



Doc. No. 78-3841-01

# Release Notes for Cisco IOS Release 11.1—Cisco CPA1600 Series Routers

---

**November 11, 1996**

These release notes identify the Cisco Internetwork Operating System (Cisco IOS) Release 11.1 feature sets for Cisco CPA1600 series routers. Product numbers supported are as follows:

- CPASW16-A-11.1= (IP Feature Pack)
- CPASW16-AP-11.1= (IP Plus Feature Pack)
- CPASW16-B-11.1= (IP/IPX/AppleTalk Feature Pack)
- CPASW16-BP-11.1= (IP/IPX AppleTalk Plus Feature Pack)
- CPASW16-DP-11.1= (IP/IPX Plus and IP/AppleTalk Plus Feature Pack)

---

**Note** The feature packs listed here are supported in Cisco IOS Release 11.1(7)AA.

---

These release notes describe the feature packs and the specific features of the available feature sets for Cisco CPA1600 series routers. These release notes also help you navigate the Cisco IOS Release 11.1 online documentation. The router image loader, which is on the same CD-ROM as the Cisco IOS feature sets, runs in Windows 95 on a PCs. These release notes also describe how to install Cisco IOS feature sets using Windows 3.1.

---

**Corporate Headquarters**

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

Copyright © 1996  
Cisco Systems, Inc.  
All rights reserved.

## Introduction

These release notes contain the following sections:

- Feature Pack Descriptions, page 2
- Memory Requirements, page 3
- List of Features for Cisco CPA1600 Series Routers, page 4
- Installing the Router Software Using Microsoft Windows 3.1, page 7
- Additional Release Note Information, page 15
- About the Cisco IOS Software Electronic Documentation, page 16
- Obtaining Service and Support, page 17
- Cisco Connection Online, page 17

## Feature Pack Descriptions

This section describes the feature packs and lists the software feature sets in each pack. Note that a feature pack can contain multiple feature sets, and each feature set contains many features.

Table 1 lists each feature pack as specified on the label of the CD containing the router software. In addition, Table 1 lists the feature sets in each feature pack, giving the DOS and UNIX filenames of the images. See Table 4 for a list of the features in each feature set.

**Table 1 Feature Pack Feature Sets for Cisco CPA1600 Series Routers**

<b>Feature Sets Included</b>	<b>DOS Filename</b>	<b>UNIX Filename</b>	<b>Description of Feature Set</b>
<b>CPA1600 IP Feature Pack Release 11.1 (part number CPASW16-A-11.1=)</b>			
IP	80130501.bin	c1600-y-l.111-7.AA	IP feature set for CPA1600
<b>CPA1600 IP Plus Feature Pack Release 11.1 (part number CPASW16-AP-11.1=)</b>			
IP Plus	80130401.bin	c1600-sy-l.111-7.AA	IP Plus feature set for CPA1600
<b>CPA1600 IP/IPX/AppleTalk Feature Pack Release 11.1 (part number CPASW16-B-11.1=)</b>			
IP/IPX	80130301.bin	c1600-ny-l.111-7.AA	IP/IPX feature set for CPA1600
IP/AT	80130101.bin	c1600-by-l.111-7.AA	IP/AppleTalk feature set for CPA1600
IP/IPX/AT	80129901.bin	c1600-bny-l.111-7.AA	IP/IPX/AppleTalk feature set for CPA1600
<b>CPA1600 IP/IPX/AppleTalk Plus Feature Pack Release 11.1 (part number CPASW16-BP-11.1=)</b>			
IP/IPX/AT Plus	80129801.bin	c1600-bnsy-l.111-7.AA	IP/IPX/AppleTalk Plus feature set for CPA1600
<b>CPA1600 IP/IPX Plus and IP/AppleTalk Plus Feature Pack Release 11.1 (part number CPASW16-DP-11.1=)</b>			
IP/IPX Plus	80130201.bin	c1600-nsy-l.111-7.AA	IP/IPX Plus feature set for CPA1600
IP/AT Plus	80130001.bin	c1600-bsy-l.111-7.AA	IP/AppleTalk Plus feature set for CPA1600

## Memory Requirements

This section describes the memory required for each feature set, memory delivered by default, and available memory upgrades.

Use Table 2 to identify the memory required for the image you want to run. Use Table 3 to determine how much memory is available on the router as the factory default, as well as the upgrades that you can obtain to satisfy additional memory requirements.

**Table 2 Cisco CPA1600 Series Feature Set Memory Requirements**

Feature Set	Flash Card	DRAM
IP	4 MB (default)	2 MB (default)
IP/IPX	4 MB (default)	2 MB (default)
IP/AT	4 MB (default)	2 MB (default)
IP/IPX/AT	6 MB (upgrade)	4 MB (upgrade)
IP Plus	6 MB (upgrade)	4 MB (upgrade)
IP/IPX Plus	6 MB (upgrade)	4 MB (upgrade)
IP/AT Plus	6 MB (upgrade)	4 MB (upgrade)
IP/IPX/AT Plus	6 MB (upgrade)	4 MB (upgrade)

**Note** For feature sets that require 6-MB Flash memory, order a 6-MB Flash memory card to replace the default 4-MB Flash memory card installed in the router. For feature sets that require 4-MB DRAM, order a 2-MB DRAM upgrade option to add to the default 2-MB DRAM.

