Answer for EE3315 Test 1 2016-2017 SemB

Question 1. [8 marks]

Consider the Distance-Vector update shown in the Fig. Q.1 below. It shows an existing table (i) in a gateway K, and update messages (ii) from another gateway J and (iii) from another gateway M. Write down the changes in the table and give the reasons for those changes. Assume that the distance between gateways K and J is 2 and the distance between gateways K and M is 3.

Destination	Distance	Route
Net 1	0	Direct
Net 2	0	Direct
Net 4	8	Gate L
Net 17	2	Gate M
Net 25	3	Gate J
Net 30	5	Gate Q
Net 44	4	Gate J

(i) An existing routing table for a gateway K

Destination	Distance
Net 1	2
Net 4	4
Net 17	6
Net 25	4
Net 27	5
Net 30	8
Net 44	10

(ii) An incoming routing update message from gateway J.

Destination	Distance
Net 1	2
Net 4	1
Net 17	4
Net 25	4
Net 27	3
Net 30	7
Net 44	4

(iii) An incoming routing update message from gateway M.

Figure Q.1

Destination	Distance	Route
Net 4	4	Gate M
Net 17	7	Gate M
Net 25	6	Gate J
Net 27	6	Gate M
Net 44	7	Gate M

Figure Q.1a

For destination Net 4, it updates that a shorter distance resulting from routing via gateway M.
For destination Net 17, it updates that if passing via gateway M, it will take longer route.
For destination Net 25, it updates that if passing via gateway J, it will take longer route.
For destination Net 27, it updates that a new route is setup via gateway M.
For destination Net 44, it updates that a shorter distance resulting from routing via gateway M compared with the updated route via gateway J.

Question 2. [26 marks]

In Figure Q.2, assume that the network has been operating for a long time. Assume A, B and C use split horizon with Poisoned Reverse.

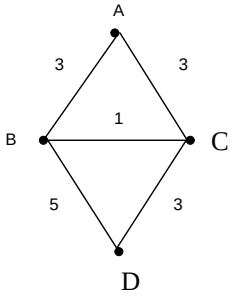


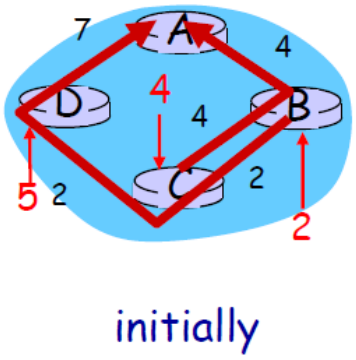
Figure Q.2

i. What distance to D will C report to A? 3
ii. What distance to D will C report to B? 3
iii. What distance to D will A report to C? ∞
iv. What distance to D will B report to C? ∞

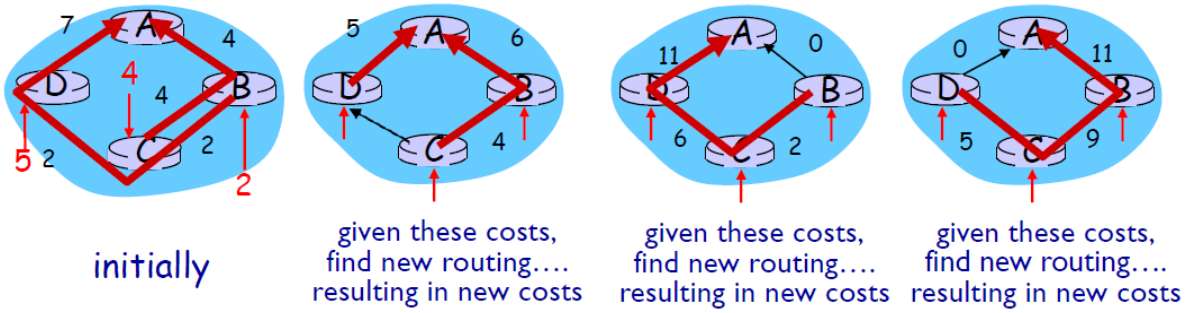
Now, suppose link BD goes down.
v. What distance to D will B report to A? 4
vi. At the same time, what is the distance to D that C reports to B? 3
vii. At the same time, what is the distance to D that C reports to A? 3
viii. At the same time, what is the distance to D that A reports to B? 6
ix. What does A then think the shortest path to D is? A-C-D
x. What does A then tell B about its distance to D? 6
xi. What does A then tell C about its distance to D? ∞
xii. What is B's route to D now? B-C-D
xiii. What does B then tell C the distance to D? ∞

Question 3. [16 marks]

Let link cost be equal to the amount of carried traffic in a link. Let the traffic from node B, node C and node D to node A be 2 units, 4 units and 5 units, respectively. According to the routing decision initially given by the following figure, draw down three corresponding figures if we use Link State routing algorithm three times to find new shortest paths to node A resulting in new costs.

