



CHAPTER 3

Assigning the Switch IP Address and Default Gateway

This chapter describes how to create the initial switch configuration (for example, assigning the switch IP address and default gateway information) for the Cisco Metro Ethernet (ME) 3400E Ethernet Access switch by using a variety of automatic and manual methods. It also describes how to modify the switch startup configuration.



Note

For complete syntax and usage information for the commands used in this chapter, see the command reference *Cisco IOS Software Documentation, 12.2 Mainline Release, Command References, Volume 1 of 3: Addressing and Services*.

This chapter consists of these sections:

- [Understanding the Boot Process, page 3-1](#)
[Assigning Switch Information, page 3-2](#)
[Checking and Saving the Running Configuration, page 3-14](#)
[Modifying the Startup Configuration, page 3-17](#)
[Scheduling a Reload of the Software Image, page 3-21](#)



Information in this chapter about configuring IP addresses and DHCP is specific to IP Version 4 (IPv4).

Understanding the Boot Process

- Performs low-level CPU initialization. It initializes the CPU registers, which control where physical memory is mapped, its quantity, its speed, and so forth.
Performs power-on self-test (POST) for the CPU subsystem. It tests the CPU DRAM and the portion of the flash device that makes up the flash file system.

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- Loads a default operating system software image into memory and boots the switch.

The boot loader provides access to the flash file system before the operating system is loaded. Normally, the boot loader is used only to load, uncompress, and launch the operating system. After the boot loader gives the operating system control of the CPU, the boot loader is not active until the next system reset or power-on.

The boot loader also provides trap-door access into the system if the operating system has problems serious enough that it cannot be used. The trap-door mechanism provides enough access to the system so that if it is necessary, you can format the flash file system, reinstall the operating system software image by using the XMODEM Protocol, recover from a lost or forgotten password, and finally restart the operating system. For more information, see the [“Recovering from a Software Failure” section on page 45-2](#) and the [“Recovering from a Lost or Forgotten Password” section on page 45-3](#).



You can disable password recovery. For more information, see the [“Disabling Password Recovery” section on page 8-5](#).

Before you can assign switch information, make sure you have connected a PC or terminal to the console port, and configured the PC or terminal-emulation software baud rate and character format to match these of the switch console port:

Baud rate default is 9600.

Data bits default is 8.



If the data bits option is set to 8, set the parity option to none.

Stop bits default is 1.

Parity settings default is none.

Assigning Switch Information

Use the switch setup program if you want to be prompted for specific IP information. With this program, you can also configure a hostname and an enable secret password. It gives you the option of assigning a Telnet password (to provide security during remote management). For more information about the setup program, see the [“Configuring the Switch with the CLI-Based Setup Program” appendix in the hardware installation guide](#).

Use a DHCP server for centralized control and automatic assignment of IP information after the server is configured.



Note

If you are using DHCP, do not respond to any of the questions in the setup program until the switch receives the dynamically assigned IP address and reads the configuration file.

If you are an experienced user familiar with the switch configuration steps, manually configure the switch. Otherwise, use the setup program described previously.

Default Switch Information

Table 3-1 Default Switch Information

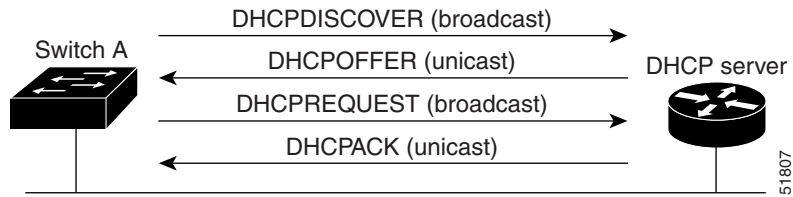
Feature	Default Setting
	<i>Switch</i>

Understanding DHCP-Based Autoconfiguration

DHCP Client Request Process

ip address dhcp

Figure 3-1 DHCP Client and Server Message Exchange



In a DHCPREQUEST broadcast message, the client returns a formal request for the offered configuration information to the DHCP server. The formal request is broadcast so that all other DHCP servers that received the DHCPDISCOVER broadcast message from the client can reclaim the IP addresses that they offered to the client.

