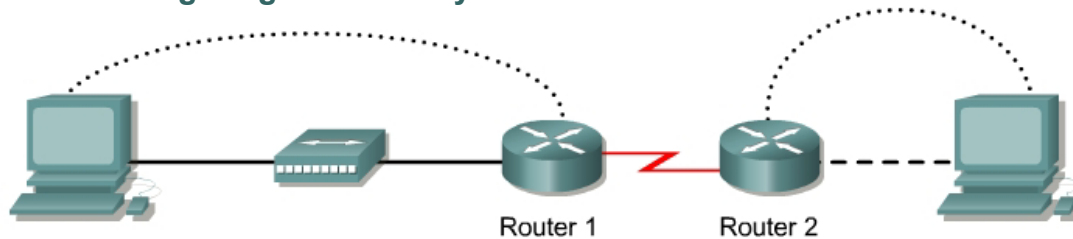


Lab 1.2.8 Configuring DHCP Relay



Router Designation	Router Name	FastEthernet 0 Address/ Subnet Mask	Interface Type	Serial 0 Address/ Subnet Mask	Enable Secret Password	Enable/VTY/ Console Passwords
Router 1	Campus	172.16.12.1/24	DCE	172.16.1.6/30	class	cisco
Router 2	Remote	172.16.13.1/24	DTE	172.16.1.5/30	class	cisco

Straight-through cable	—————
Serial cable	—————  —————
Console (rollover)	
Crossover cable	- - - - -

Objective

- A router will be configured for Dynamic Host Configuration Protocol (DHCP).
- The ability for workstations to remotely obtain DHCP addresses will be added.
- Addresses will be dynamically assigned to the attached hosts.

Background/Preparation

A DHCP client uses IP broadcasts to find the DHCP server. However, these broadcasts are not forwarded by routers, so in the case of the remote LAN, the workstations will not be able to locate the DHCP server. The router must be configured with the `ip helper-address` command to enable forwarding of these broadcasts, as unicast packets, to the specific server.

Routing between the remote router and the campus router is done using a static route between the remote router and gateway router, and a default route between the gateway router and remote router.

Cable a network similar to the one in the diagram above. Any router that meets the interface requirements displayed on the above diagram may be used. This includes the following and any of their possible combinations:

- 800 series routers
- 1600 series routers
- 1700 series routers
- 2500 series routers
- 2600 series routers

Please refer to the chart at the end of the lab to correctly identify the interface identifiers to be used based on the equipment in the lab. The configuration output used in this lab is produced from 1721 series routers. Any other router used may produce slightly different output. Conduct the following steps on each router unless specifically instructed otherwise.

Start a HyperTerminal session.

Note: Refer to the erase and reload instructions at the end of this lab. Perform those steps on all routers in this lab assignment before continuing.

Step 1 Configure the routers

Configure all of the following according to the chart:

- The hostname
- The console
- The virtual terminal
- The enable passwords
- The interfaces

If problems occur during this configuration, refer to Lab 1.1.4a Configuring NAT.

Step 2 Configure routing on the remote router

Use Open Shortest Path First (OSPF) as the routing protocol. Set up the network as area 0 and the process ID as 1:

```
remote(config)#router ospf 1
remote(config-router)#network 172.16.1.0 0.0.0.255 area 0
remote(config-router)#network 172.16.13.0 0.0.0.255 area 0
```

Step 3 Configure routing on the campus router

- a. Use OSPF as the routing protocol. Set up the network as area 0 and the process ID as 1:

```
campus(config)#router ospf 1
campus(config-router)#network 172.16.1.0 0.0.0.255 area 0
campus(config-router)#network 172.16.12.0 0.0.0.255 area 0
```

- b. Are there OSPF routes in the routing table? _____

Step 4 Save the configurations

At the privileged EXEC mode prompt on both routers, type the command `copy running-config startup-config`.