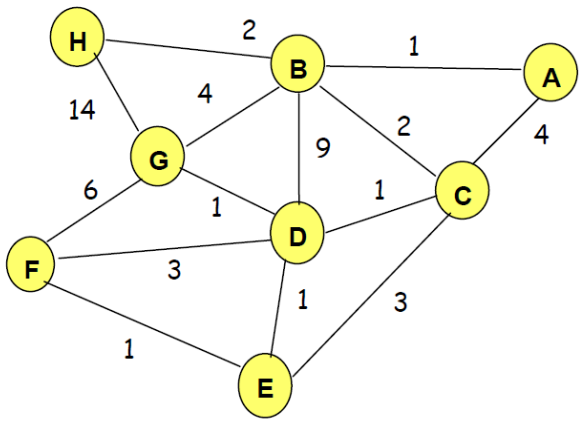


Answer for Question 3:



Question 4. [16 marks]

Consider the following network:



Say that the number on every link represents the cost of using this link. If **the cost of using the link between Node E and Node D is changed from 1 to 4 and the cost of using the link between Node E and Node C is changed from 3 to 1**, using Dijkstra's algorithm, compute the shortest path from **Node E** to all network nodes. Use the table form below, but work out the results in your answer sheet. If there is a tie, ***break it in favor of leftmost column***. List out all the shortest paths from Node E to all the other

nodes and their corresponding costs.

N	A	B	C	D	F	G	H
E	∞	∞	1,E	4,E	1,E	∞	∞
E,C	5,C	3,C		2,C	1,E	∞	∞
E,C,F	5, C	3,C		2,C		7, F	∞
E,C,F,D	5,C	3,C				3,D	∞
E,C,F,D,B	4,B					3,D	5,B
E,C,F,D,B,G	4,B						5,B
E,C,F,D,B,G,A							5,B
E,C,F,D,B,G,A,H							

The shortest path from Node E to
A: ECBA Cost: 4
B: ECB Cost: 3
C: EC Cost: 1
D: ECD Cost: 2
F: EF Cost: 1
G: ECDG Cost: 3
H: ECBH Cost: 5

Question 5. [8 marks]

In Figure Q.5, we assume that A, B, C are provider networks and X, W, Y are customers of provider networks. In addition, Border Gateway Protocol (BGP) is used between networks. State whether the following statements are true or false. Explain your answer.

i) W is willing to advertise to A a route to C.
ii) B is willing to advertise to A the path BX
iii) A is willing to advertise to W the path ABX
iv) A is willing to advertise to Y the path ABX

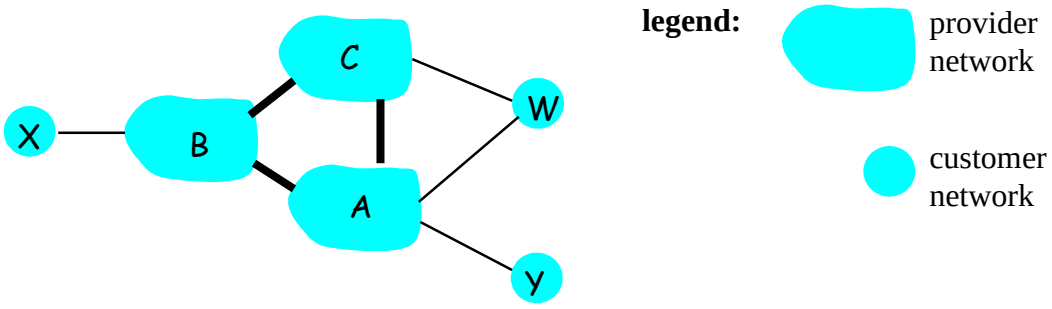


Figure Q.5 : A simple BGP scenario

i) False. W does not want to route from A via W to C since W gets no "revenue" for that.
ii) True. B gets "revenue" for routing ABX since X is B's customer.
iii) True. A gets "revenue" for routing WABX since W is A's customer.
iv) True. A gets "revenue" for routing YABX since y is A's customer.

