EE 3315 Tutorial: IP Routing 2

1. In Figure Q1: (a) What are the initial distance vectors of C, D, and E, respectively? (b) What is C’s distance vector after C receives a vector from E? (c) What is C’s distance vector when C further receives a vector from D?

   (a) C: (<A, 2>, <B, 2>, <C, 0>, <D, 1>, <E, 4>, <F, ∞>)
   D: (<A, ∞>, <B, ∞>, <C, 1>, <D, 0>, <E, 3>, <F, 2>)
   E: (<A, ∞>, <B, ∞>, <C, 4>, <D, 3>, <E, 0>, <F, 5>)
   (b) (<A, 2>, <B, 2>, <C, 0>, <D, 1>, <E, 4>, <F, 9>)
   (c) (<A, 2>, <B, 2>, <C, 0>, <D, 1>, <E, 4>, <F, 3>)

2. In Figure Q1, assume that link EC went down long time ago, so that E and F routes to C through D. If E and F use Split Horizon with Poisoned Reverse,

   (a) What distance to C will D report to E and F?
   (b) What distance to C will E and F report to D?

   Now, suppose the DC link goes down.

   (c) What distance to C will D report to E and F?
   (d) At the same time, what is the distance to C that F reports to E?
   (e) What does E then think the shortest path to C is?
   (f) What does E then tell D about its distance to C?
   (g) What is D's route to C now?
   (h) What does D then tell F?
   (i) When does this cycle end?

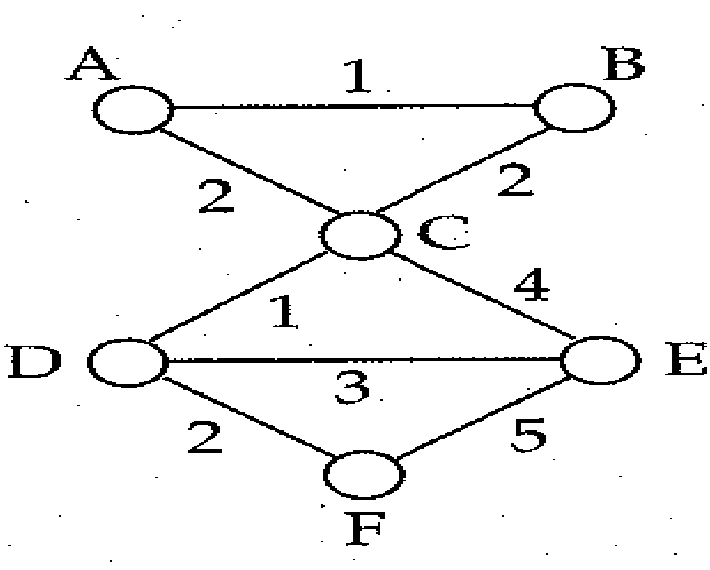

Figure Q1

(a) 1
(b) ∞
(c) D reports to E and F a distance of ∞ to C.
(d) F reports to E a distance of 3 to C
(e) E thinks the shortest path is E-F-D-C.
(f) Since D is no longer E's next hop to C, E tells D that it has a path of length 8 to C
(g) D, therefore, thinks that its route to C should be through E (i.e. D-E-F-D-C).
(h) D tells F that it has a path of length 11 to C through E.
(i) The routers cyclically count to infinity till all routers set their distance to C as infinity, so that C is known to be unreachable.

3. Initially, we have the following distance vectors for the network below:

Distance vector of y: (5, 0, 2)
Distance vector of z: (7, 2, 0)

Now link cost of x-y changes from 5 to 60. 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.

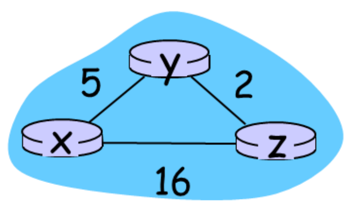

Figure Q3

Answer for Question 3:

1. y updates its vector:
   Dist. vector y: (9, 0, 2)
2. z updates its vector:
   Dist. vector z: (11, 2, 0)
3. y updates its vector:
   Dist. vector y: (13, 0, 2)
4. z updates its vector:
   Dist. vector z: (15, 2, 0)
5. y updates its vector:
   Dist. vector y: (17, 0, 2)
6. z updates its vector:
   Dist. vector z: (16, 2, 0)
7. y updates its vector:
   Dist. vector y: (18, 0, 2)
8. z updates its vector:
   Dist. vector z: (16, 2, 0)

4. Referring to Figure Q4, what is the path used (a) from 1a to 5a (b) from 1a to 6a, respectively, using the following routing algorithms?

1. The shortest path routing
2. The hot potato routing (with the shortest path routing outside AS1)
3. BGP routing with the elimination rules:
   i. shortest AS-PATH
   ii. shortest path to NEXT-HOP

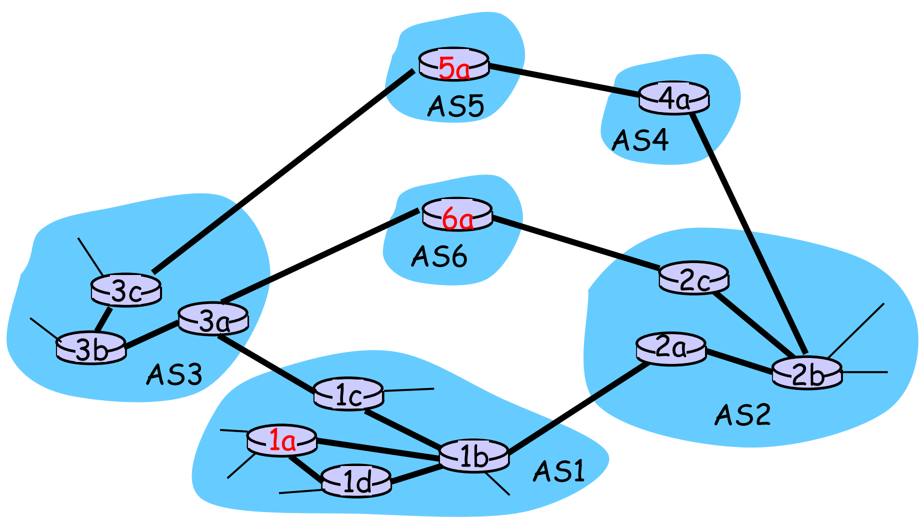

Figure Q4

(a) From 1a to 5a

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

(b) From 1a to 6a

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