Networking Academy

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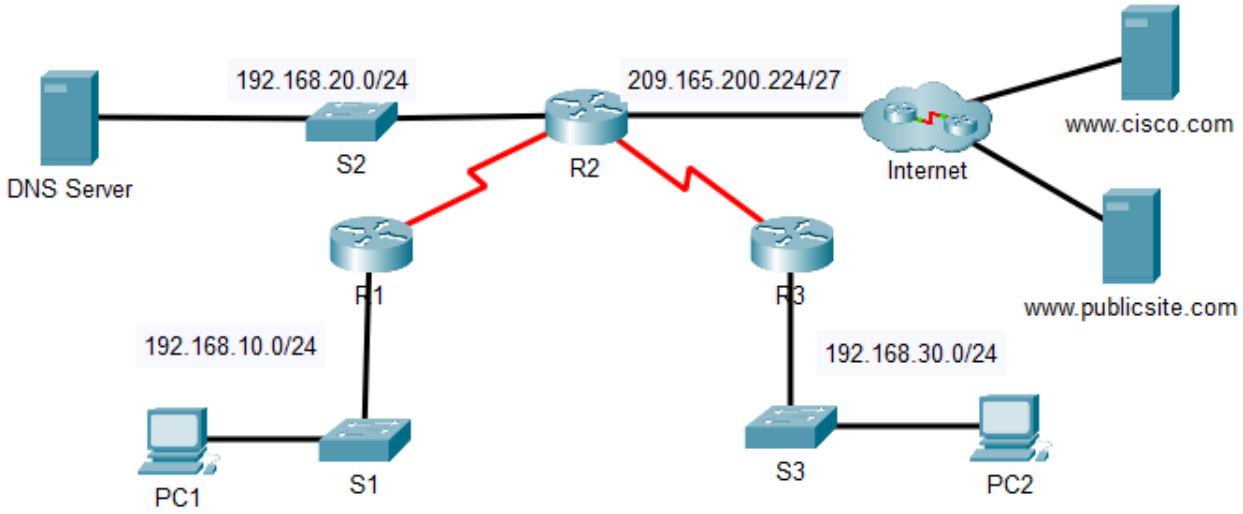
Lab 6.1 Configure DHCPv4

Topology

This activity comes with an accompanying Packet Tracer file with a partially configured network. Make sure to download the Packet Tracer file from the Animospace assignment page. The focus of the lab activity is only the DHCPv4 configurations for the routers.



Addressing Table

Device	Interface	IPv4 Address	Subnet Mask	Default Gateway
R1	G0/0	192.168.10.1	255.255.255.0	N/A
	S0/0/0	10.1.1.1	255.255.255.252	N/A
R2	G0/0	192.168.20.1	255.255.255.0	N/A
	G0/1	DHCP Assigned	DHCP Assigned	N/A
	S0/0/0	10.1.1.2	255.255.255.252	N/A
	S0/0/1	10.2.2.2	255.255.255.252	N/A
R3	G0/0	192.168.30.1	255.255.255.0	N/A
	S0/0/1	10.2.2.1	255.255.255.0	N/A
PC1	NIC	DHCP Assigned	DHCP Assigned	DHCP Assigned
PC2	NIC	DHCP Assigned	DHCP Assigned	DHCP Assigned
DNS Server	NIC	192.168.20.254	255.255.255.0	192.168.20.1

Objectives

Part 1: Configure a Router as a DHCP Server

Part 2: Configure DHCP Relay

Part 3: Configure a Router as a DHCP Client

Part 4: Verify DHCP and Connectivity

Scenario

A dedicated DHCP server is scalable and relatively easy to manage but it can be costly to have one at every location in a network. However, a Cisco router can be configured to provide DHCP services without the need for a dedicated server. As the network technician for your company, you have been assigned the task of configuring a Cisco router as a DHCP server. You are also required to configure the edge router as a DHCP client so that it receives an IP address from the ISP network.

Instructions

Part 1: Configure a Router as a DHCP Server

Step 1: Configure the excluded IPv4 addresses.

Addresses that have been statically assigned to devices in the networks that will use DHCP must be excluded from the DHCP pools. This avoids errors associated with duplicate IP addresses. In this case the IP addresses of the R1 LAN interface must be excluded from DHCP. In addition, nine other addresses are excluded for static assignment to other devices such servers and device management interfaces.

