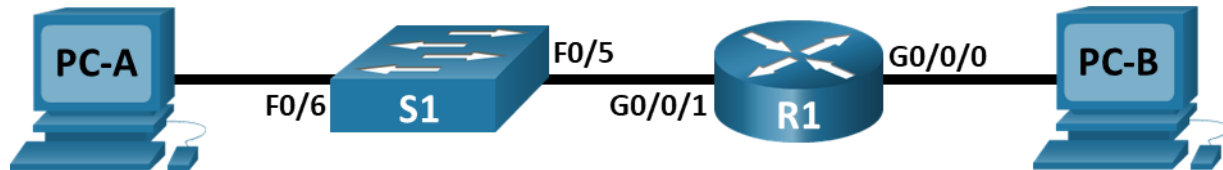


Lab - Configure Basic Router Settings

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	
		2001:db8:acad:1::1 /64	
		fe80::1	
	Loopback0	10.0.0.1 /24	
		2001:db8:acad:2::1 /64	
		fe80::1	
PC-A	NIC	192.168.1.10 /24	192.168.1.1
		2001:db8:acad:1::10 /64	fe80::1
PC-B	NIC	192.168.0.10 /24	192.168.0.1
		2001:db8:acad::10 /64	fe80::1

Objectives

Part 1: Set Up the Topology and Initialize Devices

- Cable equipment to match the network topology.
- Initialize and restart the router and switch.

Part 2: Configure Devices and Verify Connectivity

- Assign static IPv4 and IPv6 information to the PC interfaces.
- Configure basic router settings.
- Configure the router for SSH.
- Verify network connectivity.

Part 3: Display Router Information

- Retrieve hardware and software information from the router.
- Interpret the output from the startup configuration.
- Interpret the output from the routing table.
- Verify the status of the interfaces.

Background / Scenario

This is a comprehensive lab to review previously covered IOS router commands. In Parts 1 and 2, you will cable the equipment and complete basic configurations and interface settings on the router.

In Part 3, you will use SSH to connect to the router remotely and utilize the IOS commands to retrieve information from the device to answer questions about the router.

For review purposes, this lab provides the commands necessary for specific router configurations.

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.

Note: Make sure that the router and switch have been erased and have no startup configurations. Consult with your instructor for the procedure to initialize and reload a router and switch.

Required Resources

- 1 Router (Cisco 4221 with Cisco IOS XE Release 16.9.4 universal image or comparable)
- 1 Switch (Cisco 2960 with Cisco IOS Release 15.2(2) lanbasek9 image or comparable)
- 2 PCs (Windows with a terminal emulation program, such as Tera Term)
- Console cables to configure the Cisco IOS devices via the console ports
- Ethernet cables as shown in the topology

Note: The Gigabit Ethernet interfaces on Cisco 4221 routers are autosensing and an Ethernet straight-through cable may be used between the router and PC-B. If using another model Cisco router, it may be necessary to use an Ethernet crossover cable.

Instructions

Part 1: Set Up the Topology and Initialize Devices

Step 1: Cable the network as shown in the topology.

- Attach the devices as shown in the topology diagram, and cable as necessary.
- Power on all the devices in the topology.

Step 2: Initialize and reload the router and switch.

Part 2: Configure Devices and Verify Connectivity

Step 1: Configure 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.

Step 2: Configure the router.

- a. Console into the router and enable privileged EXEC mode.
- b. Enter configuration mode.
- c. Assign a device name to the router.
- d. Set the router's domain name as ccna-lab.com.
- e. Disable DNS lookup to prevent the router from attempting to translate incorrectly entered commands as though they were host names.
- f. Encrypt the plaintext passwords.
- g. Configure the system to require a minimum 12-character password.
- h. Configure the username **SSHadmin** with an encrypted password of **55Hadm!n2020**.
- i. Generate a set of crypto keys with a 1024 bit modulus
- j. Assign the privileged EXEC password to **\$cisco!PRIV***
- k. Assign **\$cisco!!CON*** as the console password, configure sessions to disconnect after four minutes of inactivity, and enable login.
- l. Assign **\$cisco!!VTY*** as the vty password, configure the vty lines to accept SSH connections only, configure sessions to disconnect after four minutes of inactivity, and enable login using the local database.
- m. Create a banner that warns anyone accessing the device that unauthorized access is prohibited.
- n. Enable IPv6 Routing
- o. Configure all three interfaces on the router with the IPv4 and IPv6 addressing information from the addressing table above. Configure all three interfaces with descriptions. Activate all three interfaces.
- p. The router should not allow vty logins for two minutes if three failed login attempts occur within 60 seconds.
- q. Set the clock on the router.
- r. Save the running configuration to the startup configuration file.

