Answer for EE3315 Test 1 2015-2016

Question 1. **(8 marks)**

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

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	1
Net 17	2
Net 25	4
Net 26	3
Net 30	8
Net 44	1

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

Figure Q.1

Destination	Distance	Route
Net 4	3	Gate J
Net 25	6	Gate J
Net 26	5	Gate J
Net 44	3	Gate J

Figure Q.1a

For destination Net 4, it updates that a shorter distance resulting from routing via gateway J.
For destination Net 25, it updates that if passing via gateway J, it will take longer route.
For destination Net 26, it updates that a new route is setup via gateway J.
For destination Net 44, it updates that a shorter distance resulting from routing via gateway J.

Question 2. **(16 marks)**

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

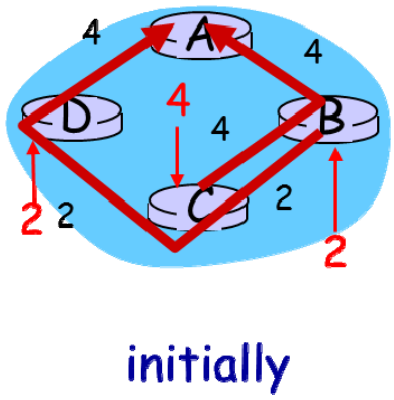
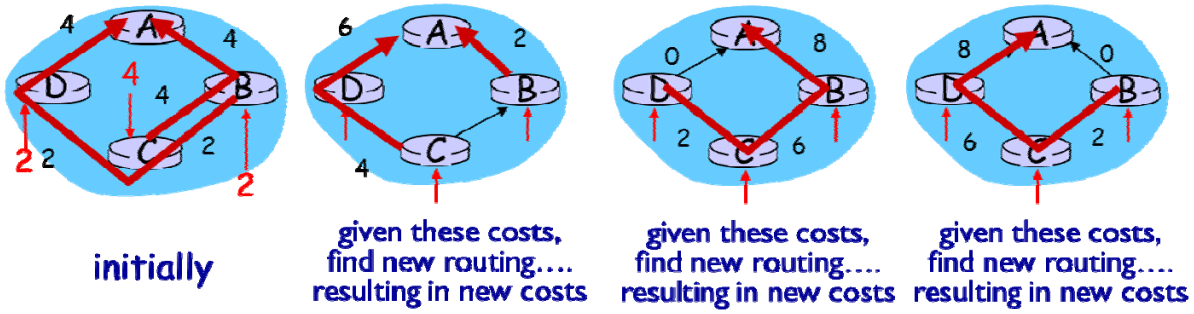


Figure Q.2

Answer for Question 2:



Question 3. **(26 marks)**

In Figure Q.3, assume that link CD has gone down for a long time. Assume A, B and C use split horizon with Poisoned Reverse.

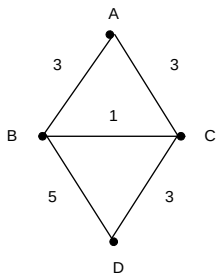


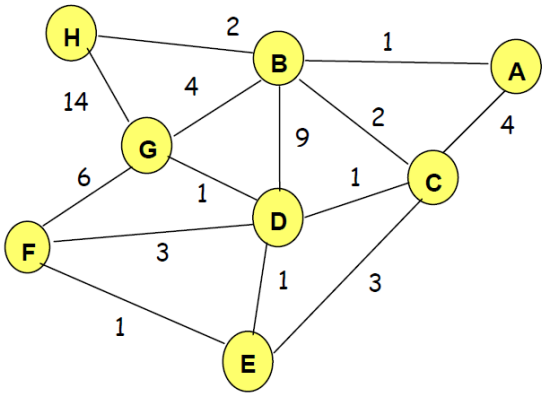
Figure Q.3

i. What is the distance to D that C reports from C to A? 6
ii. What is the distance to D that C reports from C to B? ∞
iii. What is the distance to D that A reports from A to C? 8
iv. What is the distance to D that B reports from B to C? 5

Now, suppose link BD goes down.
v. What is the distance to D that B reports from B to A? ∞
vi. At the same time, what is the distance to D that C reports from C to B? ∞
vii. At the same time, what is the distance to D that C reports from C to A? 6
viii. At the same time, what is the distance to D that A reports from A to B? ∞
ix. What will A think the shortest path from A to D is? A-C-B-D
x. What will A tell B about its distance from A to D? 9
xi. What will A tell C about its distance from A to D? ∞
xii. What is B's route to D now? B-A-C-B-D
What will B tell C the distance from B to D? 12

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 5**, using Dijkstra's algorithm, compute the shortest path from **Node E** to all nodes in the network. Use the table below, but work out the results in your answer book. If there is a tie, ***break it in favor of rightmost 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	∞	∞	3, E	5, E	1, E	∞	∞
E,F	∞	∞	3, E	4, F		7, F	∞
E,F,C	7, C	5, C		4, F		7, F	∞
E,F,C,D	7, C	5, C				5, D	∞
E,F,C,D,G	7, C	5, C					19, G
E,F,C,D,G,B	6, B						7, B
E,F,C,D,G,B,A							7, B
E,F,C,D,G,B,A,H							

The shortest path from Node E to

A: ECBA,	Cost: 6
B: ECB	Cost: 5
C: EC	Cost: 3
D: EFD	Cost: 4
F: EF	Cost: 1
G: EFDG	Cost: 5
H: ECBH	Cost: 7

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 not willing to advertise to C a route to A.
ii) B is not willing to advertise to C the path BX.
iii) C is not willing to advertise to W the path CBX.
iv) C is not willing to advertise to A the path CBX.

