

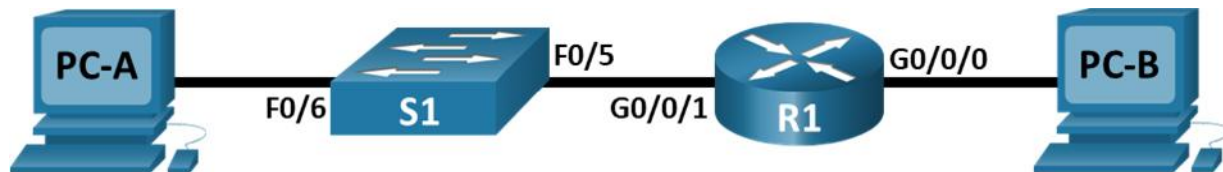
## Lab 10.4.4 - Build a Switch and Router Network



This lab has been updated for use on NETLAB+.

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### Topology



### Addressing Table

Device	Interface	IP Address / Prefix	Default Gateway
R1	G0/0/0	192.168.0.1 /24	N/A
		2001:db8:acad::1/64	
		fe80::1	
	G0/0/1	192.168.1.1 /24	N/A
		2001:db8:acad:1::1/64	
		fe80::1	
S1	VLAN 1	192.168.1.2 /24	192.168.1.1
PC-A	NIC	192.168.1.3 /24	192.168.1.1
		2001:db8:acad:1::3/64	fe80::1
PC-B	NIC	192.168.0.3 /24	192.168.0.1
		2001:db8:acad::3/64	fe80::1

### Objectives

#### Part 1: Configure Devices and Verify Connectivity

### Background / Scenario

This is a comprehensive lab to review previously covered IOS commands. In this lab, you will configure the devices to match the addressing table. After the configurations have been saved, you will verify your configurations by testing for network connectivity.

After the devices have been configured and network connectivity has been verified, you will use IOS commands to retrieve information from the devices to answer questions about your network equipment.

This lab provides minimal assistance with the actual commands necessary to configure the router. Test your knowledge by trying to configure the devices without referring to the content or previous activities.

**Note:** The routers used with CCNA hands-on labs are Cisco 4221 with Cisco IOS XE Release 16.9.4 (universalk9 image). The switches used in the labs are Cisco Catalyst 2960s with Cisco IOS Release 15.2(2) (lanbasek9 image). Other routers, switches, and Cisco IOS versions can be used. Depending on the model and Cisco IOS version, the commands available and the output produced might vary from what is shown in the labs. Refer to the Router Interface Summary Table at the end of the lab for the correct interface identifiers.

The **default bias** template used by the Switch Database Manager (SDM) does not provide IPv6 address capabilities. Verify that SDM is using either the **dual-ipv4-and-ipv6** template or the **lanbase-routing** template. The new template will be used after reboot even if the configuration is not saved.

```
S1# show sdm prefer
```

Use the following commands to assign the **dual-ipv4-and-ipv6** template as the default SDM template.

```
S1# configure terminal
S1(config)# sdm prefer dual-ipv4-and-ipv6 default
S1(config)# end
S1# reload
```

## Instructions

### Part 1: Configure Devices and Verify Connectivity

In Part 1, you will configure basic settings, such as the interface IP addresses, device access, and passwords. Refer to the Addressing Table and Topology at the beginning of this lab for device names and address information.

#### Step 1: Assign static IP information to the PC interfaces.

- Configure the IP address, subnet mask, and default gateway settings on PC-A.
- Configure the IP address, subnet mask, and default gateway settings on PC-B.
- Ping PC-B from a command prompt window on PC-A.

**Note:** If pings are not successful, the Windows Firewall may need to be turned off.

Why were the pings not successful?

The pings were unsuccessful because the router interfaces have not been configured, so Layer 3 traffic will not get routed through subnets.

#### Step 2: Configure the router.

- Click on the router to access the console port and enable privileged EXEC mode.
- Enter configuration mode.
- Assign a device name to the router.
- Disable DNS lookup to prevent the router from attempting to translate incorrectly entered commands as though they were host names.
- Assign **class** as the privileged EXEC encrypted password.
- Assign **cisco** as the console password and enable login.
- Assign **cisco** as the VTY password and enable login.
- Encrypt the plaintext passwords.
- Create a banner that warns anyone accessing the device that unauthorized access is prohibited.
- Configure and activate both interfaces on the router.

- k. Configure an interface description for each interface indicating which device is connected to it.
- l. To enable IPv6 routing, enter the command `ipv6 unicast-routing`.

```
R1(config)# ipv6 unicast-routing
```

- m. Save the running configuration to the startup configuration file.
- n. Set the clock on the router.

**Note:** Use the question mark (?) to help with the correct sequence of parameters needed to execute this command.

- o. Ping PC-B from a command prompt window on PC-A.

**Note:** If pings are not successful, the Windows Firewall may need to be turned off.

Were the pings successful? Explain.

