

Configuring the Cisco 1005

This chapter describes how to configure the Cisco 1005 router and contains the following sections:

- Preparing to Boot the Router
- Booting the Router
- Specifying the Boot Method
- Checking the Configuration Settings
- For More Information

Preparing to Boot the Router

The router can load the Cisco IOS software (which is the router's operating software) from Flash memory or from a Trivial File Transfer Protocol (TFTP) server (not included), depending on the options you selected for your router.

If you ordered a Flash memory card with your router, the Cisco IOS software is already installed on the Flash memory card. The router can boot from the Cisco IOS software on the Flash memory card.

If you did not order a Flash memory card for your router, a 3.5-inch diskette that contains the Cisco IOS software was shipped with your router. Install the Cisco IOS software in the appropriate directory (/tftpboot on UNIX systems) on your TFTP server. You can set up a TFTP server, using TFTP software (not included), on most operating systems (for example, DOS, Macintosh, and UNIX). (Refer to your TFTP software instructions for more information.)

Booting the Router

If you want to load the Cisco IOS software from a TFTP server, take the following steps to make sure the server is ready:

- Step 1** TFTP software is installed and running on the server.
- Step 2** The Cisco IOS software is installed in the appropriate directory on the TFTP server.
- Step 3** A console terminal or PC running terminal emulation software is connected to the router. (Refer to the section “Connecting the Console” in the chapter “Installing the Cisco 1005.”)

Note The details of setting up a TFTP server and installing system software or configuration files on the server vary from one operating system to another. Refer to the documentation that accompanied your TFTP software for more information about setting up TFTP service.

Preparing your TFTP server before attempting to boot the router will significantly reduce the time and effort required to begin using your router.

Booting the Router

Each time you power on the router, it goes through a boot sequence. The router searches for a valid configuration file and attempts to boot in the manner specified in the configuration file. The router can obtain a configuration file from nonvolatile random-access memory (NVRAM), Flash memory, or a TFTP server, or it can be configured manually. If a valid configuration file is not found, the router enters the **setup** command facility so you can configure it manually.

The boot sequence is as follows:

- 1 If a configuration file is already in NVRAM in your router, it will load the configuration automatically from NVRAM when you turn ON power to the router (by plugging in the power cord).

If a configuration file is not present in NVRAM, the router will check to see if a Flash memory card is installed in the PCMCIA slot. If the Flash memory card is present, and a configuration file with either the filename *router-config* (for UNIX or Macintosh systems) or *ciscortr.cfg* (for DOS systems) is stored on it, the router will load the configuration automatically from the Flash memory card. The router will load a configuration file only if the following conditions are met:

- The configuration file is named *router-config* (for UNIX or Macintosh systems) or *ciscortr.cfg* (for DOS systems). Use the **show flash** command to check the configuration filename.

Note The router searches for the filename *router-config* or *ciscortr.cfg*. Do not preface the filename with the path name. For example, enter the filename *router-config* not */tftpboot/router-config*.

- The configuration register has been set properly. Use the **show version** command to verify that the last number in the configuration register is set to 2. For example, the factory-default value is 0x2102. Notice that the last number is 2. (For more information, refer to the **config-register** command in the *Router Products Command Summary* publication.)
- 2 If a Flash memory card is not installed, or the configuration file is not stored on the Flash memory card, the router will check the LAN for a TFTP server with an applicable configuration file. If a configuration file is found, the router will load the configuration from that server.

Booting the Router

- 3 If a configuration file is not found, and the serial cable is connected to the router and a WAN interface, the router will attempt to use the AutoInstall process to download a configuration file across the WAN. Refer to the following section, “Using AutoInstall,” for more information. The configuration file is named *network-config* (for UNIX or Macintosh systems) or *cisconet.cfg* (for DOS systems).
- 4 If a configuration file is not found at any of these three sources, you must manually configure the router using the System Configuration Dialog. For instructions on using the System Configuration Dialog, proceed to the section “Using the System Configuration Dialog,” later in this chapter.

Using AutoInstall

The AutoInstall process is designed to configure the router automatically after connecting it to a WAN. The AutoInstall process involves connecting a new router to a network on which there is an existing preconfigured router, turning on the new router, and downloading a configuration file automatically to the new router from a TFTP server.

