CISCO SYSTEMS

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Release Notes for Cisco IOS 11.1(5)—Cisco CPA2500 Series Routers

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These release notes identify the Cisco Internetwork Operating System (Cisco IOS) Release 11.1 feature sets for Cisco CPA2500 series routers. Product numbers supported are as follows:

- CPASW25-A-11.1= (IP Feature Pack for CPA2500)

- CPASW25-B-11.1= (IP/IPX/AppleTalk Feature Pack for CPA2500)

- CPASW25-E-11.1= (IP/IPX/AppleTalk RAS Feature Pack for CPA2500)

- CPASW25-DS-11.1= (IP/IPX IBM Feature Pack for CPA2500)

- CPASW25-F-11.1= (Desktop Feature Pack for CPA2500)

- CPASW25-G-11.1= (Enterprise Feature Pack for CPA2500)

These release notes include tables that identify feature packs and tables that show the specific features comprising available feature sets for each supported CiscoPro router. These release notes also help you navigate the electronic documentation directly to the Cisco IOS Release 11.1 documentation for CiscoPro products. The CiscoPro Software Installer, delivered on the same CD-ROM as the Cisco IOS feature sets, is designed to work from a PC running Microsoft Windows 95. These release notes also describe how to install the router software feature sets using a PC running Microsoft Windows 3.1.

Note Before running the CiscoPro Software Installer, read the section "Installation Tips," page 5.

Note If you are installing feature sets on a Cisco CPA2500 router with no Ethernet interface (that is, Token Ring only), be sure to use the "CiscoPro Software Installer Version 3.0" diskette that shipped with your router. Use this diskette before you use the feature pack CD containing the feature sets.

Introduction

These release notes contain the following sections:

- CiscoPro Feature Pack Descriptions, page 2

- Memory Requirements and Recommendations, page 3

- Installation Tips, page 5

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Note A feature pack can contain multiple feature sets, and each feature set contains many features.

CiscoPro Feature Pack Descriptions

This section describes the CiscoPro feature packs, listing the software feature sets comprising each set. You can use this information to identify your feature pack set in conjunction with the corresponding information provided in the tables in the section "Installation Tips," page 5. Tables in that section identify which features that are supported for a feature set on a specific platform.

Software Feature Packs

Table 1 identifies each feature pack as specified on the label of the CD containing the router software. It also lists the feature sets comprising the feature pack, giving the DOS and UNIX filenames of the images. The table provides a brief description of each feature set and the router platform on which the feature set runs.

Table 1   CiscoPro Feature Pack Feature Set Image Filenames

Feature Sets Included	DOS Filename	UNIX Filename	Description
CPA2500 IP Feature Pack Release 11.1 (model number CPASW25-A-11.1=)			
IP	PY11150N	cpa25-y-l.111-5	IP feature set for CPA2500 series routers
IP (ISP)	PL11150N	cpa25-p-l.111-5	IP Internet Service Provider feature set for CPA2500 series routers
CPA2500 IP/IPX/AppleTalk Feature Pack Release 11.1 (model number CPASW25-B-11.1=)			
IP/IPX	PN11150N	cpa25-in-l.111-5	IP/IPX feature set for CPA2500 series
Optimized IP/IPX/AT	Pl11150N	cpa25-g-l.111-5	Optimized IP/IPX/AppleTalk for CPA2500 series routers
CPA2500 IP/IPX/AppleTalk Remote Access Server Release 11.1 (model number CPASW25-E-11.1=)			
RAS	PR11150N	cpa25-c2-l.111-5	Remote Access Server feature set for CPA2509 CPA2511, CPA2520, and CPA2522 routers without ISDN
Optimized IP/IPX/ AT + RAS	PQ11150N	cpa25-c-l-111-5	Optimized IP/IPX/AppleTalk and Remote Access Server for CPA2509 and CPA2511 routers without ISDN
Optimized IP/IPX/AT + RAS + ISDN	PG11150N	cpa25-cg-l.111-5	Optimized IP/IPX/AppleTalk and Remote Access Server for CPA2520 and CPA2522 routers
CPA2500 IP/IPX IBM Feature Pack Release 11.1 (model number CPASW25-DS-11.1=)			
IP/IPX IBM	80111101	cpa25-inr-l.111-6	IP/IPX IBM feature set for CPA2500 series routers[1]
CPA2500 Desktop Feature Pack Release 11.1 (model number CPASW25-F-11.1)			
Desktop	PD11150N	cpa25-d-l.111-5	Desktop feature set for CPA2500 series routers
CPA2500 Enterprise Feature Pack Release 11.1 (model number CPASW25-G-11.1=)			
Enterprise	PJ11150N	cpa25-j-l.111-5	Enterprise feature set for CPA2500 series routers

1. For routers with no Ethernet interfaces, these images must be loaded using the "CiscoPro Software Installer Version 3.0" diskette that shipped with your router.

Memory Requirements and Recommendations

This section includes two tables: Table 2 identifies the memory required to run each feature set; Table 3 describes the memory delivered by default and the available memory upgrades.

