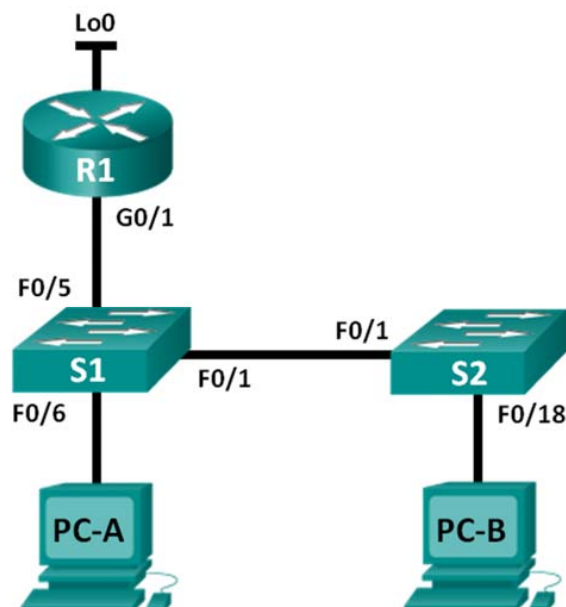# Lab 7b – Configuring Basic DHCPv4 on a Switch

Topology

Addressing Table

Device	Interface	IP Address	Subnet Mask
R1	G0/1	192.168.1.10	255.255.255.0
	Lo0	209.165.200.225	255.255.255.224
S1	VLAN 1	192.168.1.1	255.255.255.0
	VLAN 2	192.168.2.1	255.255.255.0

Objectives

Part 1: Build the Network and Configure Basic Device Settings

Part 2: Change the SDM Preference

- Set the SDM preference to lanbase-routing on S1.

Part 3: Configure DHCPv4

- Configure DHCPv4 for VLAN 1.
- Verify DHCPv4 and connectivity.

Part 4: Configure DHCP for Multiple VLANs

- Assign ports to VLAN 2.
- Configure DHCPv4 for VLAN 2.

- Verify DHCPv4 and connectivity.

Part 5: Enable IP Routing

- Enable IP routing on the switch.
- Create static routes.

Background / Scenario

A Cisco 2960 switch can function as a DHCPv4 server. The Cisco DHCPv4 server assigns and manages IPv4 addresses from identified address pools that are associated with specific VLANs and switch virtual interfaces (SVIs). The Cisco 2960 switch can also function as a Layer 3 device and route between VLANs and a limited number of static routes. In this lab, you will configure DHCPv4 for both single and multiple VLANs on a Cisco 2960 switch, enable routing on the switch to allow for communication between VLANs, and add static routes to allow for communication between all hosts.

Note: This lab provides minimal assistance with the actual commands necessary to configure DHCP. However, the required commands are provided in Appendix A. Test your knowledge by trying to configure the devices without referring to the appendix.

Note: Make sure that the router and switches have been erased and have no startup configurations.

Part 1:   Build the Network and Configure Basic Device Settings

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

Step 2:   Initialize and reload the router and switches.

Step 3:   Configure basic setting on devices.

- Assign device names as shown in the topology.
- Disable DNS lookup.
- Assign **class** as the enable password and assign **cisco** as the console and vty passwords.
- Configure the IP addresses on R1 G0/1 and Lo0 interfaces, according to the Addressing Table.
- Configure the IP addresses on S1 VLAN 1 and VLAN 2 interfaces, according to the Addressing Table.
- Save the running configuration to the startup configuration file.

Part 2:   Change the SDM Preference

The Cisco Switch Database Manager (SDM) provides multiple templates for the Cisco 2960 switch. The templates can be enabled to support specific roles depending on how the switch is used in the network. In this lab, the sdm lanbase-routing template is enabled to allow the switch to route between VLANs and to support static routing.

Step 1:   Display the SDM preference on S1.

On S1, issue the **show sdm prefer** command in privileged EXEC mode. If the template has not been changed from the factory default, it should still be the **default** template. The **default** template does not support static routing. If IPv6 addressing has been enabled, the template will be **dual-ipv4-and-ipv6 default**.

```
S1# show sdm prefer
The current template is "default" template.
The selected template optimizes the resources in
```

```
      the switch to support this level of features for
      0 routed interfaces and 255 VLANs.


        number of unicast mac addresses:               8K
        number of IPv4 IGMP groups:                    0.25K
        number of IPv4/MAC qos aces:                   0.125k
        number of IPv4/MAC security aces:              0.375k
```

What is the current template?