If AutoInstall is set up correctly by a system administrator at a regional or central site, for example, a user at a remote site could be instructed by the system administrator to attach the serial cable to the router, power it on, and save the configuration to NVRAM. In this example, AutoInstall eliminates the need for the system administrator to travel to the remote site to configure the router.

Note This section contains general guidelines and instructions about using the AutoInstall process. For more information, refer to the *Router Products Configuration Guide*.

To complete the AutoInstall process, you need both an existing preconfigured router and a TFTP server on the network. In addition, make sure the following requirements are met before proceeding to use AutoInstall:

- The existing preconfigured router is running Software Release 9.1 or later.
- The existing preconfigured router is physically attached to the network using one or more of the following interface types: Ethernet, Token Ring, Fiber Distributed Data Interface (FDDI), or serial with High-Level Data Link Control (HDLC) encapsulation. The new router is connected to the network using the serial interface.
- If the existing preconfigured router will use SLARP on an HDLC-encapsulated serial interface to help automatically configure the new router, the existing router is configured with an IP address in which the host portion is 1 or 2; for example, 60.0.0.1. The last number (1) is the host portion. Network masks of any size are supported.
- If the existing router will use BOOTP or Reverse Address Resolution Protocol (RARP) on an Ethernet, Token Ring, or FDDI interface to help autoinstall the new router, a BOOTP or RARP server is set up to map the new router's Media Access Control (MAC) address to its IP address. A BOOTP or RARP server is not required for AutoInstall using an HDLC-encapsulated serial interface.

The complete AutoInstall process is performed by two people. A system administrator at a regional or central site performs Step 1 through Step 6. A user at a remote site performs Step 7 through Step 9. To perform the AutoInstall process, follow these steps:

Step 1 Create a new file called *network-config* (for UNIX or Macintosh systems) or *cisconet.cfg* (for DOS systems) in the appropriate directory (*/tftpboot* for UNIX systems) on the TFTP server. The *network-config* or *cisconet.cfg* file maps the IP address of the new router to the router name. Or add IP address-to-host name mapping for the new router to a Domain Name System (DNS) database file.

Step 2 If you are not using DNS, enter the following in the *network-config* or *cisconet.cfg* file:

```
ip host newroutername newrouteraddress
```

An example entry follows:

```
ip host router1 60.0.0.2
```

Booting the Router

If the new router does not receive the *network-config* or the *cisconet.cfg* file, or if the IP address-to-host name mapping does not match the newly acquired IP address, the new router sends a DNS broadcast. If DNS is configured and has an entry that maps the new router's SLARP or BOOTP/RARP acquired IP address to its name, the new router resolves its name successfully.

Step 3 Create another new file based on the name of the new router. Name the new file the router name followed by *-config* (for UNIX or Macintosh systems) or *.cfg* (for DOS systems); for example, *router1-config* or *router1.cfg*. The new router name must be all lowercase, even if the true host name is not.

Step 4 In this new file, enter all the configuration information for the new router. You can enter a complete configuration or a minimal configuration. If you are using BOOTP or RARP to resolve the address of the new router, you must also enter in the configuration file the IP address to be obtained dynamically using BOOTP or RARP. An example minimal configuration file follows:

```
enable-password letmein
!
line vty0
password letmein
!
end
```

A minimal configuration file contains just enough configuration information to allow the system administrator to Telnet into the new router to configure it.

Step 5 Telnet into the existing router on the network.

Step 6 Configure the serial interface on the existing router and assign an IP helper address for the BOOTP or RARP server. If the BOOTP or RARP server does not reside on the directly attached network segment, the IP helper address allows requests and responses to be forwarded between segments. An example follows:

```
Router> enable
Password: enablepassword
Router# configure terminal
Router (config)# interface serial intrface#
Router (config)# ip address existingrtraddress
Router (config)# ip helperaddress serveraddress
Router (config)# Ctrl-Z
Router# exit
Router>
```

- Step 7** Connect the serial DTE cable to the new router, if you have not already done so. Refer to the section “Connecting the Network Interface Cables” in the chapter “Installing the Cisco 1005.”
- Step 8** Turn ON power to the new router. Startup messages appear on the console.
- Step 9** Enter enabled mode on the new router and save the configuration file to NVRAM:

```
Router> enable
Password: enablepassword
Router# copy running-config startup-config
Building configuration...
[OK]
Router# exit
Router>
```

After the configuration file has been saved to NVRAM, the new router will load the configuration file from NVRAM whenever it is rebooted.