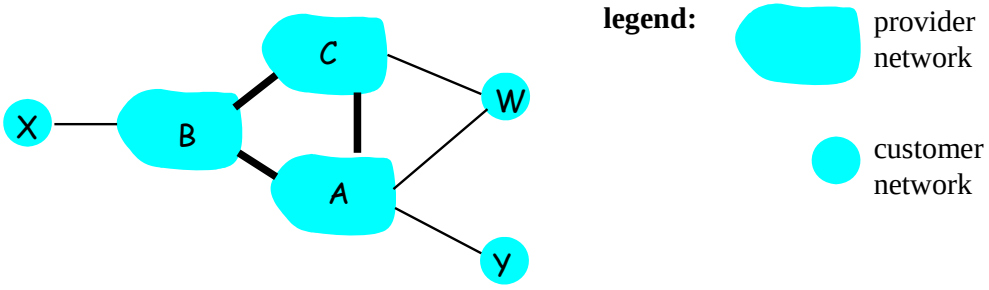


Figure Q.5 : A simple BGP scenario

i) True. W does not want to route from C via W to A since W gets no "revenue" for that.

ii) False. B gets "revenue" for routing CBX since X is B's customer.

iii) False. C gets "revenue" for routing WCBX since W is C's customer.

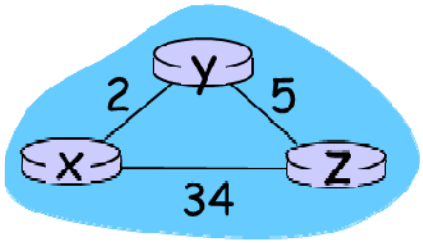
iv) True. C gets no "revenue" for routing ACBX since neither X nor A are C's customers

Question 6. **(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 x-y changes from 2 to 33. Using Distance Vector routing algorithm, write down the steps showing that how node y and node z update their distance vectors until the routing algorithm converges.



Answer for Question 6:

1. y updates its vector:
   Dist. vector y: (12, 0, 5)
2. z updates its vector:
   Dist. vector z: (17, 5, 0)
3. y updates its vector:
   Dist. vector y: (22, 0, 5)
4. z updates its vector:
   Dist. vector z: (27, 5, 0)
5. y updates its vector:
   Dist. vector y: (32, 0, 5)
6. z updates its vector:
   Dist. vector z: (34, 5, 0)
7. y updates its vector:
   Dist. vector y: (33, 0, 5)

Question 7. **(12 marks)**

Figure Q7 shows a network using Hierarchical Routing. Draw down the topology of the network from Node 2C's point of view under the use of Hierarchical Routing. Write down the routing table for Node 2C. Note that for each destination, "next hop" and "number of hops" (to that destination) should be included.

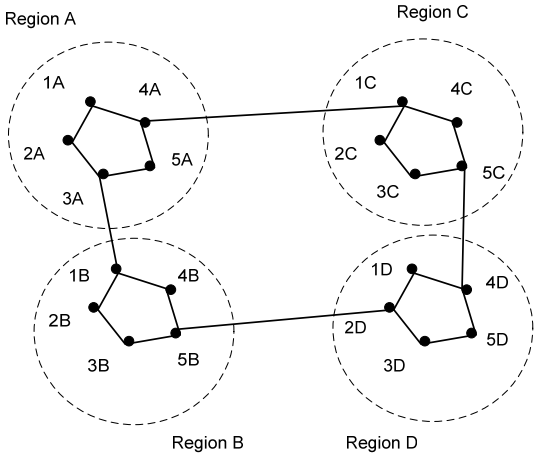
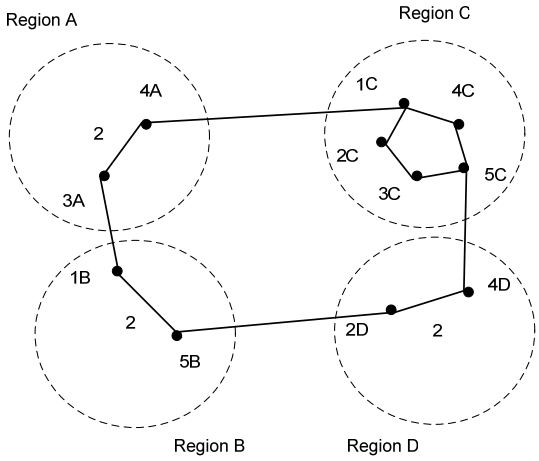


Figure Q7

Answer for Question 7:



Routing table for 2C

Destination	Next Hop	No. of Hops
2C	-	-
1C	1C	1
3C	3C	1
4C	1C	2
5C	3C	2
A	1C	2
B	1C	5
D	3C	3

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