

Configure the IPeXchange Gateway Software

This chapter describes how to configure the Cisco Internetwork Operating System (Cisco IOS) software on the IPeXchange internet gateway hardware. This chapter contains the following sections:

- Prepare to Boot the IPeXchange Internet Gateway
- Boot the IPeXchange Gateway
- Configure the Gateway Using the AutoInstall Process
- Configure the Gateway Using ClickStart
- Configure the Gateway Using the System Configuration Dialog
- Specify the Boot Method
- Check the Configuration Settings
- For More Information

Prepare to Boot the IPeXchange Internet Gateway

The IPeXchange internet gateway normally boots the Cisco IOS software from Flash memory. The gateway can also boot the software from a TFTP server on your network.

Prepare to Boot from Flash Memory

The IPeXchange internet gateway normally boots the Cisco IOS software from Flash memory. The Cisco IOS software is already installed on the Flash memory card that is shipped with the gateway. The gateway can boot from the Cisco IOS software on the Flash memory card.

Prepare to Boot the IPeXchange Internet Gateway

Prepare to Boot from a TFTP Server

The IPeXchange internet gateway can also load the Cisco IOS software from a TFTP server if one is present on your local IPX network or on the network at the remote end of the WAN connection.

You can set up a TFTP server using TFTP software (not included) on most operating systems (including DOS, Macintosh, and UNIX). Refer to your TFTP software instructions for more information.

Note An IPeXchange client PC cannot act as a TFTP server because the version of the Cisco IOS software running on the gateway does not support UDP and hence does not support TFTP service.

If a TFTP server is present on your network, install the Cisco IOS software in the appropriate directory (/tftpboot on UNIX systems).

Before loading the Cisco IOS software from a TFTP server, take the following steps to make sure the server is ready:

- Step 1** Make sure that the TFTP software is installed and running on the server.
- Step 2** Make sure that the Cisco IOS software is installed in the appropriate directory on the TFTP server.
- Step 3** Make sure that a console terminal or PC running terminal emulation software is connected to the gateway.

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 gateway will significantly reduce the time and effort required to begin using your IPeXchange gateway.

Boot the IPeXchange Gateway

Each time you power on the IPeXchange gateway hardware by plugging in the power cord, the gateway executes the following boot sequence in an attempt to start the Cisco IOS software and execute the commands in a configuration file in order to configure the gateway:

- 1 If a configuration file is present in nonvolatile RAM (NVRAM) in the gateway, the gateway loads the file.
- 2 If a configuration file is not present in NVRAM, the gateway checks whether a Flash memory card is installed in the PC Bus (PCMCIA) slot. If a Flash memory card is present and contains a configuration file, the gateway loads the configuration file from the Flash memory card.
- 3 If a configuration file is not present in Flash memory, the gateway searches for a TFTP server. If it finds a server with an applicable a configuration file, the gateway loads it from that server provided the following conditions are met:
 - The configuration file is named router-config (for UNIX or Macintosh systems) or ciscotr.cfg (for DOS systems). To check the configuration filename, use the **show flash** command.

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

- The configuration register is set so that the last number is 2. The factory default configuration register value is 0x2102. To check the value in the configuration register, use the **show version** command. (For more information, refer to the discussion of the **config-register** command in the Cisco IOS command reference.)
- 4 If a configuration file is not present on a TFTP server, and if the synchronous serial cable is connected to the gateway and a WAN interface, the gateway attempts to use the AutoInstall process to download a configuration file from the remote end of the WAN.

Configure the Gateway Using ClickStart

The configuration file must be named `network-config` (for UNIX or Macintosh systems) or `cisconet.cfg` (for DOS systems). For more information about the AutoInstall process, see the section “Configure the Gateway Using the AutoInstall Process” in this chapter.

- 5 If the gateway has not yet found a configuration file, it displays the following message, followed by the first few lines of the **setup** command facility:

```
Cisco IPeXchange autoconfiguration will begin in 90 seconds.  
Press any key to abort.
```

To configure the gateway from a web browser using ClickStart, wait for approximately 2 to 5 minutes and continue with the procedure described in the section “Configure the Gateway Using ClickStart.” During this time, we recommend that you power up and install the IPeXchange client software, as described in the chapter “Configure the IPeXchange Client Software.”

To configure the gateway using the **setup** command facility, answer **yes** to the **setup** prompt and continue with the procedure described in the section “Configure the Gateway Using the System Configuration Dialog.”

