

Lab 8

Router Configuration and Static Routing

Prof. Kredo

Due: Start of lab Friday, March 27

Name:	
Name:	

Submissions without a checkoff will lose half credit. All checkoffs must occur during the scheduled lab session. Attendance in lab is required for credit.

Introduction

In this lab you will accomplish several goals:

- Learn to configure and manage the lab routers
- Setup a small network using your networking equipment
- Explore how routers use forwarding tables

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.

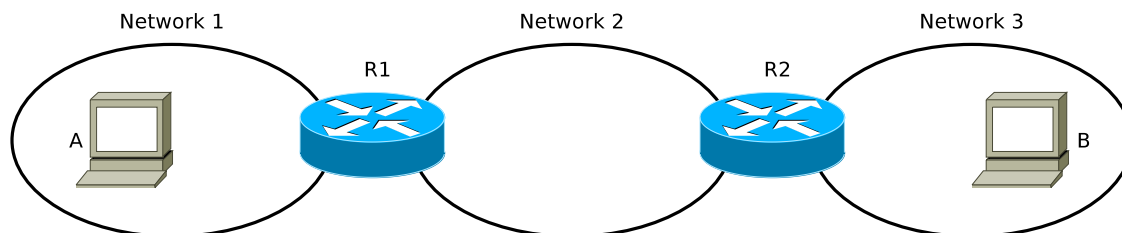
Before working with any lab equipment, reset all devices to a known configuration. Follow the reset instructions posted on the bulletin board and on Learn.

In this lab you will create several subnetworks by connecting and configuring your network devices based on addresses and network masks that you pick. Begin by selecting network addresses for your devices and filling in the Lab 8 Diagram, which also indicates the upper octets for your addresses and the upper address for R1. For this lab, each router has an “upper” and “lower” interface; these refer to the interfaces in the Lab 8 Diagram. It does not matter which physical interface you use for the upper or lower interface.

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 8 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.

1 Prelab [15 Points]

You have a network with three IP subnetworks, as shown in the figure below. Use the figure to answer the following Prelab questions.



1. In order for A and B to send packets to each other, what needs to be in the forwarding table of R1 and R2? Assume R1 and R2 do not need to be told about networks directly connected to them.

2. What device should A use as a default route?

2 Single Router Network [30 Points]

Start the process of connecting your networking equipment by configuring R1 with the appropriate addresses. Configure R1 with PC2 by connecting PC2 directly to the INT port on the patch panel. **Do not use the ip route command on PC2.** The passwords are the same as the switches, **chico**. The command line for the routers is very similar to the switches and you should feel comfortable with it after using the switches for the previous labs. Enter the global configuration mode (**configure terminal**) and then the interface configuration mode (**interface <Interface Name>**) for the interface you wish to setup. You can assign an IP address to an interface by entering the following commands:

```
XR1(config-if)#ip address <IP> <Mask>
```

You must enter the mask using dotted decimal notation. The interfaces on your routers are turned off by default and you must tell the routers to use them. You accomplish this by using the **no shutdown** command while in the interface configuration mode for the interface you want to configure.

The routers assume an interface is not available unless the interface is connected to another device.

After you have configured both interfaces of R1, connect it, PC1, and a switch to the internal network as shown in the Lab 8 Diagram. Configure PC1 to use an address on the same subnet as your router. **ping** the upper and lower interfaces of R1 from PC1 and fill in the table below.

Destination	Avg. Delay
R1 Upper Interface	
R1 Lower Interface	

3 Multiple Router Network [30 Points]

Now you will expand your network using your other router and switch. Configure your second router, R2, from PC2 with the addresses you specified and connect R2 and the other switch to your existing network, as in the Lab 8 Diagram.

From each router, try to ping all router interfaces of both your routers. You can do this by logging in to each router and using the **ping** command from within the routers. Do not ping from the hosts yet.

1. Why can't you ping some of the addresses? (Hint: Think about how the routers decide where to send packets at each hop.)

You can add static routes to your routers to tell them where to send packets. Static routes are manually entered directions that tell routers where to send packets if the destination IP address is not on a local interface. Do not add a default route (default gateway) to your routers. The following command, entered in global configuration mode, will add a static route:

```
XR1(config)#ip route <DestNet> <DestNetMask> <NextHopIP>
```

Where <DestNet> and <DestNetMask> indicate the destination network and <NextHopIP> tells the router where to send packets for the destination network.

Add any required routes so that both routers can ping all the network interfaces of both routers and fill in the table below.

2. What route or routes did you add to R1? What did you add to R2?

Destination	Avg. Delay
R1 Lower Interface from R2	
R1 Upper Interface from R2	
R2 Lower Interface from R1	
R2 Upper Interface from R1	

Now add PC2 to the network (you'll have to change its IP address) by only using the `ip addr` and `ip link` commands. Try to ping every router interface and every host from PC2.

3. Why can't PC2 ping some of the interfaces? What is PC2 missing?

Add the missing configuration and verify your network configuration by having each host **ping** the other and demonstrate your setup to the lab instructor.

4 Multiple Desk Network [25 Points]

Expand your network further by adding any static routes necessary to ping the interfaces in Desk Z.

1. What routes did you have to add to your devices for you to ping the interfaces in Desk Z?

Fill in the table below with the delays you experienced when using **ping** from **PC2**.

Host IP	Avg. Delay
100.26.26.1	
200.26.26.1	

Submit your completed lab handout by the next lab session.