Step 5 Create the campus DHCP address pool on the campus router

To configure the campus LAN pool, use the following commands:

```
campus(config)#ip dhcp pool campus
campus(dhcp-config)#network 172.16.12.0 255.255.255.0
campus(dhcp-config)#default-router 172.16.12.1
campus(dhcp-config)#dns-server 172.16.12.2
campus(dhcp-config)#domain-name foo.com
campus(dhcp-config)#netbios-name-server 172.16.12.10
```

Step 6 Create the remote DHCP address pool on the campus router

To configure the remote LAN pool, use the following commands:

```
campus (dhcp-config) #ip dhcp pool remote
campus (dhcp-config) #network 172.16.13.0 255.255.255.0
campus (dhcp-config) #default-router 172.16.13.1
campus (dhcp-config) #dns-server 172.16.12.2
campus (dhcp-config) #domain-name foo.com
campus (dhcp-config) #netbios-name-server 172.16.12.10
```

Step 7 Exclude addresses from pool

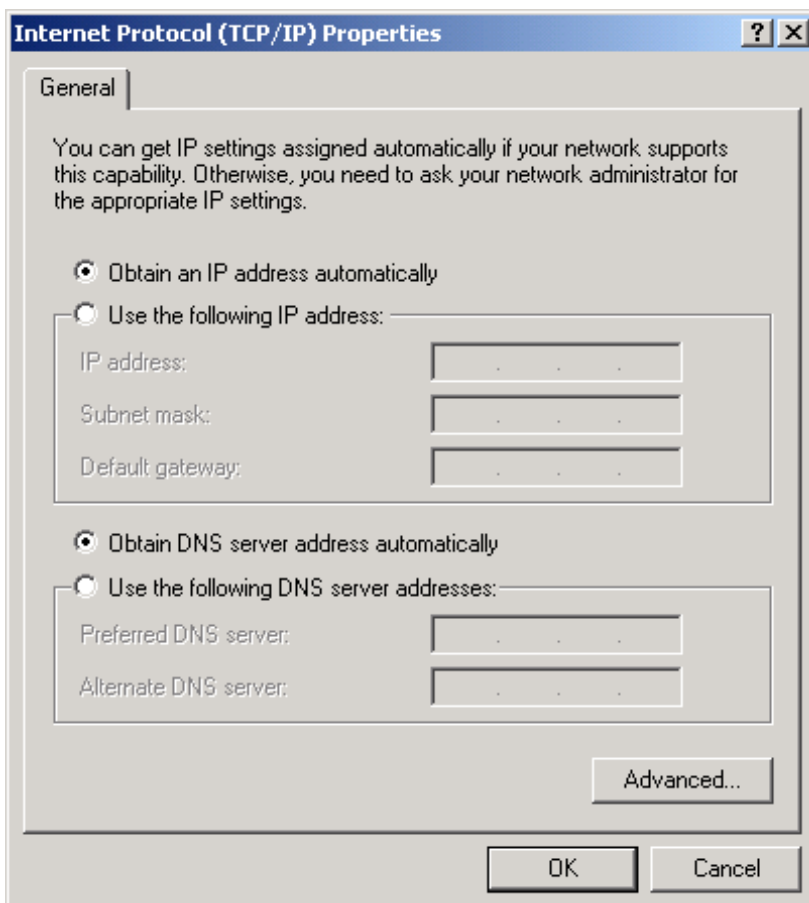
- a. To exclude addresses from the pool, use the following commands:

```
campus (dhcp-config) #ip dhcp excluded-address 172.16.12.1 172.16.12.10
campus (dhcp-config) #ip dhcp excluded-address 172.16.13.1 172.16.13.10
```

This defines the address range to be excluded from dynamic issue by the DHCP server.

- b. Why would addresses be excluded? _____

Step 8 Verify DHCP operation on the campus router



- a. From the workstation directly connected to the campus router configure the TCP/IP properties for the workstation to obtain its IP properties automatically from DHCP. These properties include the IP and Domain Name System (DNS) server address.