- 6 If no configuration file is found at any of these sources, you must manually configure the gateway using ClickStart or the **setup** command facility, which is an interactive system configuration program. For information about using the **setup** command facility, see the section “Configure the Gateway Using the System Configuration Dialog” in this chapter.

Configure the Gateway Using ClickStart

ClickStart is a Cisco IOS software feature that allows you to configure the IPeXchange internet gateway software using a web browser, such as Netscape.

To use ClickStart to configure the gateway software, follow these steps:

- Step 1** Start Netscape or another web browser on one of the PCs on the IPX network.
- Step 2** In the browser’s location field, enter the following URL to get to the router home page:

```
http://new-router.cisco.com
```

The router home page is located on the IPeXchange internet gateway.

Step 3 Select EZ Setup.

This link displays the EZ Setup form, which you use to configure the IPeXchange internet gateway software.

Step 4 Complete the section on the EZ Setup form that configure the router name and password.

Step 5 Complete the section on the EZ Setup form that configures the WAN interface in the router.

If your router has an ISDN interface, use the remote router name, remote phone number, remote CHAP password, ISDN switch type, ISDN interface speed, and SPIDs given to you by your service provider or network administrator.

If your router has a Frame Relay interface, use the IP address, netmask, and DLCI given to you by your service provider or network administrator.

Step 6 Complete the section of the EZ Setup form that configures IPX on the router.

The router learned your IPX network number, IPX internal network number, and frame type. These values are entered on the EZ Setup form. If the values on the EZ Setup form are not the ones you want to use, change them.

Step 7 Complete the section of the EZ Setup form that configures the IP address of the default router. The default router is a router that can direct packets to their destination. You commonly enter the IP address of a router located at the remote end of the WAN connection. If there is a router on your local network on which IP routing is enabled, you can enter the IP address of that router.

Step 8 Complete the section of the EZ Setup form that configures IP addresses.

Enter the IP address and netmask of the Ethernet interface on the router. Use the IP address and netmask given to you by your service provider or network administrator. If your router has a Frame Relay interface, note that the IP address and netmask you enter in this step are different from those you entered in Step 6.

Enter the IP address of a DNS server.

Step 9 Click the **Submit** button to configure the IPeXchange internet gateway.

Configure the Gateway Using the AutoInstall Process

Note After you click **Submit**, you must quit from Netscape and restart it in order to continue using the router home page.

Configure the Gateway Using the AutoInstall Process

The AutoInstall process configures the IPeXchange gateway router automatically if it is not already configured and if the router is connected to a WAN on which there is an existing preconfigured router. When you power on the IPeXchange gateway router, it downloads a configuration file from a TFTP server that is also connected to the WAN.

Note This section contains general guidelines and instructions about using the AutoInstall process. For more information, refer to the Cisco IOS configuration guides.

AutoInstall Requirements

For the AutoInstall procedure to work, your system must meet the following requirements:

- Routers must be physically attached to the network using one or more of the following interface types: Ethernet, Token Ring, Fiber Distributed Data Interface (FDDI), serial with High-Level Data Link Control (HDLC) encapsulation, or serial with Frame Relay encapsulation. HDLC is the default serial encapsulation. If the AutoInstall process fails over HDLC, the Cisco IOS software automatically configures Frame Relay encapsulation.
- The existing preconfigured router must be running Software Release 9.1 or later. For AutoInstall over Frame Relay, the routers on both sides must be running Cisco Internetwork Operating System (Cisco IOS) Release 10.3 or later.
- The new router must be running Software Release 9.1 or later. For AutoInstall over Frame Relay, the new router must be running Cisco IOS Release 10.3 or later.

Configure the Gateway Using the AutoInstall Process

Note Only Token Ring interfaces that set ring speed with physical jumpers will support AutoInstall. AutoInstall does not work with Token Ring interfaces for which the ring speed must be set using software configuration commands. If the ring speed is not set, the interface is set to shutdown mode.