*Type your answers here.*

The pings were now successful because the router's interfaces have been configured. Traffic can now be routed through subnets.

### Step 3: Configure the switch.

In this step, you will configure the hostname, the VLAN 1 interface and its default gateway.

- a. Click on the switch to access the console port and enable privileged EXEC mode.
- b. Enter configuration mode.
- c. Assign a device name to the switch.
- d. Disable DNS lookup to prevent the router from attempting to translate incorrectly entered commands as though they were host names.
- e. Configure and activate the VLAN interface on the switch S1.
- f. Configure the default gateway for the switch S1.
- g. Save the running configuration to the startup configuration file.

### Step 4: Verify connectivity end-to-end connectivity.

- a. From PC-A, ping PC-B.
- b. From S1, ping PC-B.

All the pings should be successful.

## Part 2: Display Device Information

In Part 2, you will use **show** commands to retrieve interface and routing information from the router and switch.

### Step 1: Display the routing table on the router.

- a. Use the **show ip route** command on the router R1 to answer the following questions.

What code is used in the routing table to indicate a directly connected network?

The "L" designates a local interface, while the "C" designates a directly connected subnet.

How many route entries are coded with a C code in the routing table?

*Type your answers here.*

2

What interface types are associated to the C coded routes?

*Type your answers here.* G0/0/0 and G0/0/1 are associated with the subnets.

- b. Use the **show ipv6 route** command on router R1 to display the IPv6 routes.

### Step 2: Display interface information on the router R1.

- a. Use the **show ip interface g0/0/1** to answer the following questions.

What is the operational status of the G0/0/1 interface?

*Type your answers here.*

G0/0/1 is up

What is the Media Access Control (MAC) address of the G0/1 interface?

*Type your answers here.*

4c71.0d42.cb61

How is the Internet address displayed in this command?

*Type your answers here.*

192.168.1.1/24

- b. For the IPv6 information, enter the **show ipv6 interface interface** command.

### Step 3: Display a summary list of the interfaces on the router and switch.

There are several commands that can be used to verify an interface configuration. One of the most useful of these is the **show ip interface brief** command. The command output displays a summary list of the interfaces on the device and provides immediate feedback to the status of each interface.

- a. Enter the **show ip interface brief** command on the router R1.

```
R1# show ip interface brief
```

- b. To see the IPv6 interface information, enter the **show ipv6 interface brief** command on R1.

```
R1# show ipv6 interface brief
```

- c. Enter the **show ip interface brief** command on the switch S1.

```
S1# show ip interface brief
```

### Reflection Questions

1. If the G0/0/1 interface showed that it was administratively down, what interface configuration command would you use to turn the interface up?

*Type your answers here.*

no shutdown

2. What would happen if you had incorrectly configured interface G0/0/1 on the router with an IP address of 192.168.1.2?

If the interface was incorrectly configured, PC-A would be unable to ping PC-B. Since PC-A was configured to use 192.168.1.1 for the default gateway and PC-B is on a different network, the packets would never reach PC-B.

## Router and Switch Interface Summary Table

Router / Switch Model	Ethernet Interface #1	Ethernet Interface #2	Serial Interface #1	Serial Interface #2
1800	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
1900	Gigabit Ethernet 0/0 (G0/0)	Gigabit Ethernet 0/1 (G0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
2801	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/1/0 (S0/1/0)	Serial 0/1/1 (S0/1/1)
2811	Fast Ethernet 0/0 (F0/0)	Fast Ethernet 0/1 (F0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
2900	Gigabit Ethernet 0/0 (G0/0)	Gigabit Ethernet 0/1 (G0/1)	Serial 0/0/0 (S0/0/0)	Serial 0/0/1 (S0/0/1)
2960	Fast Ethernet 0/1 (F0/1)	Fast Ethernet 0/2 (F0/2)	n/a	n/a
3560	Fast Ethernet 0/1 (F0/1)	Fast Ethernet 0/2 (F0/2)	n/a	n/a
3650	Gigabit Ethernet 1/0/1 (G1/0/1)	Gigabit Ethernet 1/0/2 (G1/0/2)	n/a	n/a
4221	Gigabit Ethernet 0/0/0 (G0/0/0)	Gigabit Ethernet 0/0/1 (G0/0/1)	Serial 0/1/0 (S0/1/0)	Serial 0/1/1 (S0/1/1)
4300	Gigabit Ethernet 0/0/0 (G0/0/0)	Gigabit Ethernet 0/0/1 (G0/0/1)	Serial 0/1/0 (S0/1/0)	Serial 0/1/1 (S0/1/1)

**Note:** To find out how the router is configured, look at the interfaces to identify the type of router and how many interfaces the router has. There is no way to effectively list all the combinations of configurations for each router class. This table includes identifiers for the possible combinations of Ethernet and Serial interfaces in the device. The table does not include any other type of interface, even though a specific router may contain one. An example of this might be an ISDN BRI interface. The string in parenthesis is the legal abbreviation that can be used in Cisco IOS commands to represent the interface.