Question 6. [12 marks]

Referring to Figure Q6, what is the path used (a) from 2a to 5a (b) from 2a to 6a, respectively, using the following routing algorithms?

1. The shortest path routing
2. The hot potato routing (with the shortest path routing outside AS2)
3. BGP routing with the elimination rules:
   i. shortest AS-PATH
   ii. shortest path to NEXT-HOP

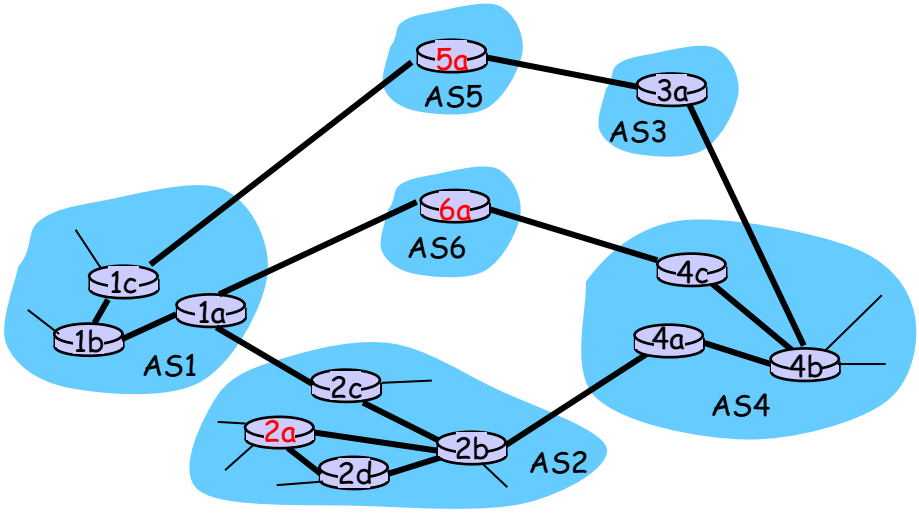


Figure Q6

(a) From 2a to 5a

1. 2a-2b-4a-4b-3a-5a
2. 2a-2b-4a-4b-3a-5a
3. 2a-2b-2c-1a-1b-1c-5a

(b) From 2a to 6a

1. 2a-2b-2c-1a-6a
2. 2a-2b-4a-4b-4c-6a
3. 2a-2b-4a-4b-4c-6a

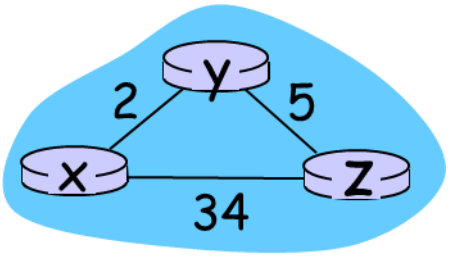
Question 7. [14 marks]

Initially, we have the following distance vectors for the network below

Distance vector of y: (2, 0, 5)

Distance vector of z: (7, 5, 0)

Now link cost of y-z changes from 5 to 28. Using Distance Vector routing algorithm, write down the steps showing that node y and node z update their distance vectors until the routing algorithm converges.



Answer for Question 2d:

1. y updates its vector:
   Dist. vector y: (2, 0, 9)
2. z updates its vector:
   Dist. vector z: (30, 28, 0)
3. y updates its vector:
   Dist. vector y: (2, 0, 13)
4. z updates its vector:
   Dist. vector z: (30, 28, 0)
5. y updates its vector:
   Dist. vector y: (2, 0, 17)
6. z updates its vector:
   Dist. vector z: (30, 28, 0)
7. y updates its vector:
   Dist. vector y: (2, 0, 21)
8. z updates its vector:
   Dist. vector z: (30, 28, 0)
9. y updates its vector:
   Dist. vector y: (2, 0, 25)
10. z updates its vector:
    Dist. vector z: (30, 28, 0)
11. y updates its vector:
    Dist. vector y: (2, 0, 28)

Or

1. y updates its vector:
   Dist. vector y: (2, 0, 9)
2. z updates its vector:
   Dist. vector z: (30, 28, 0)
3. y updates its vector:
   Dist. vector y: (2, 0, 13)
4. y updates its vector:
   Dist. vector y: (2, 0, 17)
5. y updates its vector:
   Dist. vector y: (2, 0, 21)
6. y updates its vector:
   Dist. vector y: (2, 0, 25)
7. y updates its vector:
   Dist. vector y: (2, 0, 28)

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