- You must complete procedures 1 and either 2 or 3:
 - Procedure 1: A configuration file for the new router must reside on a TFTP server. This file can contain the full configuration or the minimum needed for the administrator to Telnet into the new router for configuration.
 - Procedure 2: A file named *network-config* also must reside on the server. The file must have an Internet Protocol (IP) host name entry for the new router. The server must be reachable from the existing router.
 - Procedure 3: An IP address-to-host name mapping for the new router must be added to a Domain Name System (DNS) database file.
- If the existing router is to help automatically install the new router via an HDLC-encapsulated serial interface using Serial Line Address Resolution Protocol (SLARP), that interface must be configured with an IP address whose host portion has the value 1 or 2. (AutoInstall over Frame Relay does not have this address constraint.) Subnet masks of any size are supported.
- If the existing router is to help automatically install the new router using a Frame Relay-encapsulated serial interface, that interface must be configured with the following:
 - An IP helper address pointing to the TFTP server. In the following example, 171.69.2.75 is the address of the TFTP server:

```
ip helper 171.69.2.75
```
 - A Frame Relay map pointing back to the new router. In the following example, 172.21.177.100 is the IP address of *newrouter*'s serial interface, and 100 is the PVC identifier:

```
frame-relay map ip 172.21.177.100 100 dlci
```

Configure the Gateway Using the AutoInstall Process

- If the existing router is to help automatically install the new router via an Ethernet, Token Ring, or FDDI interface using BOOTP or Reverse Address Resolution Protocol (RARP), a BOOTP or RARP server also must be set up to map the new router's Media Access Control (MAC) address to its IP address.
- IP helper addresses might need to be configured to forward the TFTP and DNS broadcast requests from the new router to the host that is providing those services.

Using a DOS-Based TFTP Server

AutoInstall over Frame Relay and over other WAN encapsulations can download configuration files from UNIX-based and DOS-based TFTP servers. Other booting mechanisms such as RARP and SLARP also support UNIX-based and DOS-based TFTP servers.

The DOS name of the UNIX network-config file on the server must be eight characters or less, with a three-letter extension. Therefore, when an attempt to load network-config fails, AutoInstall automatically attempts to download cisco.net.cfg from the TFTP server.

If cisco.net.cfg exists and downloading succeeds, the server is assumed to be a DOS system. The AutoInstall program then attempts to resolve the host name for the router through host commands in cisco.net.cfg.

If cisco.net.cfg does not exist or cannot be downloaded, or AutoInstall cannot to resolve a host name, DNS attempts to resolve the host name. If DNS cannot resolve the host name, the router attempts to download cisco.rtr.cfg. If the host name is longer than eight characters, it is truncated to eight characters. For example, a router with a host name "australia" will be treated as "australi" and an attempt will be made to download australi.cfg.

The format of cisco.net.cfg and cisco.rtr.cfg are to be the same as those described for network-config and hostname-config.

If neither network-config nor cisco.net.cfg exists and DNS is unable to resolve the host name, the program will attempt to load router-config, and then cisco.rtr.cfg if router-config does not exist or cannot be downloaded. The cycle is repeated three times.

Perform the AutoInstall Process

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. For complete details about performing the AutoInstall process, see the Cisco IOS router products configuration guide.

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 new-router-name new-router-address
```

The following is a sample entry:

```
ip host router1 60.0.0.2
```

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 host name is not.

Step 4 In the new file you created in Step 3, 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

Configure the Gateway Using the AutoInstall Process

BOOTP or RARP. The following is a sample minimal configuration file. This file contains just enough configuration information to allow the system administrator to Telnet into the new router to configure it.

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

Step 5 Telnet into the existing router on the network.

Step 6 Configure the serial interface on the existing gateway 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: enable-password
Router# configure terminal
Router (config)# interface serial interface#
Router (config)# ip address existing-router-address
Router (config)# ip helperaddress server-address
Router (config)# Ctrl-Z
Router# exit
Router>
```

Step 7 Connect the synchronous serial DTE cable to the new router if you have not already done so.

Step 8 Power on 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: enable-password
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.

Configure the Gateway Using the System Configuration Dialog

If your IPeXchange gateway cannot locate a configuration file as described in the section “Boot the IPeXchange Gateway” and you have not configured the gateway from a web browser using the Cisco IOS ClickStart feature, the gateway starts the **setup** command facility automatically. The **setup** command starts an interactive dialog on the console screen called the system configuration dialog. The dialog prompts you for the information necessary to configure the IPeXchange internet gateway.

This section gives a sample configuration using the system configuration dialog. When you are configuring your gateway, you should respond as appropriate for your network.

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.

At any time during the system configuration dialog, you can request help by typing 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 synchronous serial ports from your system administrator. For more information about IP addresses and subnets, refer to the Cisco IOS configuration guides.

To configure the IPeXchange gateway using the system configuration dialog, follow these steps:

Step 1 Connect a console terminal to the console connector on the rear panel of your IPeXchange gateway. This turns on power to the gateway.

