

Configuring and Deploying DHCP (Dynamic Host Configuration Protocol) on a Cisco Router

Prepared by Don R. Crawley, MCSE, CCNA-certified
President, soundtraining.net

Email: don@soundtraining.net
Telephone: 206.988.5858
Fax: 206.892.0499

On the World Wide Web at www.soundtraining.net

soundtraining.net
P.O. Box 1321
Seahurst, WA 98062-1321
USA

October 21, 2002

This paper is the property of soundtraining.net and may not be reproduced in any form or used for commercial purposes without the expressed, written consent of Don R. Crawley, except that you may freely distribute it electronically as long as it remains unaltered, unedited, and unabridged.

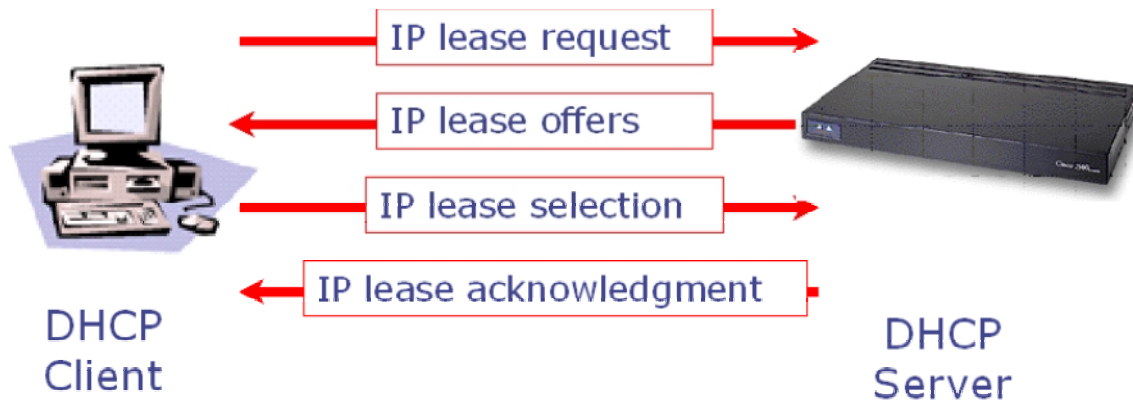
Configuring and Deploying DHCP

- Configuring a DHCP pool
- Setting up a TFTP server for log maintenance
- Determining and configuring the DHCP excluded address range
- Configuring the addresses, subnet masks, and options for assignment by DHCP

DHCP Basics

DHCP stands for Dynamic Host Configuration Protocol. It offers many benefits including lower cost for Internet access, lower cost for IP client configuration, and centralized management.

When a DHCP client comes online, it broadcasts a DHCPDISCOVER packet, which is an IP lease request. A DHCP server then sends the client a DHCPOFFER unicast which offers the client an IP lease (and possibly other parameters). The client selects the first one it receives and the DHCP server then sends an acknowledgement to the client.



Design Considerations

Before configuring DHCP on your Cisco router, identify an external File Transport Protocol (FTP), Trivial File Transfer Protocol (TFTP), or remote copy protocol (rcp) server that you will use to store the DHCP bindings database. You must also identify the IP addresses that you will enable the DHCP server to assign, and the IP addresses that you will exclude. Additionally, identify necessary DHCP client device options, including: default boot image name, default router(s) (gateways), DNS server(s), NetBIOS name server (WINS), decide on a NetBIOS node type (b, p, m, or h), and decide on a DNS domain name.

Once the preliminary design is completed, the steps required to configure DHCP on a Cisco router are fairly simple.

Configuring a DHCP Pool

Configure a DHCP pool name, which also allows you to enter DHCP configuration mode

```
Router(config)#ip dhcp pool [name]
```

Configure the DHCP pool subnet address and mask

```
Router(dhcp-config)#network 10.16.0.0 /12
```

```
router1#
```

```
router1#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

```
router1(config)#ip dhcp pool dhcpdemo
```

```
router1(dhcp-config)#network 10.16.0.0 /12
```

```
router1(dhcp-config)#_
```

Configuring DHCP Options

Configure a domain name for the client

```
Router(dhcp-config)#domain-name [name]
```

Configure DNS server addresses

```
Router(dhcp-config)#dns-server [address]
```

You can configure multiple DNS server addresses

Configuring WINS server addresses

```
Router(dhcp-config)#netbios-name-server [address]
```

Configuring the client's NetBIOS node type

```
Router(dhcp-config)#netbios-node-type [b,h,m,p]
```

Configuring the client's default router

```
Router(dhcp-config)#default-router [address]
```

Setting the address lease time

```
Router(dhcp-config)#lease [(days, hours, minutes) infinite] (Defaults to one day)
```

```
router1#
```

```
router1#conf t
```

Enter configuration commands, one per line. End with CNTL/Z.