**Table 3 Cisco CPA1600 Series Default Memory and Upgrade Options**

Memory Type	Default	Upgrade Options
Flash memory card	4 MB	6-MB: CPA016-MEM6FC= 8-MB: CPA016-MEM8FC= 12-MB: CPA016-MEM12FC=
DRAM	2 MB	2-MB: CPA016-MEM2D= 4-MB: CPA016-MEM4D= 8-MB: CPA016-MEM8D= 16-MB: CPA016-MEM16D=

## List of Features for Cisco CPA1600 Series Routers

This section identifies specific features, listed by categories, that are supported on Cisco CPA1600 series routers:

- “Yes” indicates that the feature is supported.
- “–” indicates that the feature is not supported.
- “Plus” indicates that the feature is supported in Plus feature sets such as CPASW16-AP-11.1=.

You can use the information in Table 4 in conjunction with the information provided in the section “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 CPA1600 Series Routers**

Supported Features	IP Routing	IP/IPX Routing	IP/AppleTalk	IP/IPX/AppleTalk
<b>LAN Support</b>				
Apollo Domain	–	–	–	–
AppleTalk 1 and 2	–	–	Yes	Yes
Banyan VINES	–	–	–	–
Concurrent routing and bridging	–	–	–	–
DECnet IV	–	–	–	–
DECnet V	–	–	–	–
GRE tunneling	Yes	Yes	Yes	Yes
Integrated routing and bridging (IRB)	–	–	–	–
IP	Yes	Yes	Yes	Yes
LAN extension host	–	–	–	–
Multiring	Yes	Yes	–	–
Novell IPX	–	Yes	–	Yes
OSI	–	–	–	–
Source-route bridging	–	–	–	–
Transparent bridging	Yes	Yes	–	–
Translational bridging	–	–	–	–
XNS	–	–	–	–
<b>WAN Services</b>				
Asynchronous	Yes	Yes	Yes	Yes
Frame Relay	Yes	Yes	Yes	Yes
HDLC	Yes	Yes	Yes	Yes
IPXWAN 2.0	Plus	Plus	Plus	Plus
ISDN	Yes	Yes	Yes	Yes
PPP	Yes	Yes	Yes	Yes
SMDS	Yes	Yes	Yes	Yes
Switched 56	Yes	Yes	Yes	Yes

<b>Supported Features</b>	<b>IP Routing</b>	<b>IP/IPX Routing</b>	<b>IP/AppleTalk</b>	<b>IP/IPX/AppleTalk</b>
X.25	Yes	Yes	Yes	Yes
SLIP asynchronous only	Yes	Yes	Yes	Yes
<b>WAN Optimization</b>				
Bandwidth-on-demand	Yes	Yes	Yes	Yes
Custom and priority queuing	Yes	Yes	Yes	Yes
Dial backup	Yes	Yes	Yes	Yes
Dial-on-demand	Yes	Yes	Yes	Yes
Header, link and payload compression	Yes	Yes	Yes	Yes
Snapshot routing	Yes	Yes	Yes	Yes
Weighted fair queuing	Yes	Yes	Yes	Yes
IPX and SPX spoofing	–	Yes	–	Yes
<b>IP Routing</b>				
AppleTalk SMRP Multicast	–	–	Yes	Yes
BGP	–	–	–	–
EGP	–	–	–	–
Enhanced IGRP	Yes	Yes	Yes	Yes
OSPF	Plus	Plus	Plus	Plus
OSPF On Demand Circuit	Plus	Plus	Plus	Plus
IP Multicast (PIM)	Plus	Plus	Plus	Plus
ES-IS	–	–	–	–
IGRP	Yes	Yes	Yes	Yes
IS-IS	–	–	Yes	Yes
NHRP	–	–	Plus	Plus
Policy-based routing	Yes	Yes	Yes	Yes
RIP	Yes	Yes	Yes	Yes
RIP Version 2	Yes	Yes	Yes	Yes
<b>Other Routing</b>				
AURP	–	–	Plus	Plus
IPX RIP	–	Yes	–	Yes
NLSP	–	Plus	–	Plus
RTMP	–	–	Yes	Yes
SMRP	–	–	Plus	Plus
SRTP	–	–	–	–
<b>Management</b>				
AutoInstall	Yes	Yes	Yes	Yes
Automatic modem configuration	Yes	Yes	Yes	Yes
RMON events and alarms	Yes	Yes	Yes	Yes