Note The default parameters for the console port are 9600 baud, 8 data bits, no parity, and 2 stop bits.

|||||

```
program load complete, entry point: 0x2004000, size: 0x29466c
```

Configure the Gateway Using the System Configuration Dialog

```
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.
Cisco IPeXchange autoconfiguration will begin in 90 seconds.
Press any key to abort.
```

--- System Configuration Dialog ---

At any point you may enter a question mark '?' for help.
Use ctrl-c to abort configuration dialog at any prompt.
Default settings are in square brackets '['].

Continue with 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

Configure Global Parameters

The system configuration dialog then prompts you to configure the global parameters for the IPeXchange gateway:

Step 5 Enter a name for the IPeXchange gateway:

Configuring global parameters:

Enter host name [Router]: **IPeX-gateway**

Configure the Gateway Using the System Configuration Dialog

Step 6 Enter privileged-level passwords for the IPeXchange gateway. 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 you enter the same password for both, the gateway will accept them, but you will receive a warning message indicating that you should enter different passwords.

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

```
Enter enable secret: mygate
```

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

```
Enter enable password: boojum
```

```
Enter virtual terminal password: snark
```

Step 7 IP is enabled by default on the IPeXchange gateway. Enable IPX.

```
Configure SNMP Network Management? [yes]: no
```

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

Step 8 If you have an ISDN IPeXchange gateway, enter the ISDN BRI switch type:

```
Enter ISDN BRI Switch Type [none]: basic-NI1
```

The ISDN switch type appropriate for your router depends on the ISDN provider's equipment. Table 2-1 lists the ISDN switch types.

Table 2-1 ISDN Switch Types

ISDN Switch Type	Description
none	Switch type not defined
Australia	
basic-ts013	Australian TS013 switches

Configure the Gateway Using the System Configuration Dialog

ISDN Switch Type	Description
Europe	
basic-1tr6	German 1TR6 ISDN switches
basic-nwnet3	Norway NET3 ISDN switches (phase 1)
basic-net3	NET3 ISDN switches (UK and others)
vn2	French VN2 ISDN switches
vn3	French VN3 ISDN switches
Japan	
ntt	Japanese NTT ISDN switches
North America	
basic-5ess	AT&T basic rate switches
basic-dms100	NT DMS-100 basic rate switches
basic-ni1	National ISDN-1 switches
New Zealand	
basic-nznet3	New Zealand NET3 switches

Configure the Ethernet Interface

The system configuration dialog then prompts you to configure the Ethernet interface in the IPeXchange gateway:

Step 9 To start the configuration of the Ethernet interface, press **Return** or enter **yes** at the prompt:

```
Configuring interface parameters:
```

```
Configuring interface Ethernet0:
```

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

Step 10 Configure IP and IPX on the Ethernet interface:

```
Configure IP on this interface? [yes]: yes
```

```
IP address for this interface [172.16.72.2]: 172.16.72.2
```

```
Number of bits in subnet field [8]: 8
```

```
Class B network is 172.16.0.0, 8 subnet bits; mask is /24
```

Configure the Gateway Using the System Configuration Dialog

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

Configure the Serial Interface

If your IPeXchange gateway has a serial interface, the system configuration dialog then prompts you to configure it:

Step 11 To start the configuration of the serial interface, press **Return** or enter **yes** at the prompt:

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

Step 12 Configure only IP on the serial interface:

```
Configure IP on this interface? [yes]: yes
IP address for this interface [172.16.72.2]: 172.16.72.2
Number of bits in subnet field [8]: 8
Class B network is 172.16.0.0, 8 subnet bits; mask is /24
```

Configure the BRI Interface

If your IPeXchange gateway has an ISDN BRI interface, the system configuration dialog then prompts you to configure it:

Step 13 To start the configuration of the serial interface, press **Return** or enter **yes** at the prompt:

```
Configuring interface BRI0:
Is this interface in use? [yes]: yes
Configure IP on this interface? [yes]: yes
IP address for this interface [172.16.72.2]: 172.16.72.2
Number of bits in subnet field [8]: 8
Class B network is 172.16.0.0, 8 subnet bits; mask is /24
```

Save the Configuration

When you have completed the configuration, 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 IPeX-gateway
enable secret 5 $1$7gA0$sLxUbQPZMKXe6oxU.le7M0
enable password boojum
line vty 0 4
password snark
snmp-server community public
!
ipx routing
ip routing
!
interface Ethernet0
ip address 172.16.20.11 255.255.255.0
!
!
interface Serial0
ip address 131.108.97.67 255.0.0.0
!
end
```

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

####

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

You have now completed the initial configuration.

Configure Novell IPX

After you have completed the initial IPeXchange gateway software configuration, configure the Ethernet port on the gateway for IPX:

Step 1 Enter enabled mode.