What would be the result of reloading the router prior to completing the **copy running-config startup-config** command?

Step 3: Verify network connectivity.

- a. Using the command line at PC-A, ping the IPv4 and IPv6 addresses for PC-B.

Note: It may be necessary to disable the PCs firewall.

Were the pings successful?

- b. Remotely access R1 from PC-A using the Tera Term SSH client.

Using Tera Term on PC-A, open an SSH session to the R1 Loopback interface IPv4 address. Ensure that the **SSH** radio button is selected and then click **OK** to connect to the router. Log in as **SSHadmin** with the password **55Hadm!n2020**.

Was remote access successful?

Using Tera Term on PC-A, open an SSH session to the R1 Loopback interface IPv6 address. Ensure that the **SSH** radio button is selected and then click **OK** to connect to the router. Log in as **SSHadmin** with the password **55Hadm!n2020**. **Note:** The IPv6 address should be surrounded with square brackets, i.e. [IPv6 address]

Was remote access successful?

Why is the Telnet protocol considered to be a security risk?

Part 3: Display Router Information

In Part 3, you will use **show** commands from an SSH session to retrieve information from the router.

Step 1: Establish an SSH session to R1.

Using Tera Term on PC-B, open an SSH session to the R1 Loopback interface IPv6 address and log in as **SSHadmin** with the password **55Hadm!n2020**.

Step 2: Retrieve important hardware and software information.

- a. Use the **show version** command to answer questions about the router.

What is the name of the IOS image that the router is running?

How much non-volatile random-access memory (NVRAM) does the router have?

How much Flash memory does the router have?

- b. The **show** commands often provide multiple screens of outputs. Filtering the output allows a user to display certain sections of the output. To enable the filtering command, enter a pipe (|) character after a **show** command, followed by a filtering parameter and a filtering expression. You can match the output to the filtering statement by using the **include** keyword to display all lines from the output that contain the filtering expression. Filter the **show version** command, using **show version | include register** to answer the following question.

What is the boot process for the router on the next reload?

Step 3: Display the startup configuration.

Use the **show startup-config** command on the router to answer the following questions.

How are passwords presented in the output?

Use the **show startup-config | section vty** command.

What is the result of using this command?

Step 4: Display the routing table on the router.

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

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

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

Step 5: Display a summary list of the interfaces on the router.

- a. Use the **show ip interface brief** command on the router to answer the following question.

What command changed the status of the Gigabit Ethernet ports from administratively down to up?

- b. Use the **show ipv6 int brief** command to verify IPv6 settings on R1.

What is the meaning of the [up/up] part of the output?

- c. On PC-B, change its configuration so that it no longer has a static IPv6 address. You may have to reboot the machine. Then, issue the **ipconfig** command on PC-B to examine the IPv6 configuration.

What is the IPv6 address assigned to PC-B?

What is the default gateway assigned to PC-B?

Issue a ping from PC-B to the R1 default gateway link local address. Was it successful?

Issue a ping from PC-B to the R1 IPv6 unicast address 2001:db8:acad::1. Was it successful?

Reflection Questions

1. In researching a network connectivity issue, a technician suspects that an interface was not enabled. What **show** command could the technician use to troubleshoot this issue?
2. In researching a network connectivity issue, a technician suspects that an interface was assigned an incorrect subnet mask. What **show** command could the technician use to troubleshoot this issue?

Router Interface Summary Table

Router 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)
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.