You can use Table 2 to identify the memory required for your configuration based on the image you run. You can then check this against Table 3 to determine how much memory is available on the router as the factory default and the upgrades that you can obtain to satisfy your requirements.

Table 2   Cisco CPA2500 Feature Set Memory Requirements

Feature Set	Description	Flash Memory Requirements	DRAM Memory Requirements
CPA2500 IP Feature Pack Release 11.1			
IP	IP feature set for CPA2500 series routers	4 MB (default)	4 MB (default)
IP + ISP	IP and Internet Service Provider feature set for CPA2500 series routers	4 MB (default)	8 MB upgrade
CPA2500 IP/IPX/AppleTalk Feature Pack Release 11.1			
IP/IPX	IP/IPX feature set for CPA2500 series	8 MB upgrade	4 MB (default)
Optimized IP/IPX/AT	Optimized IP/IPX/AppleTalk for CPA2500 series routers	4 MB (default)	4 MB (default)
CPA2500 IP/IPX/AppleTalk Remote Access Server Release 11.1			
RAS	Remote Access Server (RAS) feature set for CPA2509, and CPA2511 routers	4 MB (default)	4 MB (default)
Optimized IP/IPX/ AT + RAS	Optimized IP/IPX/AppleTalk and Remote Access Server for CPA2509 and CPA2511 routers	4 MB (default)	4 MB (default)
IP/IPX/AT + RAS + ISDN	Optimized IP/IPX/AppleTalk and Remote Access Server for CPA2520 and CPA2522 routers	8-MB upgrade	4 MB (default)
CPA2500 IP/IPX IBM Feature Pack Release 11.1			
IP/IPX IBM	Optimized IP/IPX IBM Feature Pack Release 11.1	8-MB	4MB (default)
CPA2500 Desktop Feature Pack Release 11.1			
Desktop	Desktop feature set for CPA2500 series routers	8-MB upgrade	4 MB (default)
CPA2500 Enterprise Feature Pack Release 11.1			
Enterprise	Enterprise feature set for CPA2500 series routers	8-MB upgrade	8-MB upgrade

Table 3 shows the amount of both Flash and main memory delivered by default on a CiscoPro CPA2500 series router. It also lists the available memory upgrades.

Table 3   CiscoPro Access Default and Memory Upgrade Options

Memory Type	Default	Upgrade Options
Flash	4 MB	8-MB upgrade: CPA025-MEM8F=
Main	4 MB	8-MB upgrade: CPA025-MEM8D=, 16-MB upgrade: CPA025-MEM16D=

Installation Tips

This section describes several solutions to problems you might encounter when using the CiscoPro Software Installer. These solutions are additions to the installer's online help.

- The CiscoPro Software Installer cannot communicate with a router that is operating in ROMMON (ROM Monitor) mode. To determine whether a router is operating in ROMMON mode, it is necessary to log in to the router via the console port by either telnet or terminal emulation software. (Configure the software settings to 9600 baud, no parity, 8 data bits, and 1 stop bit.)

  After you log in, observe the user prompt displayed by the router. If the prompt appears as "rommon 1>" or ">," the router is operating in ROMMON mode. If the prompt is "[router_name](boot)>" or "[router_name]>," the unit is not operating in ROMMON mode.

  To exit ROMMON mode and boot to a system image, enter the **b flash** command at the router prompt.

  Next, check the Configuration Register value to confirm that ROMMON mode is no longer the default boot setting by entering the **show version** command. The last line of the output shows the Configuration Register value. Examine the last digit of the value, which represents the boot field. A value of 0 indicates that the router will reload to ROMMON on reboot.

  However, the last digit should be greater than 0 for the CiscoPro Software Installer to communicate with the router. If you need to make this value greater than zero, enter the following commands while in enable (#) mode to change the value of the register to 0x2.

  ```
  router#config t
  router(config)#config 0x2
  router(config)#exit
  router#reload
  ```

  The router should now reload to the system image.

- If you encounter a message stating "The router is unreachable," you should check your network/communications connections, or the network/communications information you entered while running the CiscoPro Software Installer. The router might be operating in ROMMON mode. Refer to the previous bulleted item for instructions on how to identify whether the router is in ROMMON mode and how to exit ROMMON mode. Note that this message may indicate other types of problems as detailed in the online documentation.

- If you are installing feature sets on a Cisco CPA2500 router with no Ethernet interface, use the "CiscoPro Software Installer Version 3.0" diskette that shipped with your router before you load software from the feature pack CD.

  If the diskette is not available, you can use a TPTP server as described in the section, "Installing the Router Software Using Microsoft Windows 3.1," page 10.

Cisco IOS Release 11.1 Feature Sets for Cisco CPA2500 Series Routers

This section identifies specific features supported on Cisco CPA2500 routers. Table 4 lists feature sets that are identical to their Enterprise counterparts. Table 5 lists feature sets that have been optimized to operate in the router's default memory configuration. In Features marked with "Yes" are supported; features marked with "–" are not supported. You can use the information given in the tables provided in this section in conjunction with the information provided in the section "CiscoPro Feature Pack Descriptions," page 2, to determine which features a particular feature set supports.

