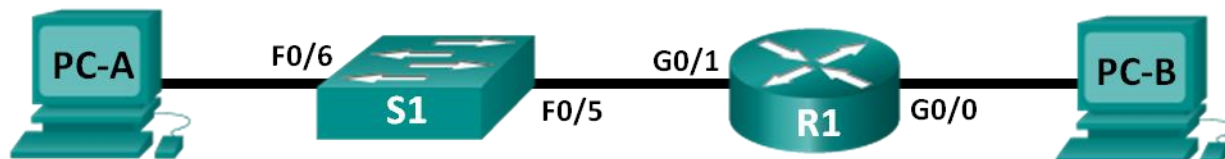# Lab - Building a Switch and Router Network

Topology

Addressing Table

Device	Interface	IP Address	Subnet Mask	Default Gateway
R1	G0/0	192.168.0.1	255.255.255.0	N/A
	G0/1	192.168.1.1	255.255.255.0	N/A
PC-A	NIC	192.168.1.3	255.255.255.0	192.168.1.1
PC-B	NIC	192.168.0.3	255.255.255.0	192.168.0.1

Objectives

Part 1: Set Up the Topology and Initialize Devices

Part 2: Configure Devices and Verify Connectivity

Part 3: Display Device Information

Background / Scenario

This is a comprehensive lab to review previously covered IOS commands. In this lab, you will cable the equipment as shown in the topology diagram. You will then 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 1941 Integrated Services Routers (ISRs) with Cisco IOS Release 15.2(4)M3 (universalk9 image). The switches used are Cisco Catalyst 2960s with Cisco IOS Release 15.0(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 output produced might vary from what is shown in the labs. Refer to the Router Interface Summary Table at the end of this lab for the correct interface identifiers.

Note: Ensure that the routers and switches 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 1941 with Cisco IOS Release 15.2(4)M3 universal image or comparable)
- 1 Switch (Cisco 2960 with Cisco IOS Release 15.0(2) lanbasek9 image or comparable)

- 2 PCs (Windows 7 or 8 with 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 1941 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.

Part 1: Set Up Topology and Initialize Devices

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

a. Attach the devices shown in the topology diagram, and cable, as necessary.

b. Power on all the devices in the topology.

Step 2: Initialize and reload the router and switch.

If configuration files were previously saved on the router and switch, initialize and reload these devices back to their basic configurations.

Part 2: Configure Devices and Verify Connectivity

In Part 2, you will set up the network topology and configure basic settings, such as the interface IP addresses, device access, and passwords. Refer to the Topology and Addressing Table at the beginning of this lab for device names and address information.

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

a. Configure the IP address, subnet mask, and default gateway settings on PC-A.

b. Configure the IP address, subnet mask, and default gateway settings on PC-B.

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

   Why were the pings not successful?

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. Disable DNS lookup to prevent the router from attempting to translate incorrectly entered commands as though they were host names.

e. Assign **class** as the privileged EXEC encrypted password.

f. Assign **cisco** as the console password and enable login.

g. Assign **cisco** as the VTY password and enable login.

h. Encrypt the clear text passwords.

    i.   Create a banner that warns anyone accessing the device that unauthorized access is prohibited.

    j.   Configure and activate both interfaces on the router.

    k.   Configure an interface description for each interface indicating which device is connected to it.

    l.   Save the running configuration to the startup configuration file.

    m.   Set the clock on the router.

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

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

       Were the pings successful? Why?

Part 3: Display Device Information

In Part 3, you will use **show** commands to retrieve information from the router and switch.

Step 1: Retrieve hardware and software information from the network devices.

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

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

       How much DRAM memory does the router have?

       How much NVRAM memory does the router have?

       How much Flash memory does the router have?

    b.   Use the **show version** command to answer the following questions about the switch.

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

       How much dynamic random access memory (DRAM) does the switch have?

       How much nonvolatile random-access memory (NVRAM) does the switch have?

       What is the model number of the switch?

Step 2: 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?

What interface types are associated to the C coded routes?

Step 3: Display interface information on the router.

Use the **show interface g0/1** to answer the following questions.

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

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

How is the Internet address displayed in this command?

Step 4: 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# show ip interface brief
Interface                  IP-Address      OK? Method Status                 Protocol
Embedded-Service-Engine0/0 unassigned      YES unset  administratively down down
GigabitEthernet0/0         192.168.0.1     YES manual up                     up
GigabitEthernet0/1         192.168.1.1     YES manual up                     up
Serial0/0/0                unassigned      YES unset  administratively down down
Serial0/0/1                unassigned      YES unset  administratively down down
R1#
```

b. Enter the **show ip interface brief** command on the switch.

```
Switch# show ip interface brief
Interface              IP-Address      OK? Method Status                 Protocol
Vlan1                  unassigned      YES manual up                     up
FastEthernet0/1        unassigned      YES unset  down                   down
FastEthernet0/2        unassigned      YES unset  down                   down
FastEthernet0/3        unassigned      YES unset  down                   down
FastEthernet0/4        unassigned      YES unset  down                   down
FastEthernet0/5        unassigned      YES unset  up                     up
FastEthernet0/6        unassigned      YES unset  up                     up
FastEthernet0/7        unassigned      YES unset  down                   down
FastEthernet0/8        unassigned      YES unset  down                   down
FastEthernet0/9        unassigned      YES unset  down                   down
FastEthernet0/10       unassigned      YES unset  down                   down
```

```
FastEthernet0/11      unassigned      YES unset  down             down
FastEthernet0/12      unassigned      YES unset  down             down
FastEthernet0/13      unassigned      YES unset  down             down
FastEthernet0/14      unassigned      YES unset  down             down
FastEthernet0/15      unassigned      YES unset  down             down
FastEthernet0/16      unassigned      YES unset  down             down
FastEthernet0/17      unassigned      YES unset  down             down
FastEthernet0/18      unassigned      YES unset  down             down
FastEthernet0/19      unassigned      YES unset  down             down
FastEthernet0/20      unassigned      YES unset  down             down
FastEthernet0/21      unassigned      YES unset  down             down
FastEthernet0/22      unassigned      YES unset  down             down
FastEthernet0/23      unassigned      YES unset  down             down
FastEthernet0/24      unassigned      YES unset  down             down
GigabitEthernet0/1    unassigned      YES unset  down             down
GigabitEthernet0/2    unassigned      YES unset  down             down
Switch#
```

Reflection

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

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

Router Interface Summary Table

Router Interface Summary				
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)
Note: To find out how the router is configured, look at the interfaces to identify the router type 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.				