CHAPTER 11

Unicast Routing Protocols (RIP, OSPF, and BGP)

Exercises

1. The expiration timer value is 6 times that of the periodic timer to allow for some missed communication between routers.

3. In distance vector routing each router sends all of its knowledge about an autonomous system to all of the routers on its neighboring networks at regular intervals. It uses a fairly simple algorithm to update the routing tables but results in a lot of unneeded network traffic. In link state routing a router floods an autonomous system with information about changes in a network only when changes occur. It uses less network resources than distance vector routing in that it sends less traffic over the network but it uses the much more complex Dijkstra's Algorithm to calculate routing tables from the link state database.

5.

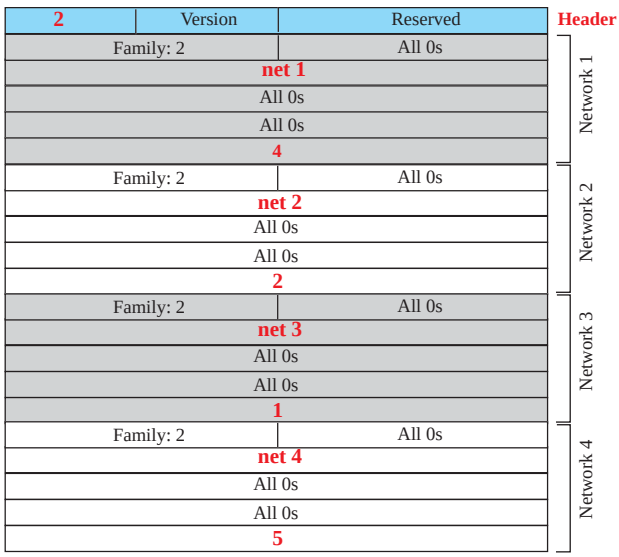
a. The size of a RIP message that advertises a single network is **24** bytes.

b. The size of a RIP message that advertises N networks is **(4 + 20 × N)** bytes.

c. The general formula can be given as **4 + (20 × N)**

7. See Figure 11.E7.

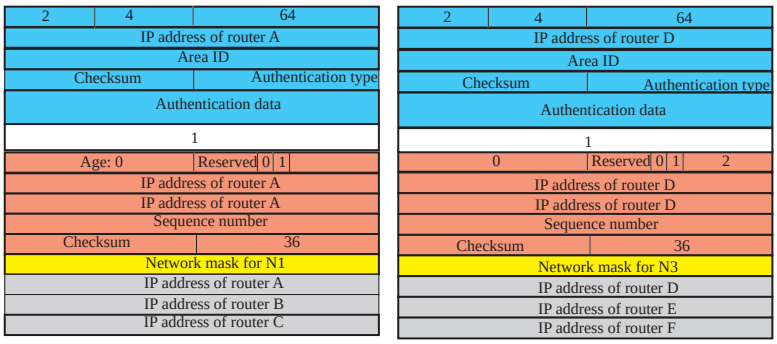
Figure 11.E7 *Solution to Exercise 7*



9. The general header has two empty bytes (set to 0's). Each advertisement section has 10 empty bytes. This means we have **2 + (10 × N)** empty bytes in a message advertising N networks.

