**Lab - Building a Switch and Router Network**

**This lab has been updated for use on NETLAB+**

**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: Configure Devices and Verify Connectivity**

**Part 2: Display Device Information**

**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 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.

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**Lab - Building a Switch and Router Network**

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

**Configure basic settings, such as the interface IP addresses, device access, and passwords. Refer to the**

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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?

The router interfaces (default gateways) have not been configured yet so Layer 3 traffic is not being routed between subnets

**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. clock rate 2000000

**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?

Yes. The router is routing the ping traffic across the two subnets. The default settings for the 2960 switch will automatically turn up the interfaces that are connected to devices.

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**Part 2: Display Device Information**

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

**Step 3: 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?

flash:c2800nm-adventerprisek9-mz.151-4.M12a.bin

How much DRAM memory does the router have?

64 bits

How much NVRAM memory does the router have?

239k bytes

How much Flash memory does the router have?

501480K bytes

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?

flash:/c3560-ipbasek9-mz.122-55.SE12.bin

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

131072K bytes

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

512K bytes

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What is the model number of the switch?

WS-C3560-48PS-S

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**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? \_\_\_\_\_

The C designates a directly connected subnet. An L designates a local interface. Both answers are correct

How many route entries are coded with a C code in the routing table? \_2

What interface types are associated to the C coded routes?

G0/0 and G0/1.

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**Step 5: 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?

GigabitEthernet0/1 is down, line protocol is down

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

0026.cb5a.d2c1

How is the Internet address displayed in this command?

192.168.1.1/24.

**Step 6: 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

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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?

R1(config-if)# **no shut**

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

PC-A would not be able to ping PC-B. This is because PC-B is on a different network than PC-A which requires the default-gateway router to route these packets. PC-A is configured to use the IP address of 192.168.1.1 for the default-gateway router, but this address is not assigned to any device on the LAN. Any packets that need to be sent to the default-gateway for routing will never reach their destination.

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**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. | | | | |

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