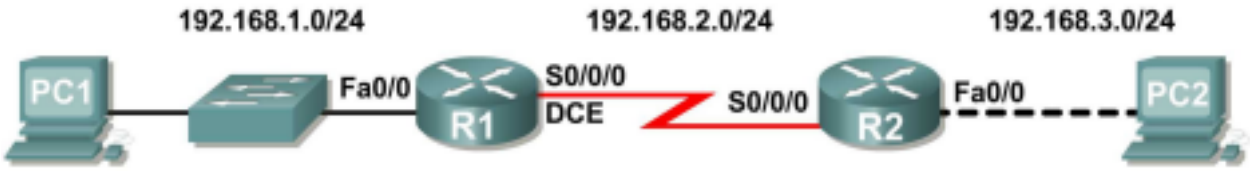
Lab 1.5.2: Basic Router Configuration

Topology Diagram



Addressing Table

Device	Interface	IP Address	Subnet Mask	Def. Gateway
R1	**Fa0/0**	192.168.1.1	255.255.255.0	N/A
	S0/0/0	192.168.2.1	255.255.255.0	N/A
R2	**Fa0/0**	192.168.3.1	255.255.255.0	N/A
	S0/0/0	192.168.2.2	255.255.255.0	N/A
PC1	**N/A**	192.168.1.10	255.255.255.0	192.168.1.1
PC2	**N/A**	192.168.3.10	255.255.255.0	192.168.3.1

Learning Objectives

Upon completion of this lab, you will be able to:

- Cable a network according to the Topology Diagram.
- Erase the startup configuration and reload a router to the default state.
- Perform basic configuration tasks on a router.
- Configure and activate Ethernet interfaces.
- Test and verify configurations.
- Reflect upon and document the network implementation.

Scenario

In this lab activity, you will create a network that is similar to the one shown in the Topology Diagram. Begin by cabling the network as shown in the Topology Diagram. You will then perform the initial router configurations required for connectivity. Use the IP addresses that are provided in the Topology Diagram to apply an addressing scheme to the network devices. When the network configuration is complete, examine the routing tables to verify that the network is operating properly. This lab is a shorter version of **Lab 1.5.1: Cabling a Network and Basic Router Configuration** and assumes you are proficient in basic cabling and configuration file management.

Task 1: Cable the Network.

Cable a network that is similar to the one in the Topology Diagram. The output used in this lab is from 1841 routers. You can use any current router in your lab as long as it has the required interfaces as shown in the topology. Be sure to use the appropriate type of Ethernet cable to connect from host to switch, switch to router, and host to router. Refer to **Lab 1.5.1: Cabling a Network and Basic Router Configuration** if you have any trouble connecting the devices. Be sure to connect the serial DCE cable to router R1 and the serial DTE cable to router R2.

Answer the following questions:

What type of cable is used to connect the Ethernet interface on a host PC to the Ethernet interface on a switch? Copper straight-through Ethernet cable.

What type of cable is used to connect the Ethernet interface on a switch to the Ethernet interface on a router? Copper straight-through Ethernet cable.

What type of cable is used to connect the Ethernet interface on a router to the Ethernet interface on a host PC? Copper Cross-Over Ethernet cable.

Task 2: Erase and Reload the Routers.

Step 1: Establish a terminal session to router R1.

Refer to Lab 1.5.1, “Cabling a Network and Basic Router Configuration,” for review of terminal emulation and connecting to a router.

Step 2: Enter privileged EXEC mode.

```
Router>enable
Router#
```

Step 3: Clear the configuration.

To clear the configuration, issue the **`erase startup-config`** command. Press **Enter** when prompted to **`[confirm]`** that you really do want to erase the configuration currently stored in NVRAM.

```
Router#erase startup-config
Erasing the nvram filesystem will remove all files! Continue? [confirm]
 [OK]
Erase of nvram: complete
Router#
```

Step 4: Reload configuration.

When the prompt returns, issue the **`reload`** command. Answer **no** if asked to save changes.