The DHCP server confirms that the IP address has been allocated to the client by returning a DHCPACK unicast message to the client. With this message, the client and server are bound, and the client uses configuration information received from the server. The amount of information the switch receives depends on how you configure the DHCP server. For more information, see the [“Configuring the TFTP Server” section on page 3-6](#).

If the configuration parameters sent to the client in the DHCPOFFER unicast message are invalid (a configuration error exists), the client returns a DHCPDECLINE broadcast message to the DHCP server.

The DHCP server sends the client a DHCPNAK denial broadcast message, which means that the offered configuration parameters have not been assigned, that an error has occurred during the negotiation of the parameters, or that the client has been slow in responding to the DHCPOFFER message (the DHCP server assigned the parameters to another client).

A DHCP client might receive offers from multiple DHCP or BOOTP servers and can accept any of the offers; however, the client usually accepts the first offer it receives. The offer from the DHCP server is not a guarantee that the IP address is allocated to the client; however, the server usually reserves the address until the client has had a chance to formally request the address. If the switch accepts replies from a BOOTP server and configures itself, the switch broadcasts, instead of unicasts, TFTP requests to obtain the switch configuration file.

Understanding DHCP-based Autoconfiguration and Image Update

DHCP Autoconfiguration

DHCP Auto-Image Update



Note

Cisco IOS IP Configuration Guide, Release 12.2

Limitations and Restrictions

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Note

copy running-configuration startup-configuration **write memory**

Configuring DHCP-Based Autoconfiguration

- [DHCP Server Configuration Guidelines, page 3-6](#)
 - [Configuring the TFTP Server, page 3-6](#)
 - [Configuring the DNS, page 3-7](#)
 - [Configuring the Relay Device, page 3-7](#)
 - [Obtaining Configuration Files, page 3-8](#)
 - [Example Configuration, page 3-9](#)

If your DHCP server is a Cisco device, see the “Configuring DHCP” section of the “IP Addressing and Services” section of the [Cisco ME 3400E Ethernet Access Switch Software Configuration Guide](#) for additional information about configuring DHCP.

DHCP Server Configuration Guidelines

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Configuring the TFTP Server

switch's current hostname. The TFTP server addresses used include the specified TFTP server address (if any) and the broadcast address (255.255.255.255).

For the switch to successfully download a configuration file, the TFTP server must contain one or more configuration files in its base directory. The files can include these files:

- The configuration file named in the DHCP reply (the actual switch configuration file).

- The network-confg or the cisco.net.cfg file (known as the default configuration files).

- The router-confg or the ciscotr.cfg file (These files contain commands common to all switches. Normally, if the DHCP and TFTP servers are properly configured, these files are not accessed.)

If you specify the TFTP server name in the DHCP server-lease database, you must also configure the TFTP server name-to-IP-address mapping in the DNS-server database.

If the TFTP server to be used is on a different LAN from the switch, or if it is to be accessed by the switch through the broadcast address (which occurs if the DHCP server response does not contain all the required information described previously), a relay must be configured to forward the TFTP packets to the TFTP server. For more information, see the [“Configuring the Relay Device” section on page 3-7](#). The preferred solution is to configure the DHCP server with all the required information.

Configuring the DNS

Configuring the Relay Device

relay agent

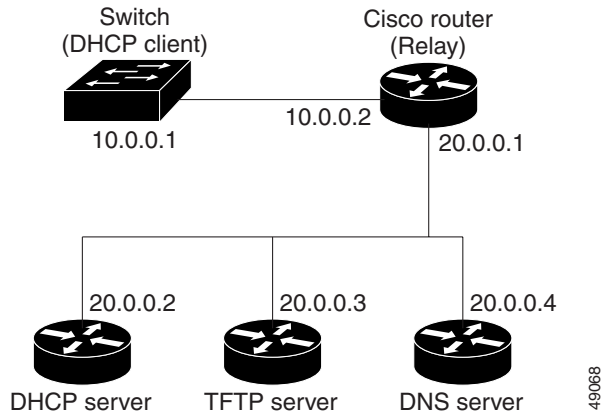
ip helper-address

```
router(config-if)# ip helper-address 20.0.0.2
                  ip helper-address 20.0.0.3
                  ip helper-address 20.0.0.4
```

```
ip helper-address 10.0.0.1
```



