ∞ | ∞ | ∞ | ∞ |
| From | x | ∞ | ∞ | ∞ | ∞ | ∞ |
| | z | ∞ | 6 | 2 | ∞ | 0 |

| | | Cost to u | v | x | y | z |
|---|---|---|---|---|---|---|
| | v | 1 | 0 | 3 | ∞ | 6 |
| From | x | ∞ | 3 | 0 | 3 | 2 |
| | z | 7 | 5 | 2 | 5 | 0 |

| | | Cost to u | v | x | y | z |
|---|---|---|---|---|---|---|
| | v | 1 | 0 | 3 | 3 | 5 |
| From | x | 4 | 3 | 0 | 3 | 2 |
| | z | 6 | 5 | 2 | 5 | 0 |

| | | Cost to u | v | x | y | z |
|---|---|---|---|---|---|---|
| | v | 1 | 0 | 3 | 3 | 5 |
| From | x | 4 | 3 | 0 | 3 | 2 |
| | z | 6 | 5 | 2 | 5 | 0 |

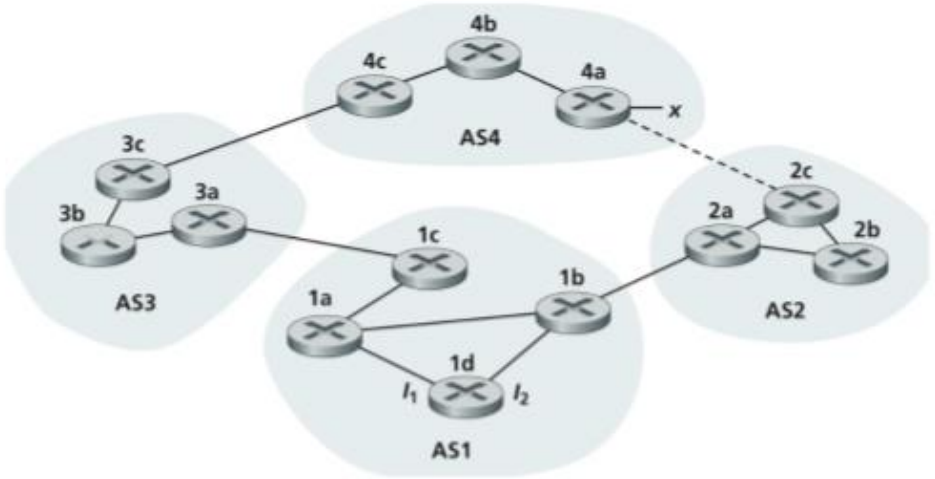
2. (20%) Consider the count-to-infinity problem in the distance vector routing. Will the count-to-infinity problem occur if we decrease the cost of a link? Why? How about if we connect two nodes which do not have a link?

Answer:

No. loops involving three or more nodes will not be detected by the poisoned reverse technique.

At each step, each updating of a node's distance vectors is based on the Bellman-Ford equation, i.e., only decreasing those values in its distance vector. There is no increasing in values. If no updating, then no message will be sent out. Thus, D(x) is non-increasing. Since those costs are finite, then eventually distance vectors will be stabilized in finite steps.

3. (20%) 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.




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

b. (5%) Router 3a learns about $x$ from which routing protocol?

c. (5%) Router 1c learns about $x$ from which routing protocol?

d. (5%) Router 1d learns about $x$ from which routing protocol?

Answer:

a. eBGP

b. iBGP

c. eBGP

d. iBGP

4. (15%) Referring to the previous problem, once router 1d learns about $x$ it will put an entry $(x, I)$ in its forwarding table.
   a. (5%) Will $I$ be equal to $I_1$ or $I_2$ for this entry? Explain why in one sentence.
   b. (5%) Now suppose that there is a physical link between AS2 and AS4, shown by the dotted line. Suppose router 1d learns that $x$ is accessible via AS2 as well as via AS3. Will I be set to $I_1$ or $I_2$? Explain why in one sentence.
   c. (5%) Now suppose there is another AS, called AS5, which lies on the path between AS2 and AS4 (not shown in diagram). Suppose router 1d learns that $x$ is accessible via AS2 AS5 AS4 as well as via AS3 AS4. Will $I$ be set to $I_1$ or $I_2$? Explain why in one sentence.

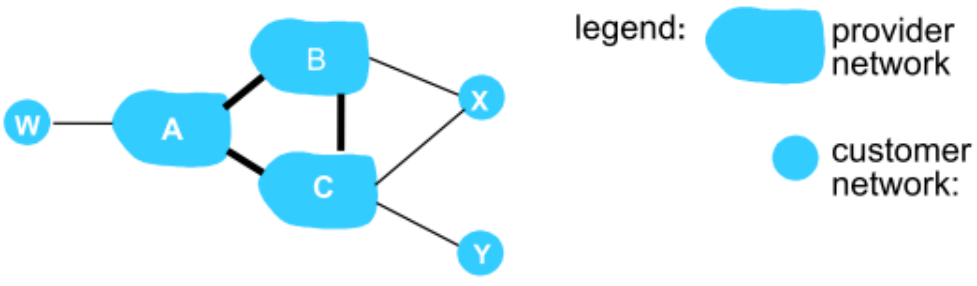
Answer:

a. $I_1$ because this interface begins the least cost path from 1d towards the gateway router 1c.

b. $I_2$. Both routes have equal AS-PATH length but $I_2$ begins the path that has the closest NEXT-HOP router.

c. $I_1$. $I_1$ begins the path that has the shortest AS-PATH.

5. (20%) Consider the Figure shown below, suppose that there is another stub network V that is a customer of ISPA. Suppose that B and C have a peering relationship, and A is a customer of both B and C. Suppose that A would like to have the traffic destined to W to come from B only, and the traffic destined to V from either B or C. How should A advertise its routes to B and C? What AS routes does C receive?




Answer:

A should advise to B two routes, AS-paths A-W and A-V.

A should advise to C only one route, A-V.

C receives AS paths: B-A-W, B-A-V, A-V.

6. (5%) In Section 5.7 we saw that is was preferable to transport SNMP messages in unreliable UDP datagrams. Why do you think the designers of SNMP chose UDP rather than TCP as the transport protocol of choice for SNMP?

Answer:

Often, the time when network management is most needed is in times of stress, when the network may be severely congested and packets are being lost. With SNMP running over TCP, TCP's congestion control would cause SNMP to back-off and stop sending messages at precisely the time when the network manager needs to send SNMP messages.