```
router1(config)#ip dhcp pool dhcpdemo
```

```
router1(dhcp-config)#network 10.16.0.0 /12
```

```
router1(dhcp-config)#domain-name soundtraining.net
```

```
router1(dhcp-config)#default-router 10.16.0.1
```

```
router1(dhcp-config)#lease 8
```

```
router1(dhcp-config)#
```

Monitoring and Administering DHCP

“clear” commands

```
Router#clear ip dhcp binding [address/*]
```

```
Router#clear ip dhcp server statistics
```

“debug” commands

```
Router#debug ip dhcp server [events/package/linkage]
```

“show” commands

```
Router>show ip dhcp [binding/conflict/server statistics]
```

```
Router#show ip dhcp database
```

Student Exercise: Configuring and Deploying DHCP

This exercise is taken from soundtraining.net's two-day hands-on workshop *Unlocking the Secrets of Cisco Router Configuration and Operation*. Use the accompanying router lab diagram. This exercise requires two routers and one host. You can use the configurations for workstation 2 and routers 2 and 3 from the diagram to complete this exercise. This exercise teaches you how to configure the Dynamic Host Configuration Protocol on a Cisco router.

Objectives:

1. Determine and configure a DHCP pool
2. Determine and configure necessary DHCP client options
3. Monitor the DHCP process through logs and console monitoring

-
1. Begin by configuring a TFTP server address for logging DHCP bindings and other information:

Router(config)#**ip dhcp database 10.16.0.13** (this configures your router to use the instructor's computer as the TFTP server for logging DHCP activity)

2. Next, set the exclusion range for your router:

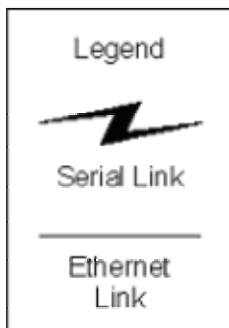
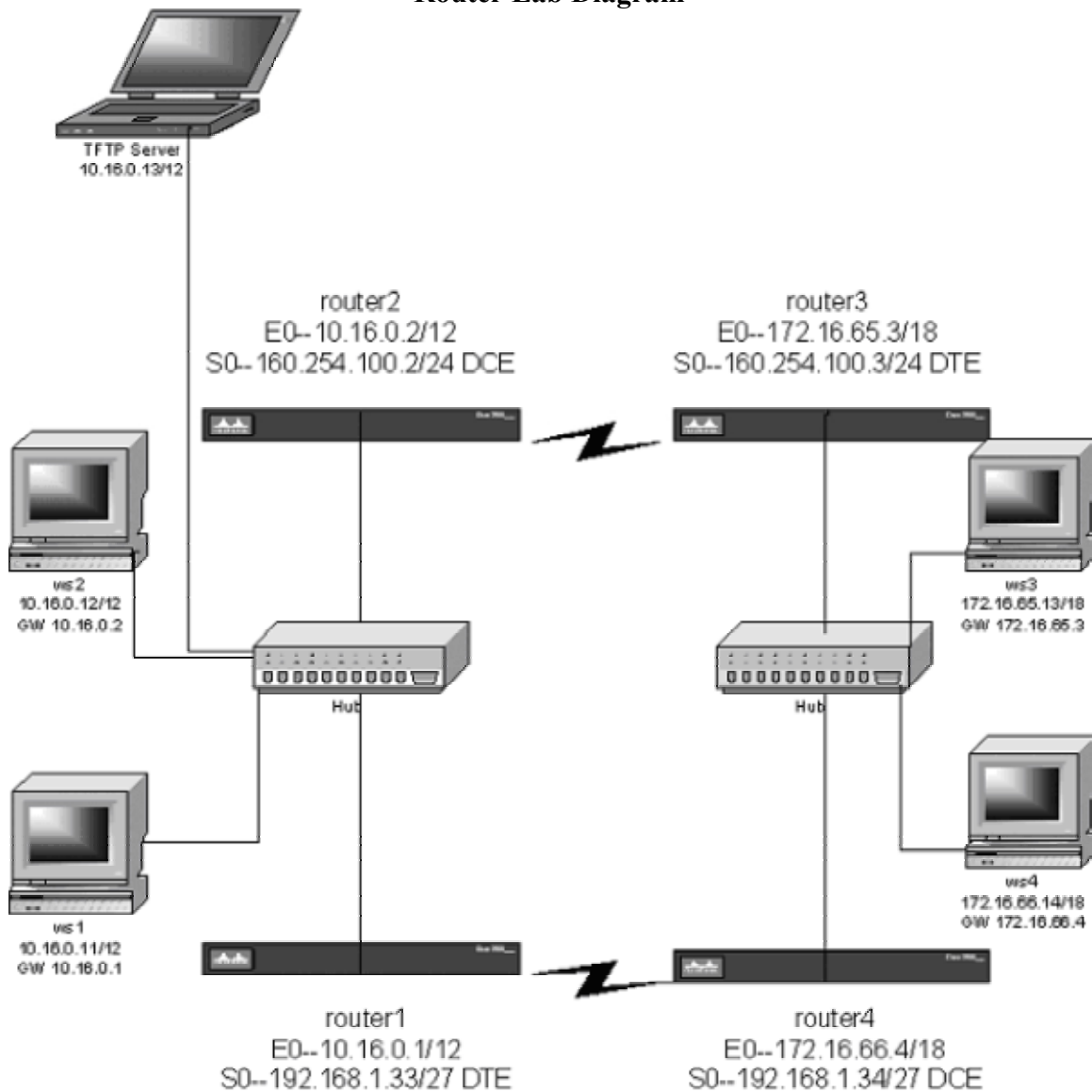
Router(config)#**ip dhcp excluded-address [low_address high_address]** (Use the following chart to identify your exclusion range.)

Router	DHCP Pool	Exclusion Range
Router1	10.16.0.0 /12	10.16.127.1-10.16.255.254
Router2	10.16.0.0 /12	10.16.0.1-10.16.126-255
Router3	172.16.64.0 /18	172.16.96.1-172.16.127.254
Router4	172.16.64.0 /18	172.16.64.1-172.16.95.255

3. You'll configure DHCP for the Ethernet network that's attached to your router. Since there are two routers attached to each Ethernet segment, the DHCP scope of addresses will be evenly divided between the two routers. Use the preceding chart to determine the appropriate scope for your router.