Figure 3-2 *Relay Device Used in Autoconfiguration*



Obtaining Configuration Files

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Example Configuration

shows a sample network for retrieving IP information by using DHCP-based autoconfiguration.

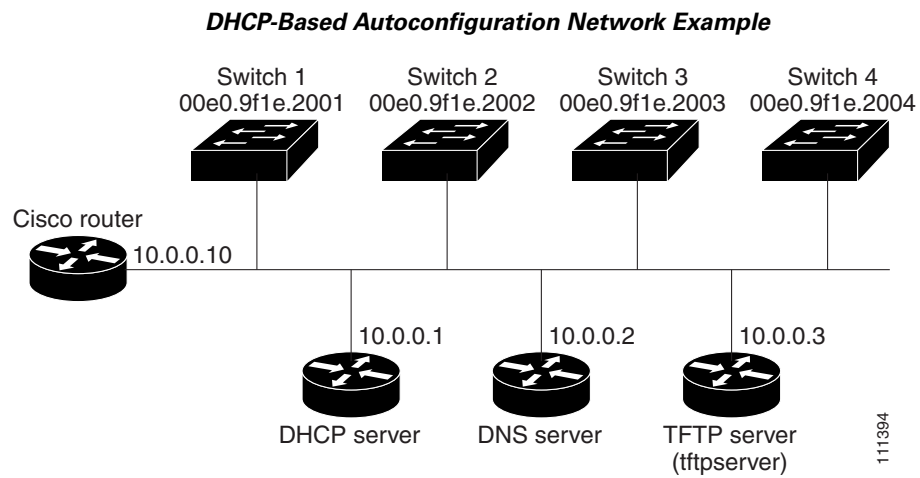


Table 3-2 DHCP Server Configuration

	Switch A	Switch B	Switch C	Switch D
	<i>tftpserver</i> <i>10.0.0.3</i>	<i>tftpserver</i> <i>10.0.0.3</i>	<i>tftpserver</i> <i>10.0.0.3</i>	<i>tftpserver</i> <i>10.0.0.3</i>

DNS Server Configuration

TFTP Server Configuration (on UNIX)

The TFTP server base directory is set to `/tftpserver/work/`. This directory contains the `network-config` file used in the two-file read method. This file contains the hostname to be assigned to the switch based on its IP address. The base directory also contains a configuration file for each switch (*switcha-config* *switchb-config*

```
prompt> cd /tftpserver/work/
ls
network-config
switcha-config
switchb-config
switchc-config
switchd-config
prompt> cat network-config
ip host switcha 10.0.0.21
ip host switchb 10.0.0.22
ip host switchc 10.0.0.23
ip host switchd 10.0.0.24
```

DHCP Client Configuration

Configuration Explanation

Configuring the DHCP Auto Configuration and Image Update Features

Configuring DHCP Autoconfiguration (Only Configuration File)

	Command	Purpose
Step 1		
Step 2		
Step 3	bootfile	
Step 4	network <i>network-number mask</i> <i>prefix-length</i>	
Step 5	<i>address</i>	
Step 6	option 150	
Step 7	exit	
Step 8		
Step 9		
Step 10		
Step 11		
Step 12		
Step 13		

```
Switch# configure terminal
      ip dhcp pool pool1
          network 10.10.10.0 255.255.255.0
          bootfile config-boot.text
          default-router 10.10.10.1
          option 150 10.10.10.1
          exit
      tftp-server flash:config-boot.text
      interface gigabitethernet1/0/4
          no switchport
          ip address 10.10.10.1 255.255.255.0
          end
```

