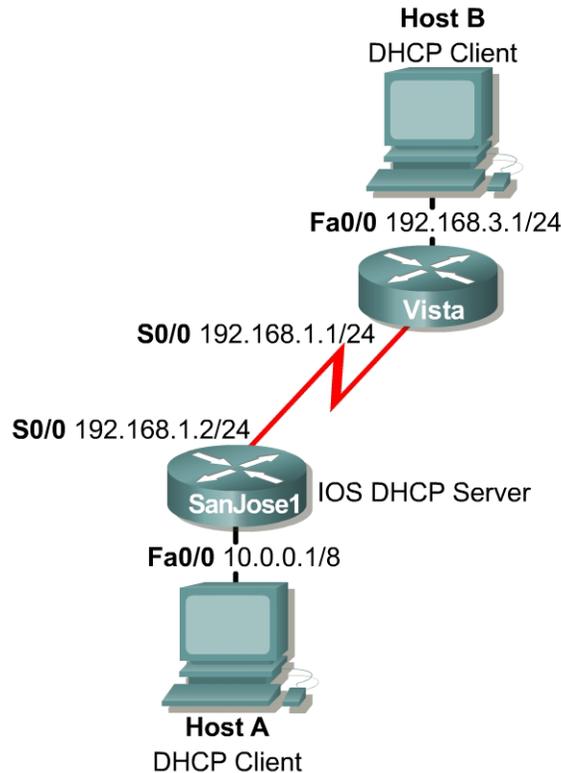


Lab 2.10.3 Using DHCP and IP Helper Addresses



Objective

In this lab, configure a Cisco router to act as a DHCP server for clients on two separate subnets. The IP helper address feature will also be used to forward DHCP requests from a remote subnet.

Scenario

Clients on the 192.168.3.0/24 network and the 10.0.0.0/8 network require the services of DHCP for automatic IP configuration. Configure SanJose1 to serve both subnets by creating two separate address pools. Finally, configure the FastEthernet interface of the Vista router to forward UDP broadcasts, including DHCP requests, to SanJose1.

Step 1

Build and configure the network according to the diagram. Connect Host A and Host B as shown, but configure these clients to obtain their IP addresses automatically. Because these hosts rely on DHCP, they cannot be tested using `ping` until Step 5.

Configure RIP v2 on SanJose1 and Vista. Be sure to enable updates on all active interfaces with the `network` command:

```
SanJose1(config)#router rip
SanJose1(config)#version 2
SanJose1(config-router)#network 192.168.1.0
```

```
SanJose1(config-router)#network 10.0.0.0

Vista(config)#router rip
Vista(config-router)#version 2
Vista(config-router)#network 192.168.1.0
Vista(config-router)#network 192.168.3.0
```

Use **ping** and **show ip route** to verify the work and test connectivity between SanJose1 and Vista.

Step 2

Configure SanJose1 to act as a DHCP server for clients on the 10.0.0.0/8 network.

First, verify that SanJose1 can use DHCP services and that it is enabled:

```
SanJose1(config)#service dhcp
```

Next, configure the DHCP address pool for the 10.0.0.0 network. Name the pool **10-net**:

```
SanJose1(config)#ip dhcp pool 10-net
SanJose1(dhcp-config)#network 10.0.0.0 255.0.0.0
```

Step 3

International Travel Agency uses the first ten addresses in this address range to statically address servers and routers. From global configuration mode, exclude addresses from the DHCP pool so that the server does not attempt to assign them to clients. Configure SanJose1 to dynamically assign addresses from the 10-net pool, starting with 10.0.0.11:

```
SanJose1(config)#ip dhcp excluded-address 10.0.0.1 10.0.0.10
```

Step 4

Return to DHCP configuration mode and assign the IP options of the default gateway address, DNS server address, WINS server address, and domain name:

```
SanJose1(dhcp-config)#default-router 10.0.0.1
SanJose1(dhcp-config)#dns-server 10.0.0.3
SanJose1(dhcp-config)#netbios-name-server 10.0.0.4
SanJose1(dhcp-config)#domain-name xyz.net
```

Step 5

The DHCP server is now ready to be tested. Release and renew the IP configuration for Host A.

