

## Lab 1: Two Router Basic Configuration

**Objective:** The objective of the lab is to configure a simple network to allow two routers to route packets between two remote networks.

### 1.1. Prelab

- Read Chapter 4 *The Network Layer* from J. F. Kurose and K. W. Ross, *Computer Networking: A Top-down Approach Featuring the Internet 3rd ed.*, New York: Pearson, 2005. ISBN 0-321-22735-2
- Read the “Router lab overview” document.
- Locate the main web site that supports *Auditor Security Collection* and read about the available tools.
- Answer the questions for the prelab and turn them in. They must be turned in before doing the lab.

## 1.2. Questions for Prelab

1. List the nine basic components of a Cisco router.
2. What is the name of the second serial interface?
3. What is the full name of the router operating system?
4. Where is the configuration information saved in the router?
5. Where is the operating system stored for PC1 and PC2?
6. List the two disadvantages of using a live CD distribution.
7. Why are the network interfaces turned off by default on PC1 and PC2?
8. List three tools available on the Auditor Security Collection.
9. What is the purpose of PC3?
10. Name the command mode in the router used for configuration.

### 1.3. Lab

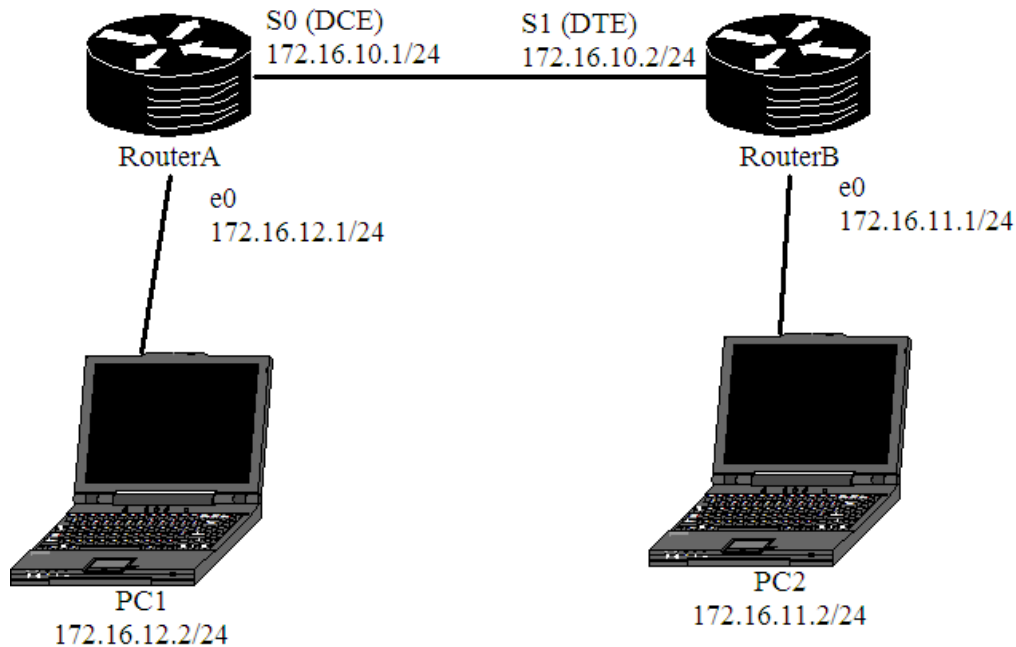


Figure 1. Two router basic configuration

#### 1.3.1. Objective

The objective of the lab is to configure a simple network to allow two routers to route packets between two remote networks.

#### 1.3.2. Set up

##### 1. Physical

- Verify the physical configuration shown in Figure 1.
- Connect PC3 to the console port of RouterA using the console cable.
- Verify that both PC1 and PC2 are connected via a cross-over (red) cable to the routers. Each PC should connect to one of the routers Ethernet transceivers.
- Verify that the serial cable is connected to the DCE port on RouterA and the DTE port on RouterB.
- Turn on the power strip.
- Turn on PC1, PC2, and PC3. Verify that the live CDs are in PC1 and PC2.
- Turn on both routers.

##### 2. Login to RouterA

- Login to PC3 with the given userid and password.
- Start the terminal program KPP to access the serial port.
  - Click configure
  - Click device
  - Set to /dev/ttyS0, None, CR, 9600
  - Click Modem

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- Click Terminal. It should now connect to the router console port. The command line interface RouterA> should appear.

### 1.3.3. Exercise

Configure RouterA and RouterB by typing the following commands. The console port cable will need to be moved to the router being configured. The part beginning with // are comments and should not be entered.

