University of Ain Temouchent Belhadj Bouchaib
Faculty of Science and Technology
Department of Mathematics and Computer Sciences
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Tutorial 2 / Networks

Responsible for the course : Mr. A. BENZERBADJ

Exercise 1

Let the following graph represent a network :

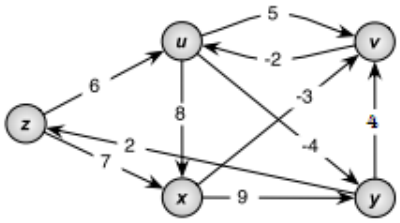

FIGURE 1 – Network topology.

— Using the Bellman-Ford algorithm covered in class, determine the set of shortest paths starting from node z. Consider the arcs in the following order : (u,v), (u,x), (u,y), (v,u), (x,v), (x,y), (y,v), (y,z), (z,u), (z,x).

Exercise 2

Consider the network represented by Figure 2 below, connecting 5 router nodes with the link costs associated :

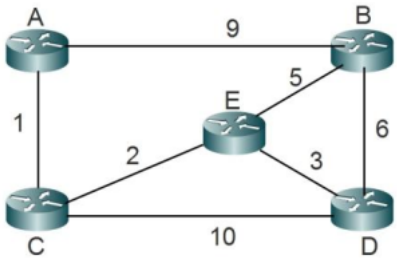

FIGURE 2 – Network topology.

— Use the Bellman-Ford algorithm to determine the set of shortest paths from all nodes to node B.

Exercise 3

Let the graph G be given by the set of vertices 1, 2, 3, and 4, and the set of arcs (1,2), (3,1), (2,3), (3,4), and (2,4) with respective costs of -2, -2, 1, -4, and 3.

— Find the shortest path between node 1 and node 4 using the Bellman-Ford algorithm.

Exercise 4

Use Dijkstra's routing algorithm to find the shortest path between A and F. Indicate all the intermediate steps :

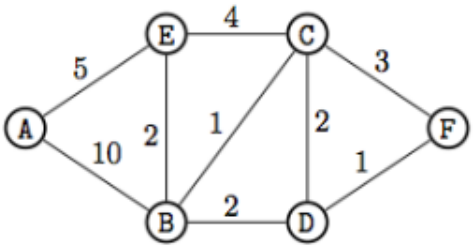

FIGURE 3 – Network topology.

Exercise 5

Distance vector routing RIP is used on the subnet below.

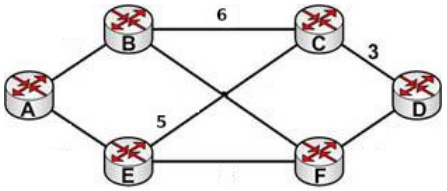

FIGURE 4 – Network topology.

At node C, the measured delays to nodes B, D, and E are 6, 3, and 5 ms respectively. It is assumed that the routing table contains the following fields :

Destination	Gateway	Cost

TABLE 1 – The structure of the routing table.

1. At startup, what is the routing table of C ?

2. Router C has just received the following vectors :
   - B : (5 ;0 ;8 ;12 ; 6 ; 2)
   - D : (16 ;12 ;6 ;0 ;9 ;10)
   - E : (7 ;6 ;3 ;9 ;0 ;4)

   What is the new routing table of C ?

Exercise 6

We use the RIP distance vector algorithm on the following network.

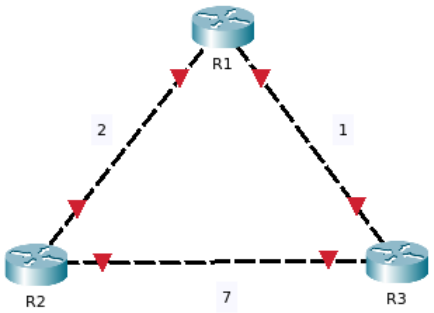

FIGURE 5 – Network topology.

— Represent the synchronous execution (routing table states) of the RIP algorithm for each node (from startup to stabilization), as well as the exchanged vectors.