Using the System Configuration Dialog

If your router does not contain a configuration file, the router will start the **setup** command facility automatically. An interactive dialog called the System Configuration Dialog appears on the console screen. The dialog helps you navigate through the configuration process by prompting you for the configuration information necessary for the router to operate.

Many prompts in the System Configuration Dialog include default answers enclosed in square brackets following the question. To accept a default answer, press **Return**; otherwise, enter your response.

This section gives an example configuration using the System Configuration Dialog. When you are configuring your router, you should respond as appropriate for your network.

At any time during the System Configuration Dialog, you can request help by entering a question mark (?) at a prompt.

Before proceeding with the System Configuration Dialog, obtain the node addresses and the number of bits in the subnet field (if applicable) of the Ethernet and serial ports from your system administrator. For more information about IP addresses and subnets, refer to the publication *Internetworking Technology Overview* or *Configuration Fundamentals Configuration Guide*.

Cisco Systems, Inc.
170 West Tasman Drive
San Jose, California 95134-1706

Cisco Internetwork Operating System (Cisco IOS [tm]) Software
1000 Software (C1005-H-M), Version 10.3(6) [dcoli 105]
Copyright (c) 1986-1995 by Cisco Systems, Inc.
Compiled Wed 07-Jun-95 13:13 by dcoli
Image text-base: 0x02004000, data-base: 0x0228CA48

Cisco 1000 (68360) processor (revision 0x00) with 3584K/512K bytes of memory.

Processor board serial number 01335546

Bridging software.

X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.

1 Ethernet/IEEE 802.3 interface.

1 Serial network interface.

8K bytes of non-volatile configuration memory.

2048K bytes of processor board PCMCIA flash (Read/Write)

Notice: NVRAM invalid, possibly due to write erase.

--- System Configuration Dialog ---

At any point you may enter a question mark '?' for help.

Refer to the 'Getting Started' Guide for additional help.

Use ctrl-c to abort configuration dialog at any prompt.

Default settings are in square brackets '['].

Would you like to enter the initial configuration dialog? [yes]:

Step 3 To begin the configuration process, press **Return** or enter **yes**.

Step 4 When the System Configuration Dialog asks whether you want to view the current interface summary, press **Return** or enter **yes**:

First, would you like to see the current interface summary? [yes]: **yes**

Any interface listed with OK? value "NO" does not have a valid configuration

Interface	IP-Address	OK?	Method	Status	Protocol
Ethernet0	unassigned	NO	not set	up	up
Serial0	unassigned	NO	not set	down	down

Booting the Router

- Step 5** Configure the global parameters. Choose which protocols to support on the Ethernet interface. For IP installations, you can accept the default values (in brackets) for most of the questions by pressing **Return**. A typical configuration using AppleTalk, IPX, and IP follows:

Configuring global parameters:

```
Enter host name [Router]: Router
```

Next, you are prompted to enter an enable secret password. There are two types of privileged-level passwords:

- Enable secret password (a very secure, encrypted password)
- Enable password (a less secure, nonencrypted password)

The enable password is used when the enable secret password does not exist.

For maximum security, be sure the passwords are different. If during the System Configuration Dialog you enter the same password for both, the router will accept it, but you will receive a warning message indicating that you should enter a different password.

Enter an enable secret password as follows:

The enable secret is a one-way cryptographic secret used instead of the enable password when it exists.

```
Enter enable secret: 1005rtr
```

The enable password is used when there is no enable secret and when using older software and some boot images.

Enter the enable password as follows:

```
Enter enable password: rtr1  
Enter virtual terminal password: vterm1  
Configure SNMP Network Management? [yes]: no
```

Configure the appropriate protocol for your router: AppleTalk, IPX, or IP.

