

Dynamic Host Configuration Protocol

SDC, CNW(CSE 4541)

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Text Book(s)



Glen E. Clarke, Richard Dea

CCT/CCNA Routing and Switching

Complete Study Guide: Exam 100-490

Exam 200-301

McGraw-Hill Education



Todd Lammle

CCNA Routing and Switching

Complete Study Guide: Exam 100-105

Exam 200-105

Exam 200-125

SYBEX Publication

Configuring DHCP

Dynamic Host Configuration Protocol (DHCP)

- DHCP- an application layer protocol for network management
- Used for automatic assignment of ip addresses and other communication parameter to a DHCP client from a DHCP configured server.
- Uses UDP port 67 (server) and 68 (client) for communication
- DHCP server: Holds the ip addresses and the configuration information.
- DHCP client: Device that requires configuration information.
- Relay: Communication channel between DHCP client and DHCP server.

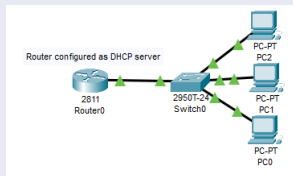


Figure 1: Router configured as DHCP server

DHCP parameter assignment process

Acronymed as **DORA**, DHCP process consists of the following message exchanges:

- **Discover:** A broadcast from client to discover all DHCP servers. The destination address is set as L2-broadcast FF.FF.FF.FF.FF.FF
- **Offer:** An L2 unicast by server (as the client has no ip address yet) with information about the available ip addresses. Contains other TCP parameters and server Id
- **Request:** Broadcasted by client. After accepting the first Offer packet, the client broadcasts the Request message containing the desired available ip address.
- **Acknowledge:** Unicast from the server to client for acknowledging that it has made an entry binding the ip address to the client id.

Now the client has the ip address for a particular lease time.

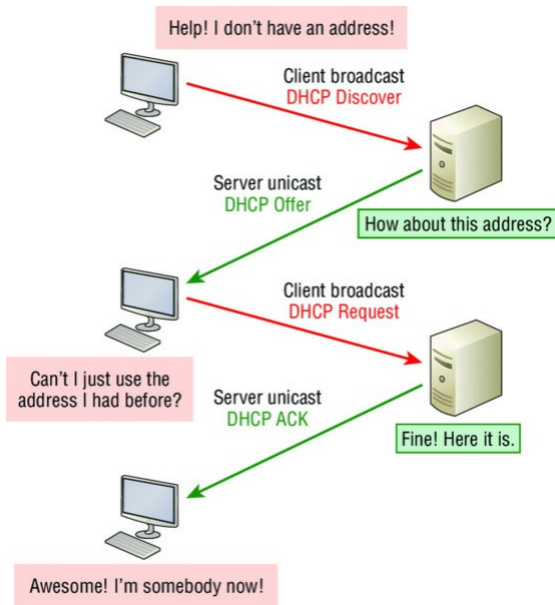


Figure 2: DHCP DORA (Discover, Offer, Request, Acknowledge) process

Required information for DHCP configuration

To configure a DHCP server for your hosts, you need the following information at minimum:

- Network and mask for each LAN Network ID
- Reserved/excluded addresses: Reserved addresses for printers, servers, routers, etc. These addresses will not be handed out to hosts.
- Default router This is the router's address for each LAN.
- DNS address A list of DNS server addresses provided to hosts so they can resolve names.

DHCP configuration steps

Configuration steps:

- ❶ Exclude the addresses you want to reserve before setting network id.
- ❷ Create your pool for each LAN using a unique name.
- ❸ Choose the network ID and subnet mask for the DHCP pool that the server will use to provide addresses to hosts.
- ❹ Add the address used for the default gateway of the subnet.
- ❺ Provide the DNS server address(es).