Configure **R2** to exclude the first 10 addresses from the R1 LAN.

```
R2(config)# ip dhcp excluded-address 192.168.10.1 192.168.10.10
```

Step 2: Create a DHCP pool on R2 for the R1 LAN.

a. Create a DHCP pool named **R1-LAN** (case-sensitive).

```
R2(config)# ip dhcp pool R1-LAN
```

b. Configure the DHCP pool to include the network address, the default gateway, and the IP address of the DNS server.

```
R2(dhcp-config)# network 192.168.10.0 255.255.255.0
R2(dhcp-config)# default-router 192.168.10.1
R2(dhcp-config)# dns-server 192.168.20.254
```

Step 3: Create a DHCP pool on R2 for the R3 LAN.

Similar to the R1 LAN, configure R2 as the DHCP server for the R3 LAN as well.

Name the pool as **R3-LAN.** Exclude the first 10 host addresses from the pool and set the correct network address, default gateway and DNS server address. Refer to the addressing table for these information

What are the commands needed to accomplish this?

Ip dhcp excluded-address 192.168.30.1 192.168.30.10

Ip dhcp pool R3-LAN

Network 192.168.30.0 255.255.255.0

default-router 192.168.30.1

dns-server 192.168.20.254

Part 2: Configure DHCP Relay

Step 1: Configure R1 and R3 as a DHCP relay agent.

For DHCP clients to obtain an address from a server on a different LAN segment, the interface that the clients are attached to must include a helper address pointing to the DHCP server. In this case, the hosts on the LANs that are attached to R1 and R3 will access the DHCP server that is configured on R2. The IP addresses of the R2 serial interfaces that are attached to R1 and R3 are used as the helper addresses. DHCP traffic from the hosts on the R1 and R3 LANs will be forwarded to these addresses and processed by the DHCP server that is configured on R2.

a. Configure the helper address for the LAN interface on R1.

```
R1(config)# interface g0/0
R1(config-if)# ip helper-address 10.1.1.2
```

b. Configure the helper address for the LAN interface on R3.

What are the commands needed to accomplish this?

Int g0/0

Ip helper-address 10.2.2.2

Step 2: Configure hosts to receive IP addressing information from DHCP.

a. Configure hosts PC1 and PC2 to receive their IP addresses from a DHCP server.

b. On PC1 and PC2, issue the ipconfig /all command to verify that the PCs have received IP address information from the DHCP server on R2. Record the IP and MAC address for each PC.

PC1 - 192.168.10.11, 0002.4AA5.1470

PC2 - 192.168.30.11, 0004.9A97.2535

Part 3: Configure a Router as a DHCP Client

Just as a PC is able to receive an IPv4 address from a server, a router interface has the ability to do the same. Router **R2** needs to be configured to receive addressing from the ISP.

a. Configure the Gigabit Ethernet 0/1 interface on **R2** to receive IP addressing from DHCP and activate the interface.

```
R2(config)# interface g0/1
```

```
R2(config-if)# ip address dhcp
R2(config-if)# no shutdown
```

Note: You can use Packet Tracer's **Fast Forward Time** feature to speed up the process.

b. Use the **show ip interface brief** command to verify that R2 received an IP address from DHCP.

What IP address did R2 receive?	209.165.200.231

Part 4: Verify DHCP and Connectivity

Step 1: Verify DHCP services and leases on R2.

a. On R2, enter the **show ip dhcp binding** command to view DHCP address leases.

Along with the IP addresses that were leased, what other piece of useful client identification information is in the output?

Apart from the IP address, there are also Client-ID/Hardware Address, Lease expiration and Type.

b. On R2, enter the show **ip dhcp pool** command to view the DHCP pool settings.

In the output of the show ip dhcp pool command, which piece/s of information tells you about the current address allocation status of the pool?

The total addresses, leased addresses, and excluded addresses.

Step 2: Verify configurations.

Verify that **PC1** and **PC2** can now ping each other and all other devices.

Reflection

1. Why would you configure a router interface with DHCP instead of a static IP address?

Sometimes, the ISP provides a dynamic IP address. Also, it is easier for admin to configure it instead of inputting everything manually.

2. What is the benefit of using DHCP relay agents instead of multiple routers acting as DHCP servers?

If both R1 and R3 are dhcp servers, it will be tedious to configure everything.