11. See Figure 11.E11.

Figure 11.E11 *Solution to Exercise 11*

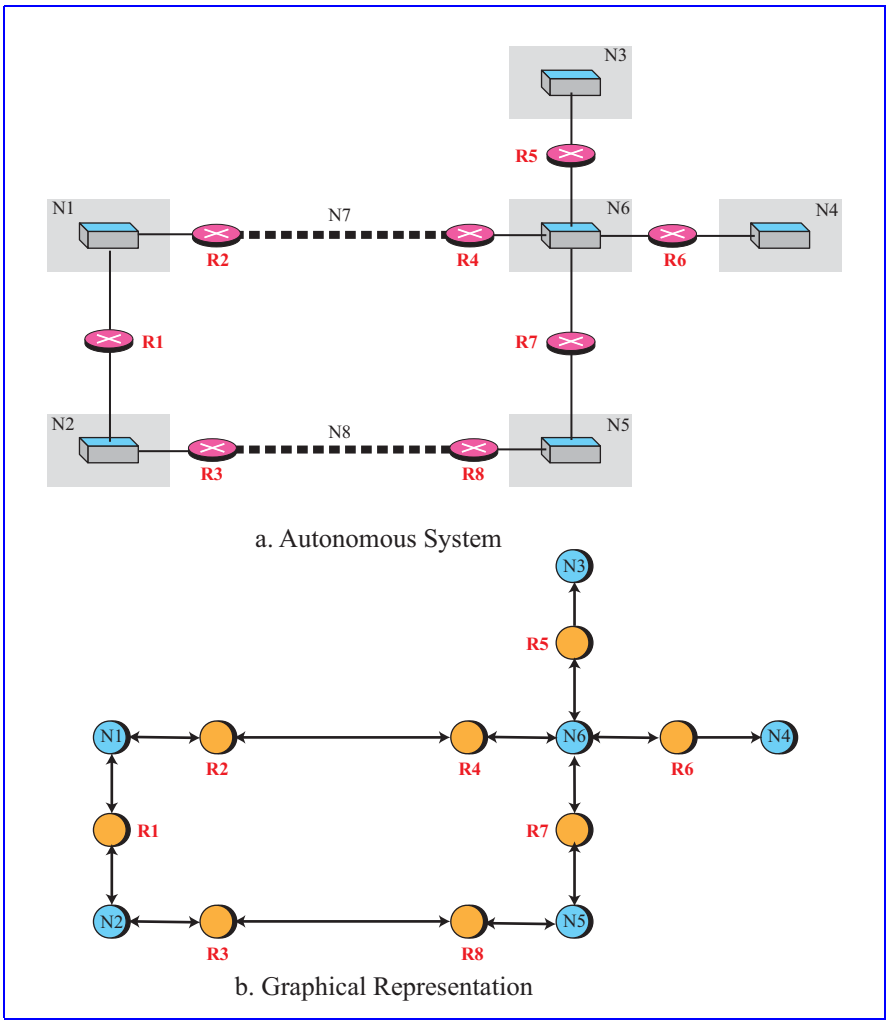


Part a. Network advertisment for N1

Part b. Network advertisment for N3

13. Figure 11.E13 shows the autonomous system and the graphical representation. N3 and N4 are stub networks; N1, N2, N5, and N6 are transient networks..

