Lab 10
Routing Information Protocol (RIP)

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Due: Start of lab Friday, April 17

Name:	
Name:	

Introduction

In this lab you will accomplish several goals:

- Setup a small network using RIP
- Examine how RIP adapts to network changes

Work in pairs for this lab using the equipment at your desk. Distribute the work evenly to make sure both group members know the material, as you will be required to know the material for evaluation.

1 Preliminary

Clear your router and switch configurations by following the directions posted on the bulletin board.

A set of devices are setup at the fictional Desk Z. This desk is available at all times, in and outside of scheduled lab sessions, for you to connect with and perform your lab experiments. The devices for Desk Z follow a topology similar to the Lab 10 Diagram with the IPs: 10.12.50.26, 100.26.26.1, 100.26.26.2, and 200.26.26.1. There are no hosts in Desk Z.

Some useful commands for this lab, which aren't mentioned below include: `show ip protocols` and `show ip route`.

Setup your network for this lab by:

1. selecting addresses for your devices and completing Lab 10 Diagram
2. connecting one or both hosts to the INT network
3. configuring your routers as shown in the Lab 10 Diagram
4. connecting your devices as shown in Lab 10 Diagram
5. configuring your hosts as shown in Lab 10 Diagram

2 `telnet` and Routers

Up to this point you have configured your networking devices only through the terminal servers. You can also configure them by using `telnet` to connect directly into configured networking ports. From PC2, `telnet` to router R2 by using the IP address you selected. While connected to router R2, `telnet` into router R1 by using the IP address you selected. (You are able to run `telnet` on the routers similar to running `telnet` on the hosts.) Using these techniques you can `telnet` into your devices directly without having to connect to the internal network. However, you can only do this once the devices already have valid IP addresses and you are able to reach them from your host. In all other cases, you'll have to connect to the internal network.

3 RIP [50 Points]

Dynamic routing can greatly simplify network management by keeping track of valid routes without user action. For the simple network used in this lab, describe the static routes needed for your PC2 to `ping` the lower interface of R2 at Desk Z. (Don't setup these routes, just determine the necessary routes.)

1. What routes are needed in your routers?

2. What routes are needed in the routers of Desk Z?

That's a lot of routes to go across a few hops. Lets try it with dynamic routing using RIP. `telnet` into router R2 and setup dynamic routing using the procedures in this section.

While in global configuration mode, enable routing within your router by using the command `ip routing`, which tells your router that you want it to perform routing. Next, you need to configure RIP within your router. Enter RIP configuration mode using the command `router rip`. **Be sure to enable RIP version 2 at this point and run the command `no auto-summary`.** Tell your router which networks it should advertise using the `network` command. The `network` command takes one argument: the network address RIP should advertise. For example, if your router were connected to a network with an address of 45.75.0.0/16, then the argument to `network` would be 45.75.0.0. Be sure to configure RIP with all the networks to which your router is connected. When you have finished configuring RIP, exit back to the global configuration mode.

3. What `network` commands did you enter to configure router R2?

Using RIP alleviates some of your work, but you may still need to enter in one static route: the default route for your router. A default route is the equivalent of a default gateway for your host. You enter a default route just like any other static route except the destination network address and mask are all zero (0.0.0.0). A default route should be an address on a local network, not one that has to be routed through another device. Select a next hop for R2 and enter the default route. Exit the configuration mode.

4. What command did you enter to create the default route for R2?

Router R2 is now configured to use RIP as a dynamic routing protocol. Repeat this procedure to setup RIP on router R1. Assume the internal network has a router at 10.12.0.1 that connects to other networks. Verify your network is setup correctly by `ping`ing every interface on your routers from both hosts and the interface addresses for Desk Z.

Use your knowledge from previous labs and what you've learned so far to answer the following questions.

5. Look at the routing table in each of your routers and list the routes (network address and next hop) that were learned through RIP. Be sure to list each router separately. Wait until a couple of desks have configured their routers before answering this question.

6. How often does your router send out RIP updates?

4 RIP Updates [50 Points]

Dynamic routing makes network setup easier, but it wouldn't be much use if it didn't adapt to changes as well. In this section you will examine how RIP responds to network changes. Begin by starting a packet trace on PC1 and capturing some RIP updates from both routers.

1. For each router, how many IP network entries appear in the RIP packets and what are they?

Keep the packet trace going while you disconnect router R1 from the internal network. Wait a few moments for RIP to stabilize (no new changes to the contents of RIP updates) and stop the packet trace. Looking at the packet trace you captured, answer the following questions. If you have trouble answering the questions, you may wish to save your packet trace and try again.

2. After disconnecting the cable, do any routing metrics change? How do they change and why? Consider both transient and steady-state changes.

3. What value is used in the Address Family field?

4. When you removed the cable, why didn't your routers count to infinity? Use evidence from your packet captures to answer the question.

Submit your completed lab handout by the next lab.

Lab 10 Diagram