```
router> enable
password: enable-password
```

Configure Novell IPX

- Step 2** Start the configure terminal program. Then enter the host name and password the router will use for CHAP caller identification.

```
router# configure terminal  
router (config)# username target-router password abc
```

Note The username and password must match the username and password already set on the IPeXchange gateway. The username and password are case sensitive, so make sure you use the correct case.

- Step 3** Define an IPX internal network number:

```
router# ipx internal-network number
```

If your IPX network does not already have an internal network number, it is common to use the lower 4 bytes of the gateway's MAC address. You can find this address on the printed label attached to the outside of the gateway's shipping container.

- Step 4** Activate the IP-IPX gateway function on the IPeXchange gateway:

```
router# ipx ip-gateway interface
```

interface is the interface name and number of the interface on the gateway that is connected to the Internet or other TCP/IP-based network.

- Step 5** Configure the IPeXchange gateway so that it knows about the gateway service only:

```
router (config)# access-list 1001 deny ffffffff  
router (config)# interface ethernet 0  
router (config-if)# ipx input-sap-filter 1001
```

- Step 6** Optionally, you can add new TCP or UDP services to the services file on the IPeXchange gateway:

```
router (config-if)# ip services [tcp | udp] service-name port-number
```

The services file is similar to the */etc/services* file commonly found on a UNIX workstation. This file defines the TCP or UDP services that the IPeXchange gateway provides and the port on which that service is provided. This file is required so that the IPeXchange gateway can respond to requests for services from clients on the TCP/IP network to which the gateway is connected. The services file on the IPeXchange gateway contains default mappings of well-known services to their port numbers.

Configure ISDN

After you have completed the initial IPeXchange gateway software configuration on a Model 1003 or Model 1004, configure the BRI port for ISDN. This section explains typical ISDN configurations for a single B channel or two B channels. In the examples that follow, the BRI port is configured for IP routing, Challenge Handshake Authentication Protocol (CHAP), and point-to-point protocol (PPP) encapsulation.

Configure the router for a basic ISDN PPP connection on a single B channel or two B channels by following the steps below, substituting the correct addresses and host names in the appropriate locations:

Step 1 Enter enabled mode.

```
router> enable  
password: enable-password
```

Step 2 Start the configure terminal program. Then enter the host name and password the router will use for CHAP caller identification.

```
router# configure terminal  
router (config)# username target-router password abc
```

Note The username and password must match the username and password already set on the IPeXchange gateway to which the ISDN connection will be made. The username and password are case sensitive, so make sure you use the correct case.

Step 3 Enter the ISDN switch type using the **isdn switch-type** command.

Configure ISDN

```
router (config)# isdn switch-type switch-type
```

Refer to the section “Configure the Gateway Using the System Configuration Dialog” earlier in this publication for a complete list of ISDN switch types.

- Step 4** Enter the BRI interface, encapsulation method (PPP), target router’s host name and IP address, ISDN number to dial, and the dialer group.

```
router (config)# interface bri 0
router (config-if)# encapsulation ppp
router (config-if)# ppp authentication chap
router (config-if)# dialer map ip target-router-ip-address name target-router phone-number
router (config-if)# dialer-group group-number
```

Note Do not use periods or hyphens when entering dialing numbers.

- Step 5** Some ISDN switch types such as Basic NI1, or DMS-100 switch service, require you to configure a Service Profile Identifier (SPID). Enter the SPID information as follows, substituting the appropriate entries for your installation:

```
router (config-if)# isdn spid1 spid_no phone-number
router (config-if)# isdn spid2 spid_no phone-number
```

- Step 6** To set up a second B channel for bandwidth-on-demand, set the ISDN load threshold using the **load-threshold** command. The load threshold determines the percentage of network loading at which the second ISDN B channel is triggered. The value ranges from 1 to 255 (100 percent).

```
router (config-if)# dialer load-threshold 128
```

In this example, a value of 128 has been chosen. This means that when the first B channel reaches 50 percent of its bandwidth capacity (128 equals 50 percent of 255), the second B channel will be activated to assist with the bandwidth load.

- Step 7** To configure the ISDN line to come up whenever IP packets are to be sent, enter the **access-list** command.

