

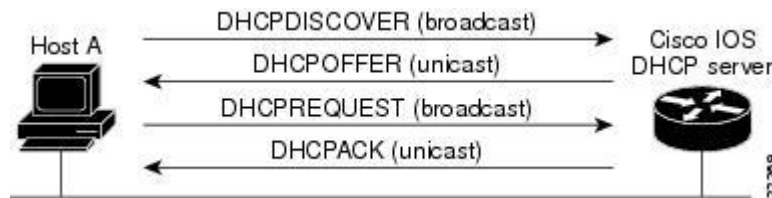
Dynamic Host Configuration Protocol (DHCP)

1. Objectives

- To learn about **Dynamic Host Configuration Protocol (DHCP)**: why and how used?
- To build an **internetwork** and configure **DHCP** using **Packet Tracer**

2. Background

Dynamic Host Control Protocol (DHCP) enables you to automatically assign reusable IP addresses to DHCP clients. The **DHCP Server** feature is a full DHCP server implementation that assigns and manages IP addresses from specified **address pools** within the router to DHCP clients. **Figure 1** shows the basic steps that occur when a DHCP client requests an IP address from a DHCP server. The client, Host A, sends a **DHCPDISCOVER** broadcast message to locate a **DHCP Server**. A DHCP server offers configuration parameters (such as an IP address, a MAC address, a domain name, and a lease for the IP address) to the client in a **DHCPOFFER** unicast message.



Benefits

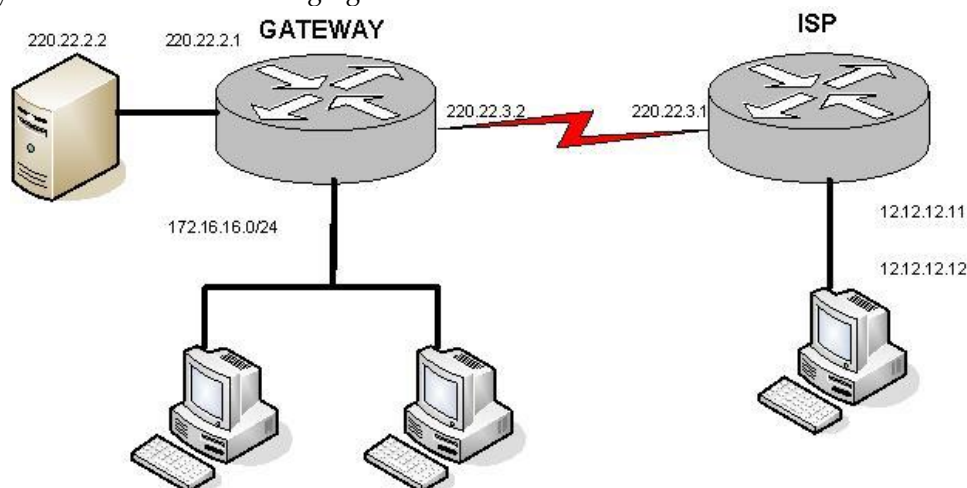
- **Reduced Internet access costs:** Using automatic IP address assignment at each remote site substantially reduces Internet access costs. Static IP addresses are considerably more expensive to purchase than are automatically allocated IP addresses.
- **Reduced client configuration tasks and costs:** Because DHCP is easy to configure, it minimizes operational overhead and costs associated with device configuration tasks and eases deployment by nontechnical users.
- **Centralized management:** Because the DHCP server maintains configurations for several subnets, an administrator only needs to update a single, central server when configuration parameters change.

3. Instructions

This lab provides an opportunity to revise your understanding of DHCP, and the commands for configuring DHCP functions on a router. One router is the DHCP server. The other router forwards DHCP requests to the server.

Task 1: Physical Connections

Create a topology as shown in the following figure:



Connect the following interfaces:

- **Ethernet:** Connect **Ethernet ports (fa0/0 or fa1/0)** to a hub or a switch using a **straight-through cable**. Use a **cross-over cable** if going directly from the PC's NIC to the Ethernet (AUI) port on the router.
- **Serial:** If going directly between two routers, don't forget to connect one port via the **DTE** cable and the other via the **DCE** cable.

Task 2: Configure PC1 and PC2 to receive an IP address through DHCP

Task 3: Configure a DHCP Server

Configure the **Gateway router** as a DHCP server for the **172.16.16.0/24** subnet.

Step 1: Exclude statically assigned addresses.

The DHCP server assumes that all IP addresses in a DHCP address pool subnet are available for assigning to DHCP clients. You must specify the IP addresses that the DHCP server should not assign to clients. These IP addresses are usually static addresses reserved for the router interface, switch management IP address, servers, and local network printer. The **ip dhcp excluded-address** command prevents the router from assigning IP addresses within the configured range. The following commands exclude the **first 10 IP addresses** from each pool for the LANs attached to R1. These addresses will not be assigned to any DHCP clients.

```
R2(config)#ip dhcp excluded-address 172.16.16.1 172.16.16.10
```

Step 2: Configure the pool.

Create the DHCP pool using the **ip dhcp pool** command and name it **R1Fa0**.

```
R2(config)#ip dhcp pool R1Fa0
```

Specify the subnet to use when assigning IP addresses. DHCP pools automatically associate with an interface based on the network statement. The router now acts as a DHCP server, handing out addresses in the **172.16.16.0/24** subnet starting with 172.16.16.1.

```
R2(dhcp-config)#network 172.16.16.0 255.255.255.0
```

Configure the **default router** and **domain name server** for the network. Clients receive these settings via DHCP, along with an IP address.

```
R2(dhcp-config)#dns-server 172.16.17.5  
R2(dhcp-config)#default-router 172.16.16.1
```

Note: There is not a DNS server at 172.16.17.5. You are configuring the command for practice only.

Task 4: Test the DHCP configuration

Configure the server with the address 220.22.2.2. It is assumed that the server requires a fixed, global IP address in order to allow access from the public Internet (represented by the node 12.12.12.12). Configure the server address manually. Ping from the PC1 and PC2 to router ports and server host.