#### Part 1. Configure RouterA and RouterB IP Addresses

##### RouterA

```
RouterA>enable
RouterA#config t
RouterA(config)#int e0 //Choose Ethernet interface e0
RouterA(config-if)#ip address 172.16.12.1 255.255.255.0
RouterA(config-if)#description LAN Network for RouterA
RouterA(config-if)#no shutdown //this means interface is up
RouterA(config-if)#int s0 //configure serial interface
RouterA(config-if)#ip address 172.16.10.1 255.255.255.0
RouterA(config-if)#clockrate 250000
RouterA(config-if)#no shutdown
RouterA(config-if)#description Network connection to RouterB
RouterA(config-if)#^Z //combination of control+z, which takes you back
to the privileged executive mode
RouterA# copy run start //Save your changes to NVRAM. If you do not,
when the router reboots all changes are lost. Wait until the router
responds with [Ok]
```

##### RouterB

```
RouterB#config t
RouterB(config)#int e0 //Choose Ethernet interface e0
RouterB(config-if)#ip address 172.16.11.1 255.255.255.0
RouterB(config-if)#description LAN Network for RouterB
RouterB(config-if)#no shutdown //this means interface is up
RouterB(config-if)#int s1 //configure serial interface
RouterB(config-if)#ip address 172.16.10.2 255.255.255.0
RouterB(config-if)#no shutdown
RouterB(config-if)#description Network connection to RouterA
RouterB(config-if)#^Z
RouterB# copy run start
```

#### Part 2. Verify router configurations

Once both routers are configured, use the ping command from a router to ping the neighboring router's serial and Ethernet interfaces.

```
RouterB#ping 172.16.10.1
RouterB#ping 172.16.12.1
```

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Verify the configuration on both routers using the following commands.

```
RouterA#show ip route
RouterA#show ip int
```

### Part 3. Configure PC1 and PC2 IP Addresses

Manually configure the PC1 and PC2 IP addresses.

#### PC1

- Click on “K” in the lower left corner of the screen.
- Click “Settings”
- Click “Netconfig”
- Choose “No”.
- Type 172.16.12.2 as the IP address.
- Type 255.255.255.0 as the network mask.
- Type 172.16.12.1 for the default gateway.
- Use the default 127.0.0.1 for the DNS.
- Click “Exit”.
- Start a terminal and do the following commands. **Note and log what happens at each point.**
  - #ping 172.16.12.1
  - #ping 172.16.10.1
  - #ping 172.16.10.2
  - #ping 172.16.11.1

#### PC2

- Repeat the steps for PC2 but set the IP address to 172.16.11.2 and the default gateway to 172.16.11.1.
- Start a terminal and do the following commands. **Note and log what happens at each point.**
  - #ping 172.16.11.1
  - #ping 172.16.10.2
  - #ping 172.16.10.1
  - #ping 172.16.12.1
  - #ping 172.16.12.2
- Explain why some interfaces can be pinged and others cannot.

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### Part 4. Adding dynamic routing: RIP

A routing protocol like RIP needs to be enabled on the routers to advertise the directly connected networks to the neighboring router.

RouterA

```
RouterA>en
RouterA#config t
RouterA#ip routing //enable routing
RouterA(config)#router RIP //enable the routing information protocol
RouterA(config-router)#network 172.16.12.0
RouterA(config-router)#^Z
RouterA#copy run start
```

RouterB

Enable RIP on RouterB but advertise 172.16.11.0.

### Part 5. Verify the two routers are routing packets to the remote network

Use PC1 and PC2 to verify that the two remote networks can communicate.

PC1

```
#ping 172.16.11.2
```

PC2

```
#ping 172.16.12.2
```

If both ping commands work, then the configuration is complete. Two remote networks are communicating through two routers. Congratulations!

### 1.4. Checklist

Complete this checklist as the lab is performed and attach it to the lab report.

Name: \_\_\_\_\_

1. Turn in questions for prelab \_\_\_\_\_
2. Exercise Part 2 \_\_\_\_\_
3. Exercise Part 3 \_\_\_\_\_
4. Exercise Part 5 \_\_\_\_\_
5. Complete Feedback sheet \_\_\_\_\_
6. Notify instructor \_\_\_\_\_
7. Lab report \_\_\_\_\_



## 1.6. Lab Report

In the lab report, answer the following questions.

- Why was the default gateway set for PC1 and PC2?
- Why was RIP needed for PC1 and PC2 to communicate?
- How does RIP work?