Configuring DHCP Auto-Image Update (Configuration File and Image)


Note

Before following the steps in this table, you must create a text file (for example, autoinstall_dhcp) that will be uploaded to the switch. In the text file, put the name of the image that you want to download. This image must be a tar and not a bin file.

option 125	
copy tftp flash	
copy tftp flash	
exit	
tftp-server flash:	
tftp-server flash:	
tftp-server flash:	name of the image file to download
interface	
no switchport	
ip address	
end	
copy running-config startup-config	

This example shows how to configure a switch as a DHCP server so it downloads a configuration file:

```
0000.0009.0a05.08661.7574.6f69.6e73.7461.6c6c.5f64.686370
```

```

Switch(dhcp-config)#
Switch(config)#
Switch(config)#                               image-name-mz.122-44.3.SE.tar
tftp-server flash:boot-config.text
tftp-server flash: autoinstall_dhcp
interface gigabitEthernet1/0/4
  no switchport
  ip address 10.10.10.1 255.255.255.0
end

```

banner config-save ^C	^C
end	
show boot	

```

configure terminal
  boot host dhcp
  boot host retry timeout 300
  banner config-save ^C Caution - Saving Configuration File to NVRAM May Cause
  You to No longer Automatically Download Configuration Files at Reboot^C
  vlan 99
Switch(config-vlan)#
Switch(config-if)#
Switch(config-if)#
Switch#
BOOT path-list:
Config file:          flash:/config.text
Private Config file: flash:/private-config.text
Enable Break:        no
Manual Boot:         no
HELPER path-list:
NVRAM/Config file
  buffer size:       32768
Timeout for Config
  Download:          300 seconds
Config Download
  via DHCP:         enabled (next boot: enabled)
Switch#

```



Manually Assigning IP Information

	Command	Purpose
Step 1		
Step 2		
Step 3		
Step 4		
Step 5		
		Note
Step 6		
Step 7		
Step 8		
Step 9		

Checking and Saving the Running Configuration

Current configuration : 2010 bytes



```
!
version 12.2
no service pad
service timestamps debug uptime
service timestamps log uptime
no service password-encryption
!
hostname 3400-3
!
enable password cisco
!
no aaa new-model
ip subnet-zero
no ip domain-lookup
!
table-map test
  default copy
!
no file verify auto
!
spanning-tree mode rapid-pvst
spanning-tree extend system-id
!
vlan internal allocation policy ascending
!
vlan 2,10
!
class-map match-all test1
class-map match-all class2
class-map match-all class1
!
!
policy-map test
  class class1
    police cir percent 30
policy-map test2
  class class2
    police cir 8500 bc 1500
policy-map test3
!
!
interface FastEthernet0/1
!
interface FastEthernet0/2
  shutdown
!
interface FastEthernet0/3
  shutdown
!
interface FastEthernet0/4
  shutdown
!
interface FastEthernet0/5
  shutdown
!
interface FastEthernet0/6
  shutdown
!
interface FastEthernet0/7
  shutdown

<output truncated>

interface GigabitEthernet0/1
```

```
port-type nni
!
interface GigabitEthernet0/2
port-type nni
!
interface Vlan1
no ip address
no ip route-cache
no ip mroute-cache
shutdown
!
interface Vlan10
ip address 192.168.1.76 255.255.255.0
!
ip default-gateway 192.168.1.3
no ip http server
ip classless
!
!
!
control-plane
!
!
line con 0
session-timeout 120
exec-timeout 120 0
speed 115200
line vty 0 4
password cisco
no login
line vty 5 15
no login
!
!
end
```

```
Switch#
Destination filename [startup-config]?
Building configuration...
```

Modifying the Startup Configuration

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Default Boot Configuration

Feature	Default Setting

Automatically Downloading a Configuration File

Specifying the Filename to Read and Write the System Configuration

■ Modifying the Startup Configuration

	Command	Purpose
Step 1		
Step 2	<code>boot config-file flash:/</code>	
Step 3	<code>end</code>	
Step 4	<code>show boot</code>	boot config-file
Step 5	<code>copy running-config startup-config</code>	