What would happen if you answered **yes** to the question, “`System configuration has been modified. Save?`”

The result should look something like this:

```
Router#reload

System configuration has been modified. Save? [yes/no]: no
Proceed with reload? [confirm]
```


Press **Enter** when prompted to **[confirm]** that you really do want to reload the router. After the router finishes the boot process, choose not to use the AutoInstall facility, as shown:

```
Would you like to enter the initial configuration dialog? [yes/no]: no
Would you like to terminate autoinstall? [yes]: [Press Return] Press
Enter to accept default.
Press RETURN to get started!
```

Step 5: Repeat Steps 1 through 4 on router R2 to remove any startup configuration file that may be present.

Task 3: Perform Basic Configuration of Router R1.

Step 1: Establish a HyperTerminal session to router R1.

Step 2: Enter privileged EXEC mode.

```
Router>enable
Router#
```

Step 3: Enter global configuration mode.

```
Router#configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
```

Step 4: Configure the router name as R1.

Enter the command **hostname R1** at the prompt.

```
Router(config)#hostname R1
R1(config)#
```

Step 5: Disable DNS lookup.

Disable DNS lookup with the **no ip domain-lookup** command.

```
R1(config)#no ip domain-lookup
R1(config)#
```

Why would you want to disable DNS lookup in a lab environment?

Disabling DNS lookup in a lab environment is typically done to prevent the router from attempting

DNS resolution for commands that are not recognized locally. In a lab environment, you often rely on manual configurations, and DNS lookups can introduce unnecessary delays and potential errors. Disabling DNS lookup ensures that the router doesn't spend time trying to resolve domain names for invalid commands, which can be more efficient for testing and learning purposes.If it's not disabled, it will search for a solution for any incorrect command.

What would happen if you disabled DNS lookup in a production environment?

Disabling DNS lookup in a production environment can have implications for various network services and operations that rely on DNS. In a production environment, DNS is crucial for tasks like hostname resolution, domain authentication, and other network services. Disabling DNS lookup may cause issues with services that depend on DNS, leading to problems with host name resolution and potential disruptions in network functionality. It is generally not recommended to disable DNS lookup in a production environment unless there are specific security or operational reasons to do so.

Step 6: Configure the EXEC mode password.

Configure the EXEC mode password using the **enable secret** password command. Use **class** for the password.

```
R1(config)#enable secret class
R1(config)#
```

Why is it not necessary to use the **enable password** password command?

It is not necessary to use the enable password command because the enable secret command is a more secure and preferred method for configuring an enable password. The enable secret command encrypts the password, providing a higher level of security. So, it's best practice to use the enable secret command for securing privileged EXEC mode rather than the use of enable password.

Step 7: Configure a message-of-the-day banner.

Configure a message-of-the-day banner using the **banner motd** command.

```
R1(config)#banner motd &
Enter TEXT message. End with the character '&'.
********************************
 !!!AUTHORIZED ACCESS ONLY!!!
********************************
&
R1(config)#
```

When does this banner display?

It is typically displayed after a user logs in to the router but before they gain access to the command-line interface.

Why should every router have a message-of-the-day banner?

Security: To deter unauthorized access and potential intruders.
Legal compliance: Meeting legal requirements for displaying messages.
Policy notification: Informing users of acceptable use policies.
System notifications: Conveying important information to users.

Step 8: Configure the console password on the router.

Use **cisco** as the password. When you are finished, exit from line configuration mode.

```
R1(config)#line console 0
R1(config-line)#password cisco
R1(config-line)#login
R1(config-line)#exit
R1(config)#
```

Step 9: Configure the password for the virtual terminal lines.

Use **cisco** as the password. When you are finished, exit from line configuration mode.

```
R1(config)#line vty 0 4
R1(config-line)#password cisco
R1(config-line)#login
R1(config-line)#exit
R1(config)#
```

Step 10: Configure the FastEthernet0/0 interface.

Configure the FastEthernet0/0 interface with the IP address 192.168.1.1/24.

```
R1(config)#interface fastethernet 0/0
R1(config-if)#ip address 192.168.1.1 255.255.255.0
R1(config-if)#no shutdown
```



```
%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed
state to up
R1(config-if)#
```

Step 11: Configure the Serial0/0/0 interface.

Configure the Serial0/0/0 interface with the IP address 192.168.2.1/24. Set the clock rate to 64000.