The following example shows how to configure the router for AppleTalk routing:

```
Configure AppleTalk? [no]: yes
Multizone networks? [no]: yes
```

The following example shows how to configure the router for IPX routing:

```
Configure IPX? [no] yes
```

If you are using IP routing, you must also select an IP routing protocol. You can specify only one of two routing protocols: Interior Gateway Routing Protocol (IGRP) or Routing Information Protocol (RIP). The following example, shows how to configure the router for IP and IGRP routing:

```
Configure IP? [yes]: yes
Configure IGRP routing? [yes]: yes
Your IGRP autonomous system number [1]: 15
```

Configuring the Ethernet Interface

To configure the Ethernet interface, follow these steps:

Step 1 To configure Ethernet 0, press **Return** or enter **yes** at the prompt:

```
Configuring interface parameters:

Configuring interface Ethernet0:
Is this interface in use? [yes]: yes
```

Step 2 To configure the Ethernet interface for IP routing, respond to the prompts as follows:

```
Configure IP on this interface? [yes]: yes
Configure IP unnumbered on this interface? [no]: no
IP address for this interface: 131.108.6.67
Number of bits in subnet field [0]: 0
Class B network is 131.108.6.67, 0 subnet bits; mask is
255.255.0.0
```

Booting the Router

Step 3 To configure the Ethernet port for AppleTalk routing, respond to the prompts as follows:

```
Configure AppleTalk on this interface? [no]: yes
  Extended AppleTalk network? [no]: yes
  AppleTalk starting cable range [2]: 2
  AppleTalk ending cable range [2]: 2

  AppleTalk zone name [myzone]: sales
```

If applicable, enter an additional zone name. Each time you enter a zone name, you will be prompted to enter an additional zone name. When you have finished entering zone names, press **Return**.

```
  AppleTalk additional zone name: marketing
  AppleTalk additional zone name:
```

Step 4 To configure the Ethernet port for IPX routing, respond to the prompts as follows:

```
Configure IPX on this interface? [no]: yes
  IPX network number [1]: 1
```

Configuring the Serial Port for Synchronous Communication

To configure the serial port for synchronous communication, follow these steps:

Step 1 To configure Serial 0, press **Return** or enter **yes** at the prompt:

```
Configuring interface Serial0:
  Is this interface in use? [yes]: yes
```

Step 2 To configure the synchronous serial port for IP routing, respond to the prompts as follows:

```
Configure IP on this interface? [yes]: yes
configure IP unnumbered? [no]: no
  IP address for this interface: 131.108.97.67
  Number of bits in subnet field [0]: 0
  Class B network is 131.108.97.67, 0 subnet bits; mask is
  255.255.0.0
```

Step 3 To configure the synchronous serial port for AppleTalk routing, respond to the prompts as follows:

```
Configure AppleTalk on this interface? [no]: yes
Extended AppleTalk network? [yes] yes

AppleTalk starting cable range [2]: 3
AppleTalk ending cable range [2]: 3

AppleTalk zone name [myzone]: zzserial
```

Each time you enter a zone name, you will be prompted to enter an additional zone name. When you finish entering zone names, press **Return**.

```
AppleTalk additional zone name:
```

Step 4 To configure the synchronous serial port for IPX routing, respond to the prompts as follows:

```
Configure IPX on this interface? [no]: yes
IPX network number [2]: 2
```

Configuring the Serial Port for Asynchronous Communication

To configure the serial port for asynchronous communication, follow these steps:

Step 1 To configure Serial 0, press **Return** or enter **yes** at the prompt:

```
Configuring interface Serial0:
Is this interface in use? [yes]: yes
```

Step 2 To configure the asynchronous serial port for IP routing, respond to the prompts as follows:

```
Configure IP on this interface? [yes]: yes
configure IP unnumbered? [no]: no
IP address for this interface: 131.108.97.67
Number of bits in subnet field [0]: 0
Class B network is 131.108.97.67, 0 subnet bits; mask is
255.255.0.0
```

Booting the Router

Step 3 To configure the asynchronous serial port for IGRP routing, respond to the prompts as follows:

```
Configure IGRP routing? [yes]: yes
Your IGRP autonomous system number [1]: 1
```

Step 4 To configure the asynchronous serial port for IPX routing, respond to the prompts as follows:

```
Configure IPX on this interface? [no]: yes
IPX network number [2]: 2
```

Step 5 To configure the asynchronous serial port for asynchronous communication, respond to the prompts as follows:

```
Configure Async lines? [yes]: yes
Async line speed [9600]: 9600
Configure for HW flow control? [yes]: yes
Configure for modems? [yes/no]: yes
Configure for default chat script? [yes]: yes
```

Step 6 To configure the asynchronous serial port for dial-in SLIP/PPP access, respond to the prompts as follows:

```
Configure for Dial-in IP SLIP/PPP access? [no]: yes
Configure for Dynamic IP addresses? [yes]: yes
Configure Default IP addresses? [no]: no
Configure for TCP Header Compression? [yes]: yes
Configure for routing updates on async links? [no]: yes
```

Saving the Configuration

At this point, the System Configuration Dialog displays the values you entered, and you are prompted to use the displayed configuration or change the configuration.