Figure 11.E13 *Solution to Exercise 13*



15. See Figure 11.E15. We have revised each routing table to shows the change.

Figure 11.E15 *Solution to Exercise 15*

A

Dest	Cost	Next
Net1	1	—
Net2	∞	
Net3	3	C
Net4	1	—
Net5	1	—
Net6	2	C
Net7	2	C

B

Dest	Cost	Next
Net1	3	C
Net2	∞	
Net3	1	—
Net4	3	C
Net5	2	C
Net6	1	—
Net7	2	C

C

Dest	Cost	Next
Net1	2	A
Net2	∞	
Net3	2	B
Net4	2	A
Net5	1	—
Net6	1	—
Net7	1	—

D

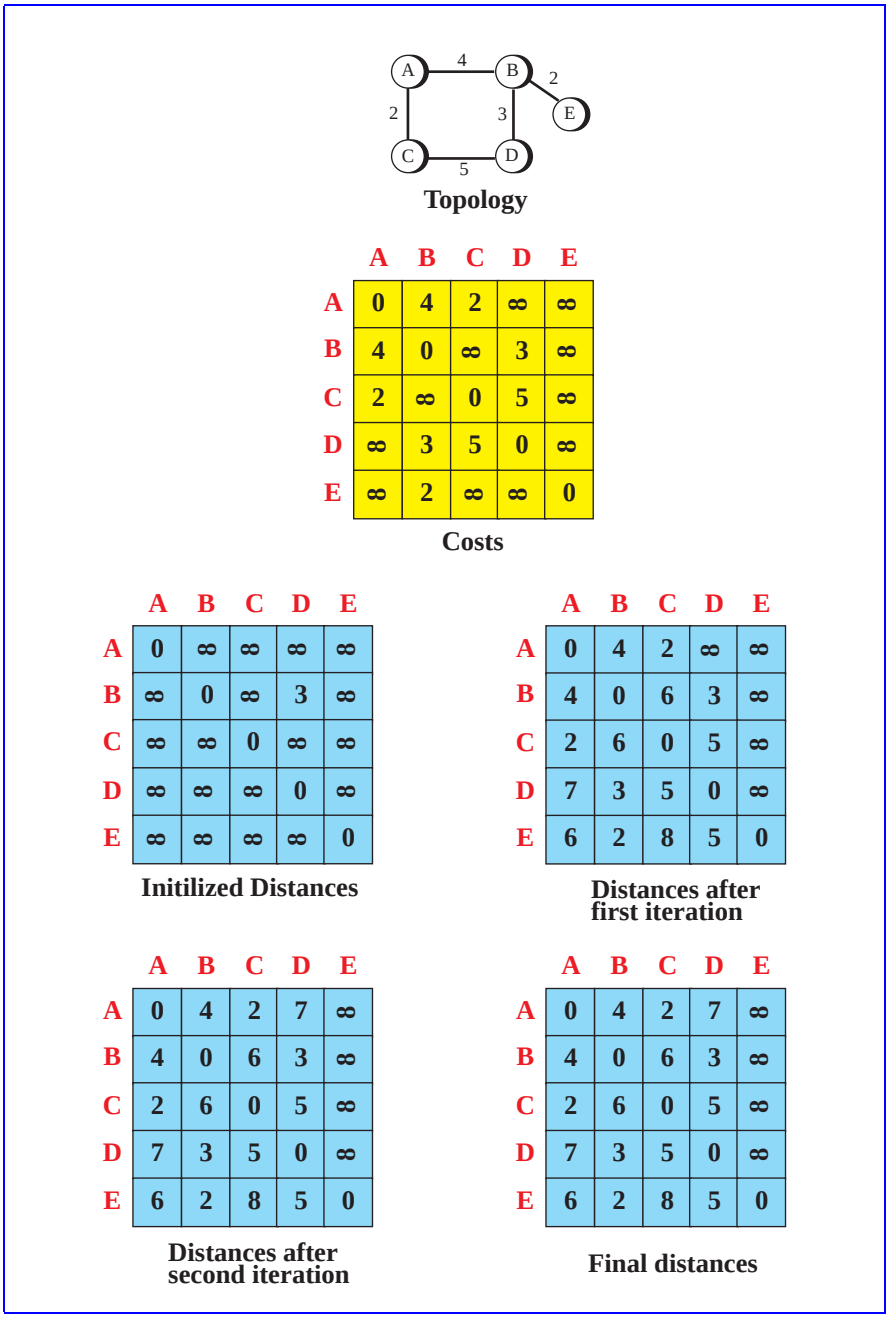
Dest	Cost	Next
Net1	2	A
Net2	∞	
Net3	4	A
Net4	1	—
Net5	2	A
Net6	3	A
Net7	3	A

E

Dest	Cost	Next
Net1	3	C
Net2	∞	
Net3	3	C
Net4	3	C
Net5	2	C
Net6	2	C
Net7	1	—

17. See Figure 11.E17. We have written a Java program based on the pseudocode defined in the text to calculate the distances. The cost and the distances are represented as two dimensional tables. Rows are sources; columns are destinations.