DHCP configuration commands

Consider the following configuration for a network 192.168.10.0:

- ❶ Excluded addresses range from 192.168.10.1 to 192.168.10.10.
- ❷ DHCP pool name (For example: CNW)
- ❸ Default gateway as 192.168.10.1
- ❹ A DNS server as 4.4.4.4

The required configuration can be performed in the following manner:

```
Router(config)#service dhcp
```

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

```
Router(config)#ip dhcp pool CNW
```

```
Router(dhcp-config)#network 192.168.10.0 255.255.255.0
```

```
Router(dhcp-config)#default-router 192.168.10.1
```

```
Router(dhcp-config)#dns-server 4.4.4.4
```


Configuring DHCP relay

- To provide addresses from a DHCP server to hosts that are not on the same LAN as the DHCP server (not in the same broadcast domain as the DHCP server), configure your router interface to relay or forward the DHCP client requests.
- Without this service, our router would receive the DHCP client broadcast, promptly discard it.
- To solve this problem, configure the router interface at the client router to accept the DHCP client requests and forward them to the DHCP server using helper address (ip address of the DHCP server) like this:

```
Router#config t
```

```
Router(config)#interface fa0/0
```

```
Router(config-if)#ip helper-address 10.10.10.254
```

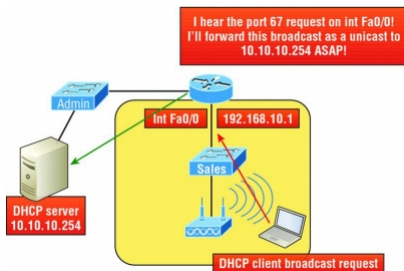


Figure 3: DHCP relay

Verifying DHCP on Cisco IOS

- `show ip dhcp binding`: Lists state information about each IP address currently leased to a client.
- `show ip dhcp pool [poolname]`: Lists the configured range of IP addresses, plus statistics for the number of currently leased addresses.
- `show ip dhcp conflict`: Shows problematic duplicate ip addresses present in the network if someone statically configures an IP address on a LAN and the DHCP server hands out that same address.

Example: Set switch as a DHCP server

For setting DHCP config:

```
ip dhcp excluded-address 192.168.10.1 192.168.10.10
ip dhcp pool cnw-pool
network 192.168.10.0 255.255.255.0
default-router 192.168.10.1
```

For setting vlan config:

```
interface Vlan 1
ip address 192.168.10.11 255.255.255.0
no shutdown
```

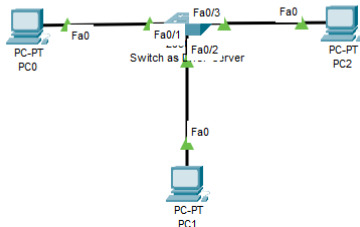


Figure 4: Configuring switch as a DHCP server

Example: Set router as a DHCP server

Here, we set router as a DHCP server. We perform DHCP relay settings to enable the devices not on the DHCP enabled router's network, to avail DHCP services.

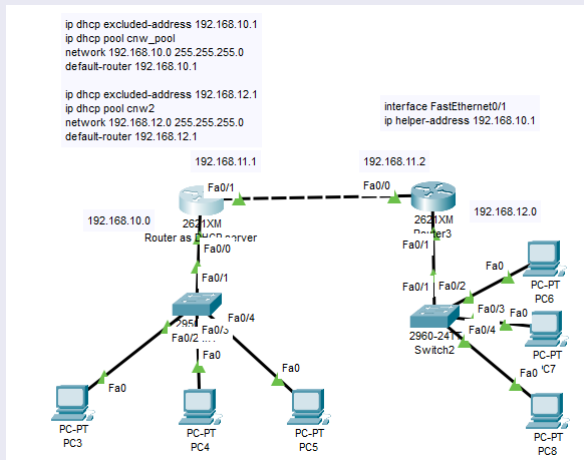


Figure 5: Configuring router as a DHCP server

Example: Configure DHCP services using a dedicated DHCP server

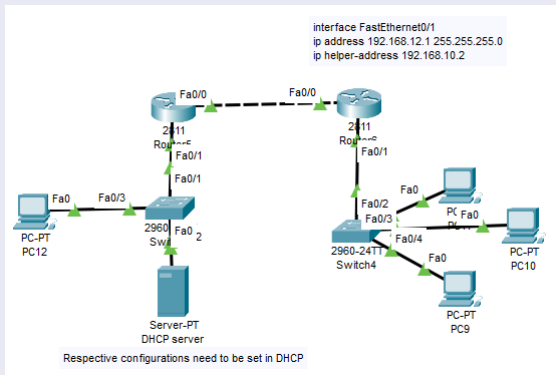


Figure 6: Configuring DHCP services using a dedicated DHCP server