
CHAPTER 14

Unicast Routing Protocols (RIP, OSPF, and BGP)

Exercises

1. RIP is an intradomain routing protocol that enables routers to update their routing tables within an autonomous system.
3. The expiration timer is 6 times that of the periodic timer to allow for some missed communication between routers.
5. The two major shortcomings are two-node instability and three-node instability. For the former, infinity can be re-defined as a number such as 20. Another solution is the split horizon strategy or split horizon combined with poison reverse. These methods do not work for three-node instability.
7. 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 Algorithm to calculate routing tables from the link state database.
9. OSPF messages are propagated immediately because a router using OSPF will immediately flood the network with news of any changes to its neighborhood. RIP messages are distributed slowly because a network using RIP relies on the periodic updates that occur every 30 seconds to carry any news from one router to the next and to the next. This process may take a lot of time.

11. One periodic timer is needed.
13. 5 garbage collection timers are needed, one for each invalid route.
15. $2 + (10 \times N) =$ Empty bytes in a message advertising N networks
17. See Figure 14.1.

Figure 14.1 Exercise 17

2	4	84
IP address of router A		
Area ID		
Checksum		Authentication type
Authentication data		
1		
0	Reserved	0 1 1
IP address of router A		
IP address of router A		
Sequence number		
Checksum		60
Reserved	E B	Reserved
IP address for designated router of N1		
Router address		
2	1	5
TOS	Reserved	Metric for TOS
IP address of router D		
Interface Number		
1	1	8
TOS	Reserved	Metric for TOS

19. See Figure 14.2.
21. See Figure 14.3.

Figure 14.2 Exercise 19

2	4	100
IP address of router E		
Area ID		
Checksum		Authentication type
Authentication data		
1		
0	Reserved	0 1 1
IP address of router E		
IP address of router E		
Sequence number		
Fletcher's checksum		Length: 76
Reserved	E B	Reserved
3		
IP address of router B		
Interface number		
1	1	4
TOS	Reserved	Metric for TOS
Network address for N4		
Network mask for N4		
3	1	2
TOS	Reserved	Metric for TOS
IP address of designated router for N3		
Router address		
2	1	5
TOS	Reserved	Metric for TOS

Figure 14.3 Exercise 21

2	4	56
IP address of designated router for N4		
Area ID		
Checksum		Authentication type
Authentication data		
1		
0	Reserved	1 1 2
IP address of designated router E		
IP address of router E		
Sequence number		
Checksum		28
Network mask for N4		
IP address of router E		

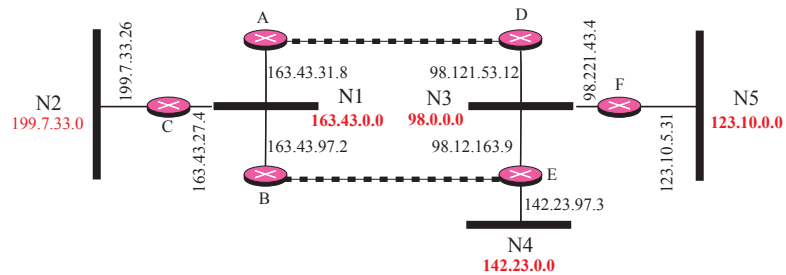
23. See Figure 14.4.

25. See Figure 14.5.

27. See Figure 14.6.

Figure 14.4 Exercise 23

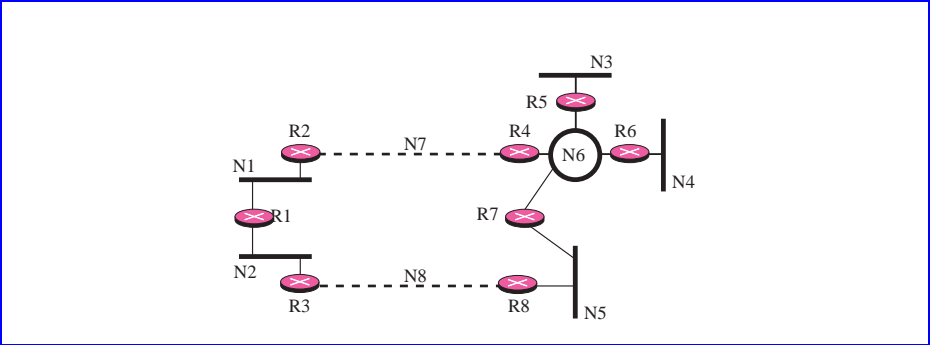
2	4	64
IP address of router A		
Area ID		
Checksum		Authentication type
Authentication data		
1		
Age: 0	Reserved	0 1 2
IP address of router A		
IP address of router A		
Sequence number		
Checksum		36
Network mask for N1		
IP address of router A		
IP address of router B		
IP address of router C		

Figure 14.5 Exercise 25**Figure 14.6** Exercise 27

2	2	Length: variable
163.43.27.4		
Area ID		
Checksum		Authentication type
Authentication data		
0	0	0 0 1 0 1
Message sequence number		
LSA header for each entry in the database		

29. See Figure 14.7.

Figure 14.7 Exercise 29



31. Transient networks: N1, N2, N5, and N6. Stub networks: N3 and N4
33. See Figure 14.8.

Figure 14.8 Exercise 33

URL: Unfeasible Route Length			
Marker			
Length		Type: 2	URL
URL	Withdrawn routes (variable length)		
Path attributes length	Path attributes (variable length)		
Network reachability length	Netid of AS1		

35. See Figure 14.9.

Figure 14.9 Exercise 35

Marker		
Length	Type: 4	Error code
Error subcode	Error data (variable length)	