Figure 11.E17 *Solution to Exercise 17*



	A	B	C	D	E
A	0	4	2	∞	∞
B	4	0	∞	3	∞
C	2	∞	0	5	∞
D	∞	3	5	0	∞
E	∞	2	∞	∞	0

	A	B	C	D	E
A	0	∞	∞	∞	∞
B	∞	0	∞	3	∞
C	∞	∞	0	∞	∞
D	∞	∞	∞	0	∞
E	∞	∞	∞	∞	0

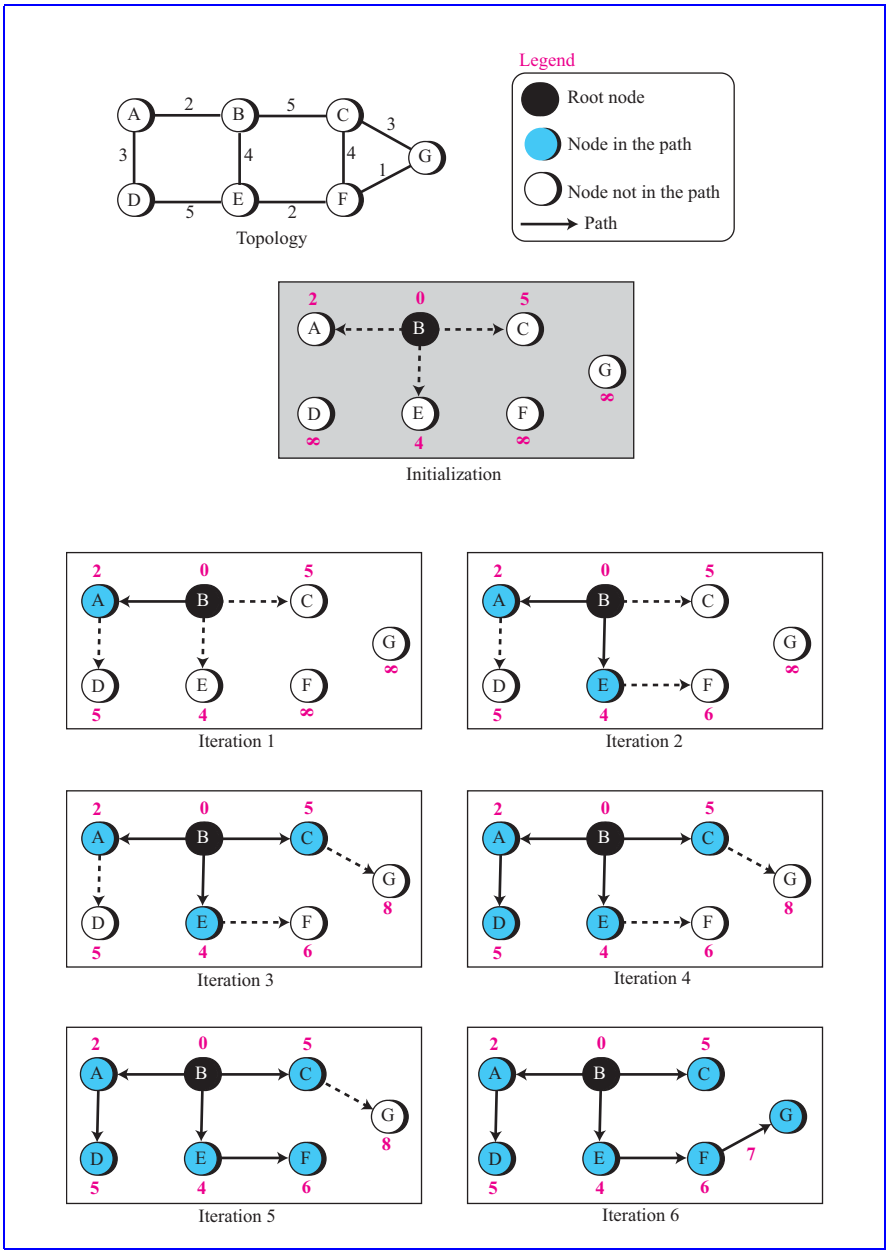
	A	B	C	D	E
A	0	4	2	∞	∞
B	4	0	6	3	∞
C	2	6	0	5	∞
D	7	3	5	0	∞
E	6	2	8	5	0

	A	B	C	D	E
A	0	4	2	7	∞
B	4	0	6	3	∞
C	2	6	0	5	∞
D	7	3	5	0	∞
E	6	2	8	5	0

	A	B	C	D	E
A	0	4	2	7	∞
B	4	0	6	3	∞
C	2	6	0	5	∞
D	7	3	5	0	∞
E	6	2	8	5	0

19. Figure 11.E19 shows how to find the shortest path tree for node B.

Figure 11.E19 *Solution to Exercise 19*



21. Figure 11.E21 shows how to find the shortest path tree for node G.

Figure 11.E21 *Solution to Exercise 21*