```
router (config-if)# access-list access-list-number permit ip source-router-ip-network
source-router-subnet-mask target-router-ip-network target-router-subnet-mask
```

```
router (config)# dialer-list group-number list access-list-number
```

- Step 8** Configure a static route to allow connectivity to the target router's local network. Enter the network number of the target router's local IP network, subnet mask, and IP address of the target router's BRI port.

```
router (config)# ip route target-router-ip-network subnet-mask  
target-BRI-port-ip-address
```

- Step 9** Enter the **exit** command to exit configuration mode.

- Step 10** Enter the **copy running-config startup-config** command to save the configuration to NVRAM.

Specify 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 IPeXchange gateway. The gateway boots using the first boot command that succeeds. If you enter multiple boot commands, the gateway 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. In the following example, replace *filename* with the filename of the Cisco IOS software image:

```
Router> enable  
Password: enable-password  
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

Check the Configuration Settings

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 the IPX network. 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: enable-password
Router# configure terminal
Router (config)# boot system tftp filename ip-address
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 Cisco IOS command references.

Check the Configuration Settings

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), enter the **show version** command:

```
Router> show version
Cisco Internetwork Operating System (Cisco IOS [tm]) Software
1000 Software (C1005-H-M), Version 11.0(6) [dcoli 105]
Copyright (c) 1986-1996 by Cisco Systems, Inc.
Compiled Wed 07-Jun-96 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
```

To display the contents of the currently running configuration file, use the **show running-config** command. To display the contents of the configuration file currently stored in NVRAM, use the **show startup-config** command. Both commands should display output similar to this for an IPeXchange internet gateway Model 1003 or Model 1004:

```
version 11.0  
no service pad  
service udp-small-servers  
service tcp-small-servers  
!  
hostname ipex-isdn-2  
!  
enable password ijuser1  
!  
username iprouter password 7 095E5B1918  
username rupa password 7 06141A314D  
ipx routing 0000.0c32.c6ec  
ipx internal-network C32C6EC  
isdn switch-type basic-5ess  
!  
interface Ethernet0  
 ip address 171.69.236.45 255.255.255.224  
 ipx input-sap-filter 1001  
 ipx network AB45EC20  
!  
interface BRI0  
 ip unnumbered Ethernet0  
 encapsulation ppp  
 isdn spid1 0192228300  
 dialer idle-timeout 600  
 dialer map ip 171.69.236.24 name iprouter broadcast 14089222830  
 dialer hold-queue 10  
 dialer-group 1  
 ppp authentication chap  
!
```

Check the Status of the IPeXchange Gateway

```
ip host ipex-isdn-2 171.69.236.45
ip host ijs11 171.69.236.16
ip domain-name cisco.com
ip name-server 171.69.2.132
ip name-server 198.92.30.32
ip route 0.0.0.0 0.0.0.0 171.69.236.33
ip route 171.69.0.0 255.255.0.0 171.69.236.33
ip route 171.69.236.0 255.255.255.0 171.69.236.24
ip route 171.69.236.24 255.255.255.255 BRI0
access-list 1001 permit FFFFFFFF 840
access-list 1001 deny 0
!
dialer-list 1 protocol ip permit
!
line con 0
line vty 0 4
  password no
  login local
!
end
```

Note The IPX input SAP filter defined by the **access-list 1001 deny ffffffff** command and applied with the **ipx input-sap-filter 1001** command configures the IPeXchange gateway so that it knows only about gateway services and hence is a dedicated gateway. When you configure the IPeXchange gateway, you must define such an access list.

Check the Status of the IPeXchange Gateway

To check the status of the IPeXchange gateway, use the following command:

show ipx ip-gateway status

To display the entries in the services files, which defines the mapping between services and their port numbers, use the following command:

show ip services

For More Information

For more information about IPeXchange gateway software configuration, refer to the following publications:

- *Internetworking Technology Overview*
- Cisco IOS configuration guides
- Cisco IOS command references
- *Router Products Getting Started Guide*
- *Configuration Builder Getting Started Guide*
- *CiscoWorks for Windows Getting Started Guide*
- *Troubleshooting Internetworking Systems* (as needed)

These publications are available on the Cisco Connection CD, Cisco's online library of product information. To order the Cisco Connection CD or paper documentation, refer to *Ordering Cisco Documentation*, which is included in the warranty pack that accompanied your IPeXchange gateway.

For More Information