Enter **yes** to save the configuration in the configuration database and store it in NVRAM. Enter **no** to begin the configuration again and make the changes you want.

The following configuration command script was created:

```
hostname Router
enable secret 5 $1$7gA0$sLxUbQPZMKXe6oxU.le7M0
enable password rtrl
```

```
line vty 0 4
password vterm1
snmp-server community public
!
appletalk routing
ipx routing
ip routing
!
interface Ethernet0
ip address 131.108.6.67 255.255.0.0
!
interface Serial0
ip address 131.108.97.67 255.0.0.0
!
router igrp 15
network 131.108.0.0
network 131.0.0.0
!
end
```

Use this configuration? [yes/no]: **yes**

####

use the enabled mode 'configure' command to modify this configuration.

You have now completed the initial configuration.

Specifying the Boot Method

You can enter multiple boot commands in the configuration in NVRAM to provide backup methods for loading the Cisco IOS software image onto the router. The router boots using the first boot command that succeeds. If you enter multiple boot commands, the router executes them in the order they are entered. There are two ways to load the Cisco IOS software image—from Flash memory or from a TFTP server on the network:

- Flash memory

Information stored in Flash memory is not vulnerable to network failures that might occur when you load system software from servers.

Specifying the Boot Method

In the following example, replace *filename* with the filename of the Cisco IOS software image:

```
Router> enable
Password: enablepassword
Router# configure terminal
Router (config)# boot system flash filename
Router (config)# Ctrl-Z
Router# copy running-config startup-config
Building configuration ...
[OK]
Router# exit
Router>
```

- TFTP server

If Flash memory is not available, or if Flash memory does not contain a valid Cisco IOS software image, you can specify that system software be loaded from a TFTP server on your Ethernet network as a backup boot method for the router. In the following example, replace *filename* with the filename of the Cisco IOS software image and replace *ipaddress* with the IP address of the TFTP server:

```
Router> enable
Password: enablepassword
Router# configure terminal
Router (config)# boot system tftp filename ipaddress
Router (config)# Ctrl-Z
Router# copy running-config startup-config
Building configuration ...
[OK]
Router# exit
Router>
```

For more information about the **configure terminal** command, refer to the *Router Products Command Summary* publication.

Checking the Configuration Settings

Enter the **show version** command to check the software version (third line from the top in the following display) and configuration register setting (at the end of the following display):

```
Router> show version
Cisco Internetwork Operating System (Cisco IOS [tm]) Software
1000 Software (C1005-H-M), Version 10.3(6) [dcoli 105]
Copyright (c) 1986-1995 by Cisco Systems, Inc.
Compiled Wed 07-Jun-95 13:13 by dcoli
Image text-base: 0x02004000, data-base: 0x0228CA48

ROM: System Bootstrap, Version X.X(17033) [enf 110], SOFTWARE
ROM: 1000 Bootstrap Software (C1000-RBOOT-R), Version 10.3(6) [enf 101]

Router uptime is 12 minutes
System restarted by reload
System image file is "flash:dirt/tftpboot/dcoli/c1005-h5-m.103.Z", booted
via flash
Cisco 1000 (68360) processor (revision 0x00) with 3584K/512K bytes of
memory.
Processor board serial number 01335546
Bridging software.
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
1 Ethernet/IEEE 802.3 interface.
1 Serial network interface.
8K bytes of non-volatile configuration memory.
2048K bytes of processor board PCMCIA flash (Read/Write)

Configuration register is 0x2102

Router>
```

For More Information

For More Information

For more information about router software configuration, refer to Cisco IOS configuration guides and command references.

Cisco documentation and additional literature are available on a CD called Cisco Connection Documentation, Enterprise Series. The CD is updated and shipped monthly, so it might be more current than printed documentation. To order the Cisco Connection Documentation, Enterprise Series CD, contact your local sales representative or call Customer Service. The CD is available both as a single CD and as an annual subscription. You can also access Cisco technical documentation on the World Wide Web URL <http://www.cisco.com>.