Host A should be dynamically assigned the first available address in the pool, which is 10.0.0.11. Check the configuration of Host A with **winiipcfg** to verify that it received the proper IP address, subnet mask, default gateway, DNS server address, and WINS server address. Check the configuration of Host A with **ipconfig /all** for Windows NT and Windows 2000 users. Troubleshoot, if necessary.

Step 6

Because Host B also requires dynamic IP configuration, create a second DHCP pool with address and gateway options appropriate to its network, 192.168.3.0/24:

```

SanJose1(config)#ip dhcp pool 192.168.3-net
SanJose1(dhcp-config)#network 192.168.3.0 255.255.255.0
SanJose1(dhcp-config)#default-router 192.168.3.1
SanJose1(dhcp-config)#dns-server 10.0.0.3
SanJose1(dhcp-config)#netbios-name-server 10.0.0.4
SanJose1(dhcp-config)#domain-name xyz.net

```

ITA has recently installed IP phones on the 192.168.3.0 network. These phones require a DHCP server to provide a TFTP server address, 10.0.0.5. The Cisco IOS DHCP server configuration does not provide a keyword for TFTP servers, so configure this option using its raw option number:

```

SanJose1(dhcp-config)#option 150 ip 10.0.0.5

```

Note: When a Cisco IP phone is turned on, it automatically queries for a DHCP server. Then the DHCP server responds by assigning an IP address to the Cisco IP phone. The IP address of the TFTP server is provided through DHCP option 150.

Step 7

The configuration of the DHCP server is now complete. However, Host B uses a UDP broadcast to find an IP address, and Vista is not configured to forward broadcasts. In order for DHCP to work, configure the FastEthernet interface of the Vista router to forward UDP broadcasts to SanJose1:

```

Vista(config)#interface fastethernet 0/0
Vista(config-if)#ip helper-address 192.168.1.2

```

Step 8

Release and renew the IP configuration of Host B while simultaneously logged into the console of SanJose1. Use a second host, if necessary.

Verify, using `winipcfg` or `ipconfig /all`, that Host B received the correct IP configuration, and troubleshoot if necessary.

1. An `ip dhcp excluded-address` command was not issued. The DHCP server did not assign Host B 192.168.3.1. Why not?

Issue `show ip dhcp ?` and note the choices.

```

SanJose1#show ip dhcp ?
binding    DHCP address bindings
conflict   DHCP address conflicts
database   DHCP database agents
import     Show Imported Parameters
relay      Miscellaneous DHCP relay information
server     Miscellaneous DHCP server information

```

Try the `conflict` and `binding` options.

```

SanJose1#show ip dhcp binding
IP address      Client-ID/      Lease expiration      Type
                Hardware address
10.0.0.11       0063.6973.636f.2d30.  Mar 02 1993 02:28 AM  Automatic
                3030.342e.3961.6432.
                2e64.3063.302d.4661.

```

```
302f.30
192.168.3.2 0063.6973.636f.2d30. Mar 02 1993 03:11 AM Automatic
3030.392e.3433.3566.
2e39.6362.312d.4661.
302f.30
```

```
SanJose1#show ip dhcp conflict
```

```
IP address      Detection method  Detection time
192.168.3.1     Ping             Mar 01 1993 03:11 AM
```

2. How did SanJose1 know to assign Host B an address from the 3-net pool and not the 10-net pool?

Issue the `show ip dhcp server statistics` command. Sample output follows:

```
SanJose1#show ip dhcp server statistics
```

```
Memory usage      15650
Address pools     2
Database agents   0
Automatic bindings 2
Manual bindings   0
Expired bindings  0
Malformed messages 0
```

```
Message           Received
BOOTREQUEST       0
DHCPDISCOVER      31
DHCPREQUEST       3
DHCPDECLINE       0
DHCPRELEASE       3
DHCPIFORM        0
```

```
Message           Sent
BOOTREPLY         0
DHCPOFFER         4
DHCPACK           3
DHCNACK           0
```

3. How many DHCPOFFER messages were sent on your network?