....

Step 2: Change the SDM Preference on S1.

- Set the SDM preference to **lanbase-routing**. (If lanbase-routing is the current template, please proceed to Part 3.) From global configuration mode, issue the **sdm prefer lanbase-routing** command.

```
S1(config)# sdm prefer lanbase-routing
Changes to the running SDM preferences have been stored, but cannot take effect
until the next reload.
Use 'show sdm prefer' to see what SDM preference is currently active.
```

  Which template will be available after reload? …………………………………………………..

- The switch must be reloaded for the template to be enabled.

```
S1# reload
System configuration has been modified. Save? [yes/no]: no
Proceed with reload? [confirm]
```

  Note: The new template will be used after reboot even if the running configuration has not been saved. To save the running configuration, answer **yes** to save the modified system configuration.

Step 3: Verify that lanbase-routing template is loaded.

Issue the **show sdm prefer** command to verify that the lanbase-routing template has been loaded on S1.

```
S1# show sdm prefer
 The current template is "lanbase-routing" template.
 The selected template optimizes the resources in
 the switch to support this level of features for
 0 routed interfaces and 255 VLANs.
 number of unicast mac addresses:                   4K
 number of IPv4 IGMP groups + multicast routes:     0.25K
 number of IPv4 unicast routes:                     0.75K
   number of directly-connected IPv4 hosts:         0.75K
   number of indirect IPv4 routes:                  16
 number of IPv6 multicast groups:                   0.375k
 number of directly-connected IPv6 addresses:       0.75K
   number of indirect IPv6 unicast routes:          16
 number of IPv4 policy based routing aces:          0
 number of IPv4/MAC qos aces:                       0.125k
 number of IPv4/MAC security aces:                  0.375k
 number of IPv6 policy based routing aces:          0
 number of IPv6 qos aces:                           0.375k
 number of IPv6 security aces:                      127
```

Part 3: Configure DHCPv4

In Part 3, you will configure DHCPv4 for VLAN 1, check IP settings on host computers to validate DHCP functionality, and verify connectivity for all devices in VLAN 1.

Step 1: Configure DHCP for VLAN 1.

- Exclude the first 10 valid host addresses from network 192.168.1.0/24. Write the command you used in the space provided.

  ………

- Create a DHCP pool named **DHCP1**. Write the command you used in the space provided.

  ………

- Assign the network 192.168.1.0/24 for available addresses. Write the command you used in the space provided.

  ………

- Assign the default gateway as 192.168.1.1. Write the command you used in the space provided.

  ………

- Assign the DNS server as 192.168.1.9. Write the command you used in the space provided.

  ………

- Assign a lease time of 3 days. Write the command you used in the space provided.

  ………

- Save the running configuration to the startup configuration file.

Step 2: Verify DHCP and connectivity.

- On PC-A and PC-B, open the command prompt and issue the **ipconfig** command. If IP information is not present, or if it is incomplete, issue the **ipconfig /release** command, followed by the **ipconfig /renew** command.

  For PC-A, list the following:

  IP Address: …………………………………………………………….

  Subnet Mask: …………………………………………………………..

  Default Gateway: …………………………………………………………..

  For PC-B, list the following:

  IP Address: …………………………………………………………….

  Subnet Mask: …………………………………………………………..

  Default Gateway: …………………………………………………………..

- Test connectivity by pinging from PC-A to the default gateway, PC-B, and R1.

  From PC-A, is it possible to ping the VLAN 1 default gateway? …………………………………………………

  From PC-A, is it possible to ping PC-B? ……………………………………………

  From PC-A, is it possible to ping R1 G0/1? ……………………………………………

  If the answer is no to any of these questions, troubleshoot the configurations and correct the error.

Part 4: Configure DHCPv4 for Multiple VLANs

In Part 4, you will assign PC-A to a port accessing VLAN 2, configure DHCPv4 for VLAN 2, renew the IP configuration of PC-A to validate DHCPv4, and verify connectivity within the VLAN.

Step 1: Assign a port to VLAN 2.

Place port F0/6 into VLAN 2. Write the command you used in the space provided.