Booting Manually

	Command	Purpose
Step 1	<code>configure terminal</code>	
Step 2	<code>boot manual</code>	
Step 3	<code>end</code>	
Step 4	<code>show boot</code>	boot manual boot :/ <ul style="list-style-type: none"> • : flash: •
Step 5	<code>copy running-config startup-config</code>	

Booting a Specific Software Image

	Enter global configuration mode.
	Configure the switch to boot a specific image in flash memory during the next boot cycle. For <code>flash:</code> , use <code>flash:</code> for the system board flash device. For <code>bootflash:</code> , specify the path (directory) and the name of the bootable image. Filenames and directory names are case sensitive.
	Return to privileged EXEC mode.
	Verify your entries. The <code>boot system</code> global command changes the setting of the BOOT environment variable. During the next boot cycle, the switch attempts to automatically boot the system using information in the BOOT environment variable.
	(Optional) Save your entries in the configuration file.

no boot system

Controlling Environment Variables

After the switch performs POST, the switch begins the autoboot process. The boot loader prompts the user for a break key character during the boot-up sequence, as shown in this example:

```
***** The system will autoboot in 5 seconds *****
```

Send a break key to prevent autobooting.

-
-

<http://www.cisco.com/warp/public/701/61.html#how-to>

When you enter the break key, the boot loader prompt appears.

The switch boot loader software provides support for nonvolatile environment variables, which can be used to control how the boot loader, or any other software running on the system, behaves. Boot loader environment variables are similar to environment variables that can be set on UNIX or DOS systems.

Environment variables that have values are stored in flash memory outside of the flash file system.

Each line in these files contains an environment variable name and an equal sign followed by the value of the variable. A variable has no value if it is not listed in this file; it has a value if it is listed in the file even if the value is a null string. A variable that is set to a null string (for example, “”) is a variable with a value. Many environment variables are predefined and have default values.

Environment variables store two kinds of data:

Data that controls code, which does not read the Cisco IOS configuration file. For example, the name of a boot loader helper file, which extends or patches the functionality of the boot loader can be stored as an environment variable.

Data that controls code, which is responsible for reading the Cisco IOS configuration file. For example, the name of the Cisco IOS configuration file can be stored as an environment variable.

You can change the settings of the environment variables by accessing the boot loader or by using Cisco IOS commands. Under normal circumstances, it is not necessary to alter the setting of the environment variables.



For complete syntax and usage information for the boot loader commands and environment variables, see the command reference for this release.

Table 3-4 describes the function of the most common environment variables.

Table 3-4 **Environment Variables**

Variable	Boot Loader Command	Cisco IOS Global Configuration Command
BOOT	set BOOT :/	boot system <i>ilesystem:/file-url ...</i>

Environment Variables (continued)

MANUAL_BOOT	set MANUAL_BOOT yes	boot manual boot flash: :/ boot config-file flash: /
CONFIG_FILE	set CONFIG_FILE flash: /	boot config-file flash: /

Scheduling a Reload of the Software Image



Note

Configuring a Scheduled Reload

- `reload [] []`

This command schedules a reload of the software to take affect in the specified minutes or hours and minutes. The reload must take place within approximately 24 days. You can specify the reason for the reload in a string up to 255 characters in length.

`reload [|] []`

This command schedules a reload of the software to take place at the specified time (using a 24-hour clock). If you specify the month and day, the reload is scheduled to take place at the specified time and date. If you do not specify the month and day, the reload takes place at the specified time on the current day (if the specified time is later than the current time) or on the next day (if the specified time is earlier than the current time). Specifying 00:00 schedules the reload for midnight.



Reload scheduled for 19:30:00 UTC Wed Jun 5 1996 (in 2 hours and 25 minutes)
Proceed with reload? [confirm]

Switch# **reload at 02:00 jun 20**
Reload scheduled for 02:00:00 UTC Thu Jun 20 1996 (in 344 hours and 53 minutes)
Proceed with reload? [confirm]