Table 4   Cisco IOS Release 11.1 Feature Sets for Cisco CPA2500 Routers–Standard Images

Features	IP	IP/IPX	IP/IPX/ IBM Base	Desktop	Enterprise	Remote Access Server
SNMP	Yes	Yes	Yes	Yes	Yes	Yes
RMON[1]	—	—	—	—	—	—
Asynchronous support (SLIP)	Yes	Yes	Yes	Yes	Yes	Yes
CSLIP	Yes	Yes	Yes	Yes	Yes	Yes
ARAP	—	—	—	Yes	Yes	Yes
Frame Relay	Yes	Yes	Yes	Yes	Yes	Yes
SMDS	Yes	Yes	Yes	Yes	Yes	—
X.25	Yes	Yes	Yes	Yes	Yes	Yes
ISDN	Yes	Yes	Yes	Yes	Yes	—
PPP	Yes	Yes	Yes	Yes	Yes	Yes
CPPP	Yes	Yes	Yes	Yes	Yes	Yes
HDLC	Yes	Yes	Yes	Yes	Yes	Yes
IP	Yes	Yes	Yes	Yes	Yes	Yes
RIP	Yes	Yes	Yes	Yes	Yes	Yes
RIPv2	Yes	Yes	Yes	Yes	Yes	Yes
IGRP	Yes	Yes	Yes	Yes	Yes	Yes
Enhanced IGRP	Yes	Yes	Yes	Yes	Yes	Yes
OSPF	Yes	Yes	Yes	Yes	Yes	—
BGP	Yes	Yes	Yes	Yes	Yes	Yes
EGP	Yes	Yes	Yes	Yes	Yes	—
PIM	Yes	Yes	Yes	Yes	Yes	Yes
NHRP	Yes	Yes	Yes	Yes	Yes	—
ES-IS	—	—	—	—	Yes	—
IS-IS	—	—	—	—	Yes	—
Snapshot routing	Yes	Yes	Yes	Yes	Yes	Yes
NTP	Yes	Yes	Yes	Yes	Yes	Yes
Bridging (transparent and translational)	Yes	Yes	Yes	Yes	Yes	—
Multiring	Yes	Yes	Yes	Yes	Yes	Yes
LAN extension host	Yes	Yes	Yes	Yes	Yes	—
IPX	—	Yes	Yes	Yes	Yes	Yes
NLSP	—	Yes	Yes	Yes	Yes	—
IPXWAN 2.0	—	Yes	Yes	Yes	Yes	Yes
RTMP	—	—	—	Yes	Yes	Yes
SMRP	—	—	—	Yes	Yes	Yes
SRTP	—	—	—	—	Yes	Yes
AppleTalk Versions 1 and 2	—	—	—	Yes	Yes	Yes
AURP	—	—	—	Yes	Yes	Yes

Features	IP	IP/IPX	IP/IPX/ IBM Base	Desktop	Enterprise	Remote Access Server
DECnet IV	—	—	—	Yes	Yes	—
DECnet V	—	—	—	—	Yes	—
Apollo Domain	—	—	—	—	Yes	—
Banyan VINES	—	—	—	—	Yes	—
ISO CLNS	—	—	—	—	Yes	—
XNS	—	—	—	—	Yes	—
Lock-and-Key	Yes	Yes	Yes	Yes	Yes	Yes
MD5 routing authentication	Yes	Yes	Yes	Yes	Yes	Yes
Kerberized login	—	—	—	—	Yes	—
V.120	—	—	—	—	Yes	—
SRB	—	—	Yes	—	Yes	—
RSRB	—	—	Yes	—	Yes	—
APPN	—	—	—	—	—	—
FRAS BAN	—	—	Yes	—	Yes	—
DLSw (RFC 1795)	—	—	Yes	—	Yes	—
DLSw+	—	—	Yes	—	Yes	—
SDLC	—	—	Yes	—	Yes	—
SDLLC	—	—	Yes	—	Yes	—
STUN	—	—	Yes	—	Yes	—
TG/COS	—	—	—	—	Yes	—
QLLC	—	—	Yes	—	Yes	—
Bisync	—	—	Yes	—	Yes	—
DSPU	—	—	—	—	Yes	—
NetView Native Service Point	—	—	—	—	Yes	—
Protocol translation	—	—	—	—	Yes	Yes
TN3270	—	—	—	—	Yes	Yes
LAT	—	—	—	—	Yes	Yes
SRT Bridging	—	—	Yes	—	Yes	—
XRemote	—	—	—	—	Yes	Yes
Telnet	Yes	Yes	Yes	Yes	Yes	Yes
PAD	Yes	Yes		Yes	Yes	Yes
AutoInstall	Yes	Yes	Yes	Yes	Yes	Yes
Modem auto- configuring	—	—	—	—	Yes	Yes
Router monitoring	Yes	Yes	Yes	Yes	Yes	Yes
DHCP	Yes	Yes	Yes	Yes	Yes	Yes
NASI	—	—	—	—	—	Yes
NetBEUI over PPP	—	—	—	—	—	Yes

1. All feature sets include RMON alarm and events groups. Full, nine-group RMON support is included in the feature sets indicated.

