# Lab 9
# Dynamic Routing with RIP

Prof. Kredo

Due: Start of your next lab session

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|---|---|
| Name: | |
| Name: | |
| Lab: | ◯ Tuesday ◯ Wednesday ◯ Thursday |

## 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 Prelab

Using Lab 9 Diagram as a reference, review what forwarding table entries are required for your PC2 to `ping` the lower interface of R2 at Desk Z. **Do not add these to your routers!**

1. (5 points) What routes are needed in your R1? For each route list the destination network (network address) and the next hop device and interface (e.g., RX upper).

2. (5 points) What routes are needed in your R2? For each route list the destination network (network address) and the next hop device and interface (e.g., RX upper).

3. (5 points) What routes are needed in Desk Z R1?

4. (5 points) What routes are needed in Desk Z R2?

That's a lot of routes to go across a few hops. In this lab, you will use RIP to dynamically create these and other routes.

# 2 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 9 Diagram with the IPs: 10.11.50.26, 192.168.26.1, 192.168.26.2, and 192.168.126.1. There are no hosts in Desk Z.

**Do not add static routes to your routers for this lab.**

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 9 Diagram
2. connecting one or both hosts to the INT network
3. configuring your router interfaces as shown in the Lab 9 Diagram
4. connecting your devices as shown in Lab 9 Diagram
5. configuring your hosts as shown in Lab 9 Diagram

# 3 RIP

Dynamic routing can greatly simplify network management by keeping track of valid routes without user action. You will do this 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` *and* run the command `no auto-summary` at this point.** 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.

5. (5 points) What `network` commands did you enter to configure router R2?

Router R2 is now configured to use RIP as a dynamic routing protocol. Repeat this procedure to setup RIP on router R1. 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.

6. (5 points) List routing table entries (network address and next hop) at **R1** for at least three routes *learned through RIP*. Your answer must include all applicable networks at your desk and Desk Z.

7. (5 points) List routing table entries (network address and next hop) at **R2** for at least three routes *learned through RIP*. Your answer must include all applicable networks at your desk and Desk Z.

8. (5 points) How often does your router send out *periodic* RIP updates? Ignore updates that occur spontaneously.

9. (5 points) What value is used in the Address Family field?

10. (10 points) Demonstrate that PC2 can ping the lower interface of R2 at Desk Z for credit.

# 4 RIP Updates

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 capture in Wireshark on PC1 and capturing some RIP updates from both routers. Keep your packet capture running until told to stop below.

11. (5 points) For R1, how many **valid, or available,** IP network entries appear in the RIP packets? List up to 3 network and metric pairs. You will likely have to look through multiple packets.

12. (5 points) For R2, how many **valid, or available,** IP network entries appear in the RIP packets? List up to 3 network and metric pairs. You will likely have to look through multiple packets.

Make note of the packet number or capture time and then disconnect router R1 from the external (EXT) network. Wait a few moments for RIP to stabilize (no new changes to the distance vector of RIP updates) and then 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.

13. (5 points) Look through the RIP packets sent by R1 after the disconnection and determine the packet that indicates R1 detected the disconnection. Ensure you focus on the disconnection you created, not the activity of other students. What network entries (network and metric) appear in that packet?

14. (5 points) What about that packet indicates R1 detected the disconnection?

15. (5 points) Similar to R1, find the packet that indicates R2 detected the disconnection. What network entries (network and metric) appear in that packet?

After a few exchanges the routers should return to periodic updates. Wait until you see a few (3-4) of these periodic updates and then answer the following questions.

16. (5 points) What does R1 share now? Why do you think R1 behaves this way?

17. (5 points) What are the routing entries (network and metric) for shared by R2?

18. (5 points) When you removed the cable, did your routers *count* to infinity? Note that there is a difference between *using* infinity as a value and *counting* to infinity.