Note: The purpose of the **clock rate** command is explained in Chapter 2: Static Routes.

```
R1(config-if)#interface serial 0/0/0
R1(config-if)#ip address 192.168.2.1 255.255.255.0
R1(config-if)#clock rate 64000
R1(config-if)#no shutdown
R1(config-if)#
```

Note: The interface will be activated until the serial interface on R2 is configured and activated

Step 12: Return to privileged EXEC mode.

Use the **end** command to return to privileged EXEC mode.

```
R1(config-if)#end
R1#
```

Step 13: Save the R1 configuration.

Save the R1 configuration using the **copy running-config startup-config** command.

```
R1#copy running-config startup-config
Building configuration...
 [OK]
R1#
```

What is a shorter version of this command? **copy run start**

Task 4: Perform Basic Configuration of Router R2.

Step 1: For R2, repeat Steps 1 through 9 from Task 3.

Step 2: Configure the Serial 0/0/0 interface.

Configure the Serial 0/0/0 interface with the IP address 192.168.2.2/24.

```
R2(config)#interface serial 0/0/0
R2(config-if)#ip address 192.168.2.2 255.255.255.0
R2(config-if)#no shutdown

%LINK-5-CHANGED: Interface Serial0/0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0/0, changed state
to up
R2(config-if)#
```


Step 3: Configure the FastEthernet0/0 interface.

Configure the FastEthernet0/0 interface with the IP address 192.168.3.1/24.

```
R2(config-if)#interface fastethernet 0/0
R2(config-if)#ip address 192.168.3.1 255.255.255.0
R2(config-if)#no shutdown

%LINK-5-CHANGED: Interface FastEthernet0/0, changed state to up
%LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0/0, changed
state to up
R2(config-if)#
```

Step 4: Return to privileged EXEC mode.

Use the **end** command to return to privileged EXEC mode.

```
R2(config-if)#end
R2#
```

Step 5: Save the R2 configuration.

Save the R2 configuration using the **copy running-config startup-config** command.

```
R2#copy running-config startup-config
Building configuration...
 [OK]
R2#
```

Task 5: Configure IP Addressing on the Host PCs.

Step 1: Configure the host PC1.

Configure the host PC1 that is attached to R1 with an IP address of 192.168.1.10/24 and a default gateway of 192.168.1.1.

Step 2: Configure the host PC2.

Configure the host PC2 that is attached to R2 with an IP address of 192.168.3.10/24 and a default gateway of 192.168.3.1.

Task 6: Verify and Test the Configurations.

Step 1: Verify that routing tables have the following routes using the `show ip route` command.

The **`show ip route`** command and output will be thoroughly explored in upcoming chapters. For now, you are interested in seeing that both R1 and R2 have two routes. Both routes are designated with a **C**. These are the directly connected networks that were activated when you configured the interfaces on each router. If you do not see two routes for each router as shown in the following output, proceed to Step 2.

```
R1#show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP   D -
EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area   N1 - OSPF
NSSA external type 1, N2 - OSPF NSSA external type 2   E1 - OSPF
external type 1, E2 - OSPF external type 2
 i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2   ia -
IS-IS inter area, * - candidate default, U - per-user static route   o - ODR, P
- periodic downloaded static route
```

```
Gateway of last resort is not set

C 192.168.1.0/24 is directly connected, FastEthernet0/0
C 192.168.2.0/24 is directly connected, Serial0/0/0

-----------------------

R2#show ip route
Codes: C - connected, S - static, R - RIP, M - mobile, B - BGP   D -
EIGRP, EX - EIGRP external, O - OSPF, IA - OSPF inter area   N1 - OSPF
NSSA external type 1, N2 - OSPF NSSA external type 2   E1 - OSPF
external type 1, E2 - OSPF external type 2
 i - IS-IS, su - IS-IS summary, L1 - IS-IS level-1, L2 - IS-IS level-2   ia -
IS-IS inter area, * - candidate default, U - per-user static route   o - ODR, P
- periodic downloaded static route

Gateway of last resort is not set

C 192.168.2.0/24 is directly connected, Serial0/0/0
C 192.168.3.0/24 is directly connected, FastEthernet0/0
```

Step 2: Verify interface configurations.