Table 5   Cisco IOS Release 11.1 Feature Sets for Cisco CPA2500 Routers–Optimized Images

	Optimized		
	IP/IPX/AT	P/IPX/AT+RAS	P/IPX/AT+RAS+ISDN
SNMP	Yes	Yes	Yes
RMON[1]	—	—	—
Asynchronous support (SLIP)	Yes	Yes	Yes
CSLIP	Yes	Yes	Yes
ARAP	—	Yes	Yes
Frame Relay	Yes	Yes	Yes
SMDS	Yes	—	—
X.25	Yes	Yes	Yes
ISDN	Yes	—	Yes
PPP	Yes	Yes	Yes
CPPP	Yes	Yes	Yes
HDLC	Yes	Yes	Yes
IP	Yes	Yes	Yes
RIP	Yes	Yes	Yes
RIPv2	Yes	Yes	Yes
IGRP	Yes	Yes	Yes
Enhanced IGRP	Yes	Yes	Yes
OSPF	Yes	Yes	Yes
BGP	—	—	—
EGP	—	—	—
PIM	—	—	—
NHRP	—	—	—
ES-IS	—	—	—
IS-IS	—	—	—
Snapshot routing	Yes	Yes	Yes
NTP	Yes	Yes	Yes
Bridging (transparent and translational)	Yes	Yes	Yes
Multiring	—	—	—
LAN extension host	—	—	—
IPX	Yes	Yes	Yes
NLSP	Yes	Yes	Yes
IPXWAN 2.0	Yes	Yes	Yes
RTMP	Yes	Yes	Yes
SMRP	—	—	—
SRTP	—	—	—
AppleTalk Versions 1 and 2	Yes	Yes	Yes
AURP	Yes	Yes	Yes

	Optimized		
	IP/IPX/AT	P/IPX/AT+RAS	P/IPX/AT+RAS+ISDN
DECnet IV	—	—	—
DECnet V	—	—	—
Apollo Domain	—	—	—
Banyan VINES	—	—	—
ISO CLNS	—	—	—
XNS	—	—	—
Lock-and-Key	Yes	Yes	Yes
MD5 routing authentication	Yes	Yes	Yes
Kerberized login	—	—	—
V.120	Yes	—	Yes
SRB	—	—	—
RSRB	—	—	—
APPN	—	—	—
FRAS BAN	—	—	—
DLSw (RFC 1795)	—	—	—
DLSw+	—	—	—
SDLC	—	—	—
SDLLC	—	—	—
STUN	—	—	—
TG/COS	—	—	—
QLLC	—	—	—
Bisync	—	—	—
DSPU	—	—	—
NetView Native Service Point	—	—	—
Protocol translation	—	Yes	Yes
TN3270	—	Yes	Yes
LAT	—	Yes	Yes
SRT Bridging	—	—	—
XRemote	—	Yes	Yes
Telnet	Yes	Yes	Yes
PAD	Yes	Yes	Yes
AutoInstall	Yes	Yes	Yes
Modem auto configuration	—	—	—
Router monitoring	Yes	Yes	Yes
DHCP	Yes	Yes	Yes
NASI	—	—	—
NetBEUI over PPP	—	Yes	Yes

1. All feature sets except CFRAD include RMON alarm and events groups. Full, nine-group RMON support is
   included in the feature sets indicated.

Installing the Router Software Using Microsoft Windows 3.1

In addition to the Cisco IOS feature sets, the CD-ROM also contains the router image loader, which you can use to download the software to the router. The booklet included with the CD-ROM explains how to install the software on a PC running Windows 95, but you can also install the software using Windows 3.1.

This section describes how to install the software images from the CD-ROM using a PC running Windows 3.1. The process requires that you first obtain a Trivial File Transfer Protocol (TFTP) application or a remote copy protocol (rcp) application, which you can use to set up your PC as a TFTP server or an rcp server. You can use either the **copy tftp flash** or **copy rcp flash** command to download the software images to the router from a system running Windows 3.1.

Note   If you do not already have a TFTP or rcp application, you can choose from a number of applications that are available from independent software vendors. In addition, a number of TFTP programs are available as shareware from public sources on the World Wide Web.

Installation Process

This section provides steps that enable you to install the router software using a TFTP application and a PC running Windows 3.1. To install the software using an rcp application, follow the same steps but use rcp instead of TFTP. You must also substitute the **copy rcp flash** command for the **copy tftp flash** command in Step 6. See the next section, "Command Reference Information for TFTP and rcp," for detailed information about the **copy rcp flash** and **copy tftp flash** commands.

Step 1   Install the TFTP application on the PC.

Step 2   Launch the TFTP application on the PC, usually by double-clicking the application icon or its filename.

Step 3   Set up the PC as a TFTP server using the TFTP application setup or configuration facility.

The user interface of most TFTP applications includes a setup facility that allows you to specify the PC as a server. For example, from the TFTP menu of one application, you can select **Settings** to display a panel that includes a checkbox beside the word Server. To configure the local PC as a server, click in this checkbox.