- b. After changing the configuration, reboot the workstation. View the TCP/IP configuration information on each host. If running Windows 98, go to **Start > Run > winipcfg**. With Windows 2000 or higher, use `ipconfig` in a DOS command prompt window.
- c. What IP address was assigned to the workstation? _____

Step 9 Verify DHCP operation on the remote router

- a. Repeat the last step using the workstation attached to the remote router.
- b. Is there a valid address assigned from the DHCP pool? _____
- c. What IP address was assigned to the workstation? _____
- d. What does this address (if any) represent? _____

Step 10 Configuring DHCP relay

Configure the remote router with the `ip helper-address` command to enable forwarding of broadcasts, as unicast packets, to the specific server. This command must be configured on the LAN interface of the remote router for DHCP to function:

```
remote(config)#interface fastethernet 0
remote(config-if)#ip helper-address 172.16.12.1
```

Step 11 Verify DHCP Operation on the Remote Router

- a. Reboot the workstation attached to the remote router.
- b. Is there a valid address assigned from the DHCP pool? _____
- c. What IP address was assigned to the workstation? _____
- d. If there is no IP address, troubleshoot the workstation and router configurations and repeat Step 11.

Step 12 View DHCP bindings

- a. From the campus router, the bindings for the hosts can be seen. To see the bindings, use the command `show ip dhcp binding` at the privileged EXEC mode prompt.
- b. What are the IP addresses assigned to the hosts?

Upon completion of the previous steps finish the lab by doing the following:

- Logoff by typing `exit`
- Turn the router off
- Remove and store the cables and adapter

Erasing and reloading the router

Enter into the privileged EXEC mode by typing **enable**.

If prompted for a password, enter **class** (if that does not work, ask the instructor) .

```
Router>enable
```

At the privileged EXEC mode, enter the command **erase startup-config**.

```
Router#erase startup-config
```

The responding line prompt will be:

```
Erasing the nvram filesystem will remove all files! Continue? [confirm]
```

Press **Enter** to confirm.

The response should be:

```
Erase of nvram: complete
```

Now at the privileged EXEC mode, enter the command **reload**.

```
Router(config)#reload
```

The responding line prompt will be:

```
System configuration has been modified. Save? [yes/no]:
```

Type **n** and then press **Enter**.

The responding line prompt will be:

```
Proceed with reload? [confirm]
```

Press **Enter** to confirm.

In the first line of the response will be:

```
Reload requested by console.
```

After the router has reloaded the line prompt will be:

```
Would you like to enter the initial configuration dialog? [yes/no]:
```

Type **n** and then press **Enter**.

The responding line prompt will be:

```
Press RETURN to get started!
```

Press **Enter**.

Now the router is ready for the assigned lab to be performed.

Router Interface Summary				
Router Model	Ethernet Interface #1	Ethernet Interface #2	Serial Interface #1	Serial Interface #2
800 (806)	Ethernet 0 (E0)	Ethernet 1 (E1)		
1600	Ethernet 0 (E0)	Ethernet 1 (E1)	Serial 0 (S0)	Serial 1 (S1)
1700	FastEthernet 0 (FA0)	FastEthernet 1 (FA1)	Serial 0 (S0)	Serial 1 (S1)
2500	Ethernet 0 (E0)	Ethernet 1 (E1)	Serial 0 (S0)	Serial 1 (S1)
2600	FastEthernet 0/0 (FA0/0)	FastEthernet 0/1 (FA0/1)	Serial 0/0 (S0/0)	Serial 0/1 (S0/1)
In order to find out exactly how the router is configured, look at the interfaces. This will identify what type and how many interfaces the router has. There is no way to effectively list all of the combinations of configurations for each router class. What is provided are the identifiers for the possible combinations of interfaces in the device. This interface chart 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 an IOS command to represent the interface.				