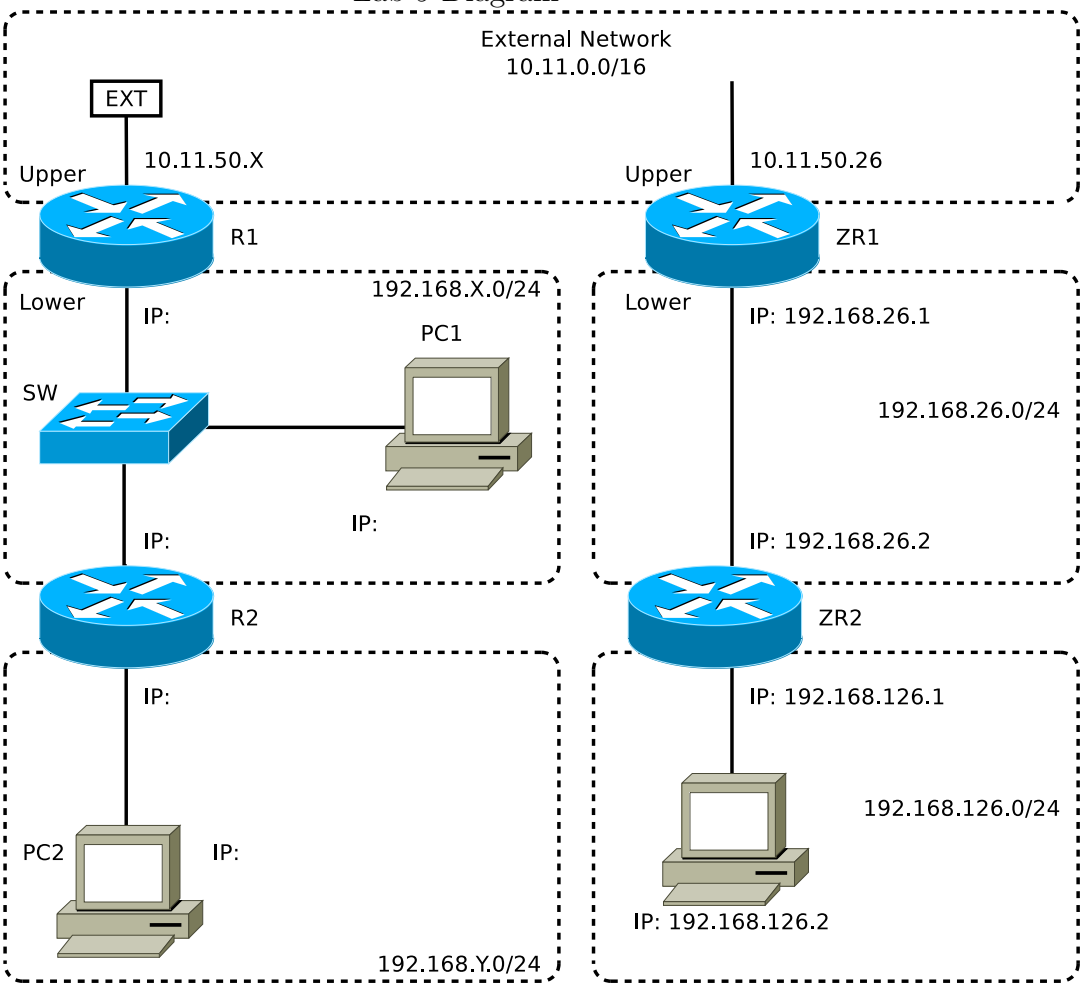
19. (5 points) Based on the evidence you collected, do the routers use RIP with:

- Split Horison with Poison Reverse,
- Split Horizon without Poison Reverse, or
- Neither Split Horizon nor Poison Reverse

Use evidence from your experiments to justify your answer.

**Submit your completed lab handout before the next lab session.**

Lab 9 Diagram




```
Desk - X
   A - 1
   B - 2
   C - 3
   D - 4
   E - 5
   F - 6
   G - 7
   H - 8
   I - 9
   J - 10
   K - 11
   L - 12
   M - 13
   N - 14
   O - 15
   Z - 26

Desk - Y
   A - 101
   B - 102
   C - 103
   D - 104
   E - 105
   F - 106
   G - 107
   H - 108
   I - 109
   J - 110
   K - 111
   L - 112
   M - 113
   N - 114
   O - 115
   Z - 126
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