Caution   Be certain to set up your local PC as a TFTP server. If you overlook this step, you will not be able to copy the new software images. If you are using rcp instead of TFTP, you should also be certain to set up your local PC as an rcp server before you copy the software images.

Step 4   Establish a console session from your local PC (which is now configured as a TFTP server) to the router. You can do this in either of two ways:

- Connect the PC's COM port to the router's console port.

  This is the recommended method. If you use this method, you will remain connected to the router when you reload the router to cause the image to take effect (in Step 11).

- Establish a Telnet session from the PC to the router. If you use this method, you will lose your connection to the router when you reload the router to cause the image to take effect (in Step 11).

Step 5   Connect your PC's Ethernet port to the router's Ethernet port using the 10BaseT crossover cable provided.

Note   Use straight-through cables if you are connecting through a 10BaseT hub.

Step 6   At the router prompt, enter the following command to copy the new software image from the CD-ROM drive of the PC to the router:

```
# copy tftp flash
```

Note   If you are using rcp, enter **copy rcp flash** instead.

Step 7   When prompted, enter the IP address of your local Windows 3.1–based PC, as in the following example:

```
Address or name of remote host [255.255.255.255]? 131.108.1.1
```

This is the IP address of your local PC not the router.

Step 8   When prompted, enter the full path name of the image to be copied to the router as in the following example:

```
Source file name? d:\images\cisco.mz
```

Step 9   In response to the following prompt, enter the destination filename and press **Enter** to indicate that you want to copy the image.

```
Destination file name [d:\images\cisco.mz]?cisco.mz
```

(This is the location and name of the image file on the router, not the full path name of the image on the CD-ROM on the PC.)

During the transfer process, messages indicate that the software has accessed the file you have specified and is loading it.

Step 10   Enter **Yes** or **No** in response to the prompt asking if you want to erase the existing image in the router's Flash memory before copying the new one:

```
Erase flash device before writing? [confirm] yes
```

When copying to Flash memory, the system provides an option to erase existing internal Flash memory before writing onto it. The entire copying process takes several minutes and differs from network to network.

The exclamation point (!) indicates that the copy process is taking place. Each exclamation point indicates that ten packets have been transferred successfully. A series of "V" characters indicates that a checksum verification of the image is occurring after the image is written to Flash memory.

Step 11   Enter the **reload** command to reload the router:

```
# reload
```

Command Reference Information for TFTP and rcp

This section includes detailed information about the **copy rcp flash** and **copy tftp flash** commands. This information supplements the information provided in the steps described in the section "Installation Process," page 10.

copy rcp flash

To copy a file from a network server to the router or to another destination using rcp, use the **copy rcp flash** EXEC command:

    copy rcp flash

Syntax Description

flash	Specifies internal Flash memory as the destination of the copy operation.

Command Mode
EXEC

Usage Guidelines

The rcp protocol requires that a client send the remote username of an rcp request to the server. When you enter the **copy rcp flash** command, by default the Cisco IOS software sends the username associated with the current teletype (TTY), if that name is valid. For example, if the user is connected to the router through Telnet and the user was authenticated through the **username** command, then the software sends that username as the remote username.

> **Note** TTY lines are commonly used for access services for Cisco routers. The concept of TTY originated with UNIX. For UNIX systems, each physical device is represented in the file system. Terminals are called TTY devices, which stands for teletype, the original UNIX terminal.

If the TTY username is invalid, the software uses the host name as the both the remote and local usernames. To specify a different remote username to be sent to the rcp server, use the **ip rcmd remote-username** command. You can also specify the path of an existing directory along with the remote username.

> **Caution** The remote username must be associated with an account on the destination server. If you do not use the **ip rcmd remote-username** command to specify the name of a remote user associated with an account on the server, then the remote username associated with the current TTY process must be associated with an account on the server. If there is no username for the current TTY process, then the host name must be associated with an account on the server. If the network administrator of the destination server did not establish accounts for the remote username used, this command will not execute successfully when a default remote username is used.

If you copy a system image from a PC used as a file server, the remote host computer must support the remote shell (rsh) protocol.

Use the **copy rcp flash** command to copy a system image from a network server to the router's internal Flash memory using rcp. The Cisco IOS software prompts for the address of the rcp server and rcp filename. When you enter this command, the system provides an option to erase existing Flash memory before writing onto it. The entire copying process takes several minutes and differs from network to network.

Before booting from Flash memory, verify that the checksum of the image in internal Flash memory matches the checksum listed in the README file distributed with the system software image. The checksum of the image in Flash memory is displayed at the bottom of the screen when you issue the **copy rcp flash** command. The README file was copied to the rcp server automatically when you installed the system software image.

Caution If the checksum value does not match the value in the README file, do not reboot the router. Re-enter the **copy rcp flash** command and compare the checksums again. If the checksum is repeatedly wrong, copy the original system software image back into Flash memory *before* you reboot the router from Flash memory. If you have a corrupted image in Flash memory and try to boot from Flash memory, the router starts the system image contained in ROM (assuming booting from a network server is not configured). If ROM does not contain a fully functional system image, the router cannot function and must be reconfigured through a direct console port connection.