Another common problem is router interfaces that are not configured correctly or not activated. Use the **show ip interface brief** command to quickly verify the configuration of each router's interfaces. Your output should look similar to the following:

```
R1#show ip interface brief
Interface IP-Address OK? Method Status Protocol  FastEthernet0/0 192.168.1.1
YES manual up up  FastEthernet0/1 unassigned YES unset administratively down
down  Serial0/0/0 192.168.2.1 YES manual up up  Serial0/0/1 unassigned YES
unset administratively down down  Vlan1 unassigned YES manual administratively
down down

------------------------
```



```
R2#show ip interface brief
Interface IP-Address OK? Method Status Protocol  FastEthernet0/0 192.168.3.1
YES manual up up  FastEthernet0/1 unassigned YES unset administratively down
down  Serial0/0/0 192.168.2.2 YES manual up up  Serial0/0/1 unassigned YES
unset down down  Vlan1 unassigned YES manual administratively down down
```

If both interfaces are **up** and **up**, then both routes will be in the routing table. Verify this again by using the **show ip route** command.

Step 3: Test connectivity.

Test connectivity by pinging from each host to the default gateway that has been configured for that host.

From the host attached to R1, is it possible to ping the default gateway? YES

From the host attached to R2, is it possible to ping the default gateway?YES

If the answer is **no** for any of the above questions, troubleshoot the configurations to find the error using the following systematic process:

1. Check the PCs.

   Are they physically connected to the correct router? (Connection could be through a switch or directly.) YES

   Are link lights blinking on all relevant ports? YES

2. Check the PC configurations.

   Do they match the Topology Diagram? YES

3. Check the router interfaces using the **`show ip interface brief`** command.

   Are the interfaces **up** and **up**? YES

If your answer to all three steps is **yes**, then you should be able to successfully ping the default gateway.

Step 4: Test connectivity between router R1 and R2.

From the router R1, is it possible to ping R2 using the command **`ping 192.168.2.2`**? YES

From the router R2, is it possible to ping R1 using the command **`ping 192.168.2.1`**? YES

If the answer is **no** for the questions above, troubleshoot the configurations to find the error using the following systematic process:

1. Check the cabling.

   Are the routers physically connected? _____

   Are link lights blinking on all relevant ports? _____

2. Check the router configurations.

   Do they match the Topology Diagram? _____

   Did you configure the **`clock rate`** command on the DCE side of the link? _____

3. Check the router interfaces using the **`show ip interface brief`** command. Are the interfaces “up” and “up”? _____

If your answer to all three steps is **yes**, then you should be able to successfully ping from R2 to R1 and from R2 to R3.

Task 7: Reflection

Step 1: Attempt to ping from the host connected to R1 to the host connected to R2.

This ping should be unsuccessful.

Step 2: Attempt to ping from the host connected to R1 to router R2.

This ping should be unsuccessful.

Step 3: Attempt to ping from the host connected to R2 to router R1.

This ping should be unsuccessful.

What is missing from the network that is preventing communication between these devices?

I think the fact that we are unable to successfully ping between the devices in the network indicates that there is likely a missing component in the network configuration. In a typical router-to-router setup such as the one described in your scenario, you would need routing information for the devices to communicate between different subnets. Such as Static Routes or a Routing Protocol.I think we need to configure either static routes or a routing protocol on R1 and R2 to allow them to exchange routing information and determine the best path to reach networks outside their directly connected interfaces. This would enable communication between hosts connected to different routers and allow pinging between them.So, in summary, we can say the routing information necessary for inter-subnet communication between R1 and R2 is missing .

Task 8: Documentation

On each router, capture the following command output to a text (.txt) file and save for future reference.

- **`show running-config`**
- **`show ip route`**
- **`show ip interface brief`**

If you need to review the procedures for capturing command output, refer to Lab 1.5.1, “Cabling a Network and Basic Router Configuration.”

Task 9: Clean Up

Erase the configurations and reload the routers. Disconnect and store the cabling. For PC hosts that are normally connected to other networks (such as the school LAN or to the Internet), reconnect the appropriate cabling and restore the TCP/IP settings.