4. In global configuration mode, enter the command to identify the DHCP pool and start the DHCP service:
Router(config)#**ip dhcp pool [pool name]**
Router(dhcp-config)**network [network (subnet) ID] [/mask]**
5. Configure appropriate options for DHCP clients:
Router(dhcp-config)**domain-name soundtraining.net**
Router(dhcp-config)**default-router [IP address of gateway router]**
6. Configure a longer DHCP lease time than the default of one day:
Router(dhcp-config)#**lease 8**
7. Ensure that your computer is configured for automatic IP address assignment, and execute the command "ipconfig /all" at a command prompt to see the results of the router's DHCP address assignment.
8. At a privileged EXEC prompt, try the following commands:

Router#show IP dhcp ?
 Router#debug ip dhcp server events

Router Lab Diagram



Class A Network: 1-126.x.y.z
 Class B Network: 128-191.x.y.z
 Class C Network: 192-223.x.y.z

This map does not show the console cable connections between the workstations and the routers.

About this guide...

This guide is taken from soundtraining.net's workbook for *Unlocking the Secrets of Cisco Router Configuration and Operation 2-Day Hands-On Workshop*. You can request information concerning onsite scheduling of this fast-paced, information-packed workshop by call 206.988.5858 or emailing cisco@soundtraining.net. Onsite training can be affordable for as few as two people! Also, be sure to check online at www.soundtraining.net for information concerning our public seminars and workshops schedules.

soundtraining.net is a Seattle, Washington based training firm, specializing in training for information technology professionals and business professionals. Training programs include Microsoft and Cisco networking and desktop workshops and seminars, project management and business process analysis seminars and workshops, and our one-day *Trends in Technology* briefing.

Contact soundtraining.net via email at trainers@soundtraining.net, by telephone at 206.988.5858, or via postal mail at:

soundtraining.net
Box 1321
Seahurst, WA 98062-1321