Examples

The following example shows how to use the **copy rcp flash** command on a Cisco 4500 router. The interface might differ slightly on other systems. This example copies a system image named file1 from the netadmin1 directory on the remote server named SERVER1.CISCO.COM with an IP address of 131.108.101.101 to Flash memory. To ensure that enough Flash memory is available to accommodate the system image to be copied, the Cisco IOS software allows you to erase the contents of Flash memory first.

```
Router1# configure terminal

Router1(config)# rcmd remote-username netadmin1
Router(config)# Ctrl-Z
Router# copy rcp flash

System flash directory, partition 2:
File  Length    Name/status
  1   984       file1 [deleted]
  2   984       file1
[2096 bytes used, 8386512 available, 8388608 total]
Address or name of remote host [255.255.255.255]? 131.108.101.101
Source file name? file1
Destination file name [file1]?
Accessing file 'file1' on 131.108.101.101...
Loading dirt/ssangiah/file1 .from 131.108.101.101 (via Ethernet0): ! [OK]

Erase flash device before writing? [confirm]
Flash contains files. Are you sure you want to erase? [confirm]

Copy 'file1' from server
  as 'file1' into Flash WITH erase? [yes/no] yes
Erasing device... eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee ...erased
Loading file1 from 131.108.101.101 (via Ethernet0): !
[OK - 984/8388608 bytes]
```

```
Verifying checksum...  OK (0x14B3)
Flash copy took 0:00:01 [hh:mm:ss]
```

The following example shows sample output resulting from copying a system image into a partition of Flash memory. The system prompts only if there are two or more read/write partitions or one read-only and one read/write partition and dual Flash memory bank support in boot ROMs. If the partition entered is not valid, the process terminates. You have the option to enter a partition number, a question mark (**?**) for a directory display of all partitions, or a question mark and a number (**?***number*) for a directory display of a particular partition. The default is the first read/write partition.

```
Router# copy rcp flash

System flash partition information:
Partition   Size    Used    Free    Bank-Size   State       Copy-Mode
   1        4096K   2048K   2048K   2048K       Read Only   RXBOOT-FLH
   2        4096K   2048K   2048K   2048K       Read/Write  Direct

[Type ?<no> for partition directory; ? for full directory; q to abort]
Which partition? [default = 2]
```

If the partition is read-only and has dual Flash memory bank support in boot ROMs, the session continues as follows:

```
                            ****  NOTICE  ****
Flash load helper v1.0
This process will accept the copy options and then terminate
the current system image to use the ROM based image for the copy.
Routing functionality will not be available during that time.
If you are logged in via telnet, this connection will terminate.
Users with console access can see the results of the copy operation.
                            ---- ******** ----
Proceed? [confirm]
System flash directory, partition 1:
File  Length   Name/status
  1   3459720  master/igs-bfpx.100-4.3
[3459784 bytes used, 734520 available, 4194304 total]
Address or name of remote host [255.255.255.255]? 131.108.1.1
Source file name? master/igs-bfpx-100.4.3
Destination file name [default = source name]?
```

The file will be copied into the partition given earlier by the user:

```
Loading master/igs-bfpx.100-4.3 from 131.108.1.111: !
Erase flash device before writing? [confirm]
Flash contains files. Are you sure? [confirm]
Copy 'master/igs-bfpx.100-4.3' from TFTP server
as 'master/igs-bfpx.100-4.3' into Flash WITH erase? [yes/no] yes
```

If the partition is read/write, the session continues as follows:

```
System flash directory, partition 2:
File  Length   Name/status
  1   3459720  master/igs-bfpx.100-4.3
[3459784 bytes used, 734520 available, 4194304 total]
Address or name of remote host [255.255.255.255]? 131.108.1.1
Source file name? master/igs-bfpx.100-4.3
Destination file name [default = source name]?
```

The file will be copied into the partition given earlier by the user:

```
Accessing file 'master/igs-bfpx.100-4.3' on ABC.CISCO.COM...
Loading master/igs-bfpx.100-4.3 from 131.108.1.111: !
Erase flash device before writing? [confirm]
Flash contains files. Are you sure? [confirm]
```

```
Copy 'master/igs-bfpx.100-4.3' from TFTP server
as 'master/igs-bfpx.100-4.3' into Flash WITH erase? [yes/no] yes
```

Related Commands
boot config
boot system flash
cd
copy flash rcp
ip rcmd remote-username
verify flash

copy tftp flash

To copy a file from a TFTP server to the router or to another destination, use the **copy tftp flash** EXEC command.

copy tftp flash

Syntax Description

flash	Specifies internal Flash memory as the destination of the copy operation.

Command Mode
EXEC

Usage Guidelines

The system prompts for the address of the TFTP server and TFTP filename if you do not provide them at the command line. When copying to internal Flash memory, the system provides an option to erase existing internal Flash memory before writing onto it. The entire copying process takes several minutes and differs from network to network.