…….

…….

Step 2: Configure DHCPv4 for VLAN 2

- Exclude the first 10 valid host addresses from network 192.168.2.0. Write the command you used in the space provided.

  …….

- Create a DHCP pool named **DHCP2**. Write the command you used in the space provided.

  …….

- Assign the network 192.168.2.0/24 for available addresses. Write the command you used in the space provided.

  …….

- Assign the default gateway as 192.168.2.1. Write the command you used in the space provided.

  …….

- Assign the DNS server as 192.168.2.9. Write the command you used in the space provided.

  …….

- Assign a lease time of 3 days. Write the command you used in the space provided.

  …….

- Save the running configuration to the startup configuration file.

Step 3: Verify DHCPv4 and connectivity.

- On PC-A, open the command prompt and issue the **ipconfig /release** command, followed by **ipconfig /renew** command.

  For PC-A, list the following:

  IP Address: ………………………………………………………………………………

  Subnet Mask: ………………………………………………………………………………

  Default Gateway: ………………………………………………………………………………………

- Test connectivity by pinging from PC-A to the VLAN 2 default gateway and PC-B.

  From PC-A, is it possible to ping the default gateway? ………………………………….

  From PC-A, is it possible to ping PC-B? ………………………………….

  Were these pings successful? Why?

  ……

  ……

- Issue the **show ip route** command on S1.

  What was the result of this command?

  ....

  ....

Part 5: Enable IP Routing

In Part 5, you will enable IP routing on the switch, which will allow for inter-VLAN communication. For all networks to communicate, static routes on S1 and R1 must be implemented.

Step 1: Enable IP routing on S1.

- From global configuration mode, use the **ip routing** command to enable routing on S1.

  ```
  S1(config)# ip routing
  ```

- Verify inter-VLAN connectivity.

  From PC-A, is it possible to ping PC-B? ....

  What function is the switch performing? ....

- View the routing table information for S1.

  What route information is contained in the output of this command?

  ....

  ....

- View the routing table information for R1.

  What route information is contained in the output of this command?

  ....

  ....

- From PC-A, is it possible to ping R1? ....

  From PC-A, is it possible to ping Lo0? ....

  Consider the routing table of the two devices, what must be added to communicate between all networks?

  ....

Step 2: Assign static routes.

Enabling IP routing allows the switch to route between VLANs assigned on the switch. For all VLANs to communicate with the router, static routes must be added to the routing table of both the switch and the router.

- On S1, create a default static route to R1. Write the command you used in the space provided.

  ....

- On R1, create a static route to VLAN 2. Write the command you used in the space provided.

  ....

- View the routing table information for S1.

  How is the default static route represented?

....

- View the routing table information for R1.

  How is the static route represented?

  ....

- From PC-A, is it possible to ping R1? ……………………….

  From PC-A, is it possible to ping Lo0? …………………………..

Reflection

1. In configuring DHCPv4, why would you exclude the static addresses prior to setting up the DHCPv4 pool?

   ....

   ....

2. If multiple DHCPv4 pools are present, how does the switch assign the IP information to hosts?

   ....

   ....

Appendix A: Configuration Commands

Configure DHCPv4

```
S1(config)# ip dhcp excluded-address 192.168.1.1 192.168.1.10
S1(config)# ip dhcp pool DHCP1
S1(dhcp-config)# network 192.168.1.0 255.255.255.0
S1(dhcp-config)# default-router 192.168.1.1
S1(dhcp-config)# dns-server 192.168.1.9
S1(dhcp-config)# lease 3
```

Configure DHCPv4 for Multiple VLANs

```
S1(config)# interface f0/6
S1(config-if)# switchport access vlan 2
S1(config)# ip dhcp excluded-address 192.168.2.1 192.168.2.10
S1(config)# ip dhcp pool DHCP2
S1(dhcp-config)# network 192.168.2.0 255.255.255.0
S1(dhcp-config)# default-router 192.168.2.1
S1(dhcp-config)# dns-server 192.168.2.9
S1(dhcp-config)# lease 3
```

Enable IP Routing S1(config)# ip routing

```
S1(config)# ip route 0.0.0.0 0.0.0.0 192.168.1.10
R1(config)# ip route 192.168.2.0 255.255.255.0 g0/1
```