CHAPTER 22 : Network Layer: Delivery, Forwarding, and Routing

Solutions to Selected Review Questions

Review Questions

1. We mentioned two groups of multicast routing protocols: the source-based tree and the group-shared tree. In a ***source-based tree*** protocol, each router needs to have one shortest path tree for each group. The shortest path tree for a group defines the next hop for each network that has loyal member(s) for that group. In a ***groupshared tree*** protocol, only one designated router takes the responsibility of distributing multicast traffic. The designated router has *m* shortest path trees in its routing table. The rest of the routers in the domain have none.

2. We discussed two different methods of delivery: direct and indirect. In a ***direct delivery***, the final destination of the packet is a host connected to the same physical network as the deliverer. In an ***indirect delivery*** the packet goes from router to router until it reaches the one connected to the same physical network as its final destination.

3. The ***hop count limit*** helps RIP instability by limiting the number of times a message can be sent through the routers, thereby limiting the back and forth updating that may occur if part of a network goes down.

4. A routing table can be either static or dynamic. A ***static routing*** table contains information entered manually. A ***dynamic routing table*** is updated periodically by using one of the dynamic routing protocols such as RIP, OSPF, or BGP.

5. BGP is an ***interdomain*** routing protocol using path vector routing.

6. A RIP ***message*** is used by a router to request and receive routing information about an autonomous system or to periodically share its knowledge with its neighbors.

7. The time-out for the ***expiration time*** is **6** times that of the ***periodic timer*** to allow for some missed communication between routers.

8. 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.

9. The three common forwarding methods used today are: next-hop, network-specific, and default methods. In the ***next-hop method***, the routing table holds only the address of the next hop for each destination. In the ***network-specific*** method, the routing table holds only one entry that defines the address of the destination network instead of all hosts on that network. In the ***default method***, a host sends all packets that are going out of the network to a specific router called the default router.

10. In OSPF, four types of links have been defined: point-to-point, transient, stub, and virtual. A ***point-to-point*** link connects two routers without any other host or router in between. A ***transient*** link is a network with several routers attached to it. The packets can enter and leave through any of the routers. A ***stub*** link is a network that is connected to only one router. The data packets enter the network through this single router and leave the network through this same router. This is a special case of the transient network. When the link between two routers is broken, the administrator may create a ***virtual*** link between them, using a longer path that probably goes through several routers.

11. 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.

12. RIP is an ***intradomain routing protocol*** that enables routers to update their routing tables within an ***autonomous*** system.