Before booting from Flash memory, verify that the checksum of the image in Flash memory matches the checksum listed in the README file distributed with the system software image. The checksum of the image in Flash memory is displayed at the bottom of the screen when you enter the **copy tftp flash** command. The README file was copied to the TFTP server automatically when you installed the system software image.

> **Caution** If the checksum value is not correct according to the value in the README file, do not reboot the router. Enter the **copy tftp flash** command and compare the checksums again. If the checksum is repeatedly wrong, copy the original system software image back into Flash memory *before* you reboot the router from Flash memory. If you have a corrupted image in Flash memory and try to boot from Flash memory, the router starts the system image contained in ROM (assuming booting from a network server is not configured). If ROM does not contain a fully functional system image, the router cannot function and must be reconfigured through a direct console port connection.

Examples

The following example shows sample output of copying a system image named file1 into Flash memory:

```
Router# copy tftp flash

System flash directory, partition 2:
File  Length   Name/status
  1   984      file1 [deleted]
  2   984      file1
[2096 bytes used, 8386512 available, 8388608 total]
Address or name of remote host [255.255.255.255]? 223.255.254.254
Source file name? file1
Destination file name [file1]?
Accessing file 'file1' on 223.255.254.254...
Loading dirt/ssangiah/file1 .from 223.255.254.254 (via Ethernet0): - [OK]

Erase flash device before writing? [confirm]
Flash contains files. Are you sure you want to erase? [confirm]

Copy 'file1' from server
  as 'file1' into Flash WITH erase? [yes/no] yes
Erasing device... eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee ...erased
Loading file1 from 223.255.254.254 (via Ethernet0): !!!!...
[OK - 984/8388608 bytes]

Verifying checksum...  OK (0x14B3)
Flash copy took 0:00:01 [hh:mm:ss]
```

The exclamation point (!) indicates that the copy process is taking place. Each exclamation point indicates that ten packets have been transferred successfully. A series of "V" characters indicates that a checksum verification of the image is occurring after the image is written to Flash memory.

The following example shows sample output resulting from copying a system image into a partition of Flash memory. The system will prompt only if there are two or more read/write partitions or one read-only and one read/write partition and dual Flash memory bank support in boot ROMs. If the partition entered is not valid, the process terminates. You can enter a partition number, a question mark (**?**) for a directory display of all partitions, or a question mark and a number (**?***number*) for directory display of a particular partition. The default is the first read/write partition.

```
Router# copy tftp flash

System flash partition information:
Partition  Size    Used    Free    Bank-Size   State       Copy-Mode
    1      4096K   2048K   2048K   2048K       Read Only   RXBOOT-FLH
    2      4096K   2048K   2048K   2048K       Read/Write  Direct

[Type ?<no> for partition directory; ? for full directory; q to abort]
Which partition? [default = 2]
```

If the partition is read-only and has dual Flash memory bank support in boot ROMs, the session continues as follows:

```
                          ****  NOTICE  ****
Flash load helper v1.0
This process will accept the copy options and then terminate
the current system image to use the ROM based image for the copy.
Routing functionality will not be available during that time.
If you are logged in via telnet, this connection will terminate.
Users with console access can see the results of the copy operation.
                          ---- ******** ----
Proceed? [confirm]
System flash directory, partition 1:
File  Length   Name/status
  1   3459720  master/igs-bfpx.100-4.3
```

```
[3459784 bytes used, 734520 available, 4194304 total]
Address or name of remote host [255.255.255.255]? 131.108.1.1
Source file name? master/igs-bfpx-100.4.3
Destination file name [default = source name]?
```

The file will be copied into the partition given earlier by the user:

```
Loading master/igs-bfpx.100-4.3 from 131.108.1.111: !
Erase flash device before writing? [confirm]
Flash contains files. Are you sure? [confirm]
Copy 'master/igs-bfpx.100-4.3' from TFTP server
as 'master/igs-bfpx.100-4.3' into Flash WITH erase? [yes/no] yes
```

If the partition is read/write, the session continues as follows:

```
System flash directory, partition 2:
File  Length   Name/status
  1   3459720  master/igs-bfpx.100-4.3
[3459784 bytes used, 734520 available, 4194304 total]
Address or name of remote host [255.255.255.255]? 131.108.1.1
Source file name? master/igs-bfpx.100-4.3
Destination file name [default = source name]?
```

The file will be copied into the partition given earlier by the user:

```
Accessing file 'master/igs-bfpx.100-4.3' on ABC.CISCO.COM...
Loading master/igs-bfpx.100-4.3 from 131.108.1.111: !
Erase flash device before writing? [confirm]
Flash contains files. Are you sure? [confirm]
Copy 'master/igs-bfpx.100-4.3' from TFTP server
as 'master/igs-bfpx.100-4.3' into Flash WITH erase? [yes/no] yes
```

Related Commands

copy flash tftp
verify
verify flash

Additional Release Note Information

For detailed information about this software release, see the Enterprise release notes located on the Cisco Connection Documentation, CD-ROMs. Information that about the feature pack described in this release note includes the following:

- New features

- Important notes

- Caveats

About the Cisco IOS Software Electronic Documentation

Cisco IOS software documentation is provided on the Cisco Connection Documentation CD that is included with your feature pack. The documentation is organized into three main categories:

- Configuration guides and command references, which are organized into the following modules:

    — Configuration Fundamentals:

    Configuration Guide

    Command Reference

— Access Services:

Configuration Guide

Command Reference

— Network Protocols, Part 1:

Configuration Guide

Command Reference

— Network Protocols, Part 2:

Configuration Guide

Command Reference

— Bridging and IBM Networking:

Configuration Guide

Command Reference

Each of the six modules consists of a configuration guide and command reference. The first chapter of each document of a set is called "About the Cisco IOS Software Documentation." Each chapter includes a section called "Cisco IOS Software Documentation Organization," which provides a documentation roadmap and describes the structure and content of the guides and references. You should read this chapter to familiarize yourself with the overall structure and organization of the documentation so you can more readily find information you need to set up, configure, and maintain the router to support your particular feature set.

Cisco IOS configuration guides describe system configuration and maintenance tasks and provide comprehensive configuration examples. The configuration guides do not include command syntax for every command, so you should use them in conjunction with the command references. The Cisco configuration guides give in-depth descriptions of configuration tasks.

Cisco IOS command references describe the commands necessary for configuring and maintaining your system. If you are new to CiscoPro software, you should use the Cisco command references in conjunction with the configuration guides to reference commands and detailed information pertaining to their use. If you are an experienced network administrator, you might want to use the Cisco command references as standalone manuals.

- Supporting documentation, as follows:

Cisco IOS Command Summary: This document summarizes the commands in the six command reference publications. For each command, it provides complete syntax, the purpose of the command, and a description of each keyword and argument in the command syntax. Where possible, it also identifies the default values of keywords and arguments.

System Error Messages: This document describes system error messages reported by Cisco IOS software. It includes possible causes and recommended actions. The System Error Messages publication is intended for network administrators who are responsible for monitoring and maintaining internetworking equipment.

Cisco Access Connection Guide: This document explains how to use an access server or a router to connect to network hosts. It also describes how to manage and monitor network connections and how to change terminal parameters.

Cisco Management Information Base (MIB) User Quick Reference: This document describes the Cisco Systems private, or local, Management Information Base (MIB), which is provided with all Cisco software releases and with CiscoWorks router management software. A MIB file

contains variables that can be set or read to provide information on network devices and interfaces. The Cisco MIB is a set of variables that are private extensions to the Internet standard MIB II.

Debug Command Reference: This document provides information about using debug commands to troubleshoot your internetwork. The *Debug Command Reference is* intended for network administrators who already know how to configure a router and are familiar with all relevant network equipment.

- Release Notes

Obtaining Service and Support

For service and support for a product purchased from a reseller, contact the reseller. Resellers offer a wide variety of Cisco service and support programs, which are described in the section "Service and Support" in the information packet that shipped with your chassis.

Note   If you purchased your product from a reseller, you can access Cisco Connection Online (CCO) as a guest. CCO is Cisco Systems' primary, real-time support channel. Your reseller offers programs that include direct access to CCO's services.

For service and support for a product purchased directly from Cisco, use CCO.

Cisco Connection Online

CCO is Cisco Systems' primary, real-time support channel. SMARTnet customers and partners can self-register on CCO to obtain additional content and services.

Note   If you purchased your product from a reseller, you can access CCO as a guest. Your reseller offers programs that include direct access to CCO's services.

Available 24 hours a day, 7 days a week, CCO provides a wealth of standard and value-added services to Cisco's customers and business partners. CCO services include product information, software updates, release notes, technical tips, the Bug Navigator, configuration notes, brochures, descriptions of service offerings, and download access to public and authorized files.

CCO serves a wide variety of users through two interfaces that are updated and enhanced simultaneously—a character-based version and a multimedia version that resides on the World Wide Web (WWW). The character-based CCO supports Zmodem, Kermit, Xmodem, FTP, and Internet e-mail, and is excellent for quick access to information over lower bandwidths. The WWW version of CCO provides richly formatted documents with photographs, figures, graphics, and video, as well as hyperlinks to related information.

You can access CCO in the following ways:

- WWW: http://www.cisco.com.

- WWW: http://www-europe.cisco.com.

- WWW: http://www-china.cisco.com.

- Telnet: cco.cisco.com.

- Modem: From North America, 408 526-8070; from Europe, 33 1 64 46 40 82. Use the following terminal settings: VT100 emulation; databits: 8; parity: none; stop bits: 1; and baud rates up to 14.4 kbps.

For a copy of CCO's Frequently Asked Questions (FAQ), contact cco-help@cisco.com. For additional information, contact cco-team@cisco.com.

Note If you need technical assistance with a Cisco product that is under warranty or covered by a Cisco maintenance contract, contact Cisco's Technical Assistance Center (TAC) at 800 553-2447, 408 526-7209, or tac@cisco.com.

Please use CCO to obtain general information about Cisco Systems, Cisco products, or upgrades. If CCO is not accessible, contact 800 553-6387, 408 526-7208, or cs-rep@cisco.com.