List of Features for Cisco CPA1600 Series Routers

Supported Features	IP Routing	IP/IPX Routing	IP/AppleTalk	IP/IPX/AppleTalk
SNMP	Yes	Yes	Yes	Yes
Telnet	Yes	Yes	Yes	Yes
<b>Security</b>				
Access lists	Yes	Yes	Yes	Yes
Access security	Yes	Yes	Yes	Yes
Extended access lists	Yes	Yes	Yes	Yes
Kerberized login	–	–	–	–
Kerberos V client support	–	–	–	–
Lock and key	Yes	Yes	Yes	Yes
MAC security for hubs	–	–	–	–
MD5 routing authentication	–	–	–	–
RADIUS	–	–	–	–
TACACS+	Yes	Yes	Yes	Yes
<b>IBM Support (Optional)</b>				
APPN (Optional)	–	–	–	–
BAN for SNA Frame Relay support	–	–	–	–
Bisync	–	–	–	–
Caching and filtering	–	–	–	–
DLSw+	–	–	–	–
Downstream PU concentration (DSPU)	–	–	–	–
Frame Relay SNA Support (RFC 1490)	–	–	–	–
NetView Native Service Point	–	–	–	–
QLLC	–	–	–	–
SDLC integration	–	–	–	–
SDLC transport (STUN)	–	–	–	–
SDLC-to-LAN conversion (SDLLC)	–	–	–	–
SNA and NetBIOS WAN optimization via local acknowledgment	–	–	–	–
SRB/RSRB	–	–	–	–
SRT	–	–	–	–
TG/COS	–	–	–	–
<b>Protocol Translation</b>				
LAT	–	–	–	–
PPP	–	–	–	–
Rlogin	–	–	–	–
Telnet	–	–	–	–
TN3270	–	–	–	–
X.25	–	–	–	–

Supported Features	IP Routing	IP/IPX Routing	IP/AppleTalk	IP/IPX/AppleTalk
<b>Remote Node</b>				
ARAP 1.0/2.0	–	–	–	–
Asynchronous master interfaces	–	–	–	–
ATCP	–	–	–	–
CPPP	–	–	–	–
CSLIP	–	–	–	–
DHCP	Yes	Yes	Yes	Yes
IP pooling	–	–	–	–
IPX and ARAP on virtual asynch interfaces	–	–	–	–
IPXCP	–	–	–	–
MacIP	–	–	–	–
NASI	–	–	–	–
NetBEUI over PPP	–	–	–	–
PPP	Yes	Yes	Yes	Yes
SLIP	Yes	Yes	Yes	Yes
<b>Terminal Services</b>				
LAT	–	–	–	–
Rlogin	Yes	Yes	Yes	Yes
Telnet	Yes	Yes	Yes	Yes
TN3270	–	–	–	–
X.25 PAD	–	–	–	–
Xremote	–	–	–	–

## 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 8.

### 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... eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee ...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 rep**  
**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... eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee ..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](http://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](mailto:cco-help@cisco.com). For additional information, contact [cco-team@cisco.com](mailto: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](mailto: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](mailto:cs-rep@cisco.com).

---

This document is to be used in conjunction with the Cisco IOS configuration guide and command reference publications.

AtmDirector, AutoConnect, AutoRoute, AXIS, BPX, Catalyst, CD-PAC, CiscoAdvantage, CiscoFusion, Cisco IOS, the Cisco IOS logo, *CiscoLink*, CiscoPro, the CiscoPro logo, CiscoRemote, the CiscoRemote logo, CiscoSecure, Cisco Systems, CiscoView, CiscoVision, CiscoWorks, ClickStart, ControlStream, EdgeConnect, EtherChannel, FairShare, FastCell, FastForward, FastManager, FastMate, FastPADImp, FastPADmicro, FastPADmp, FragmentFree, FrameClass, Fulcrum INS, IGX, Impact, Internet Junction, JumpStart, LAN<sup>2</sup>LAN Enterprise, LAN<sup>2</sup>LAN Remote Office, LightSwitch, NetBeyond, NetFlow, Newport Systems Solutions, *Packet*, PIX, Point and Click Internetworking, RouteStream, Secure/IP, SMARTnet, StrataSphere, StrataSphere BILLder, StrataSphere Connection Manager, StrataSphere Modeler, StrataSphere Optimizer, Stratm, StrataView Plus, StreamView, SwitchProbe, SwitchVision, SwitchWare, SynchroniCD, *The Cell*, The FastPacket Company, TokenSwitch, TrafficDirector, Virtual EtherSwitch, VirtualStream, VlanDirector, Web Clusters, WNIC, Workgroup Director, Workgroup Stack, and XCI are trademarks; Access by Cisco, Bringing the Power of Internetworking to Everyone, Enter the Net with MultiNet, and The Network Works. No Excuses, are service marks; and Cisco, the Cisco Systems logo, CollisionFree, Combinet, EtherSwitch, FastHub, FastLink, FastNIC, FastPacket, FastPAD, FastSwitch, ForeSight, Grand, Grand Junction, Grand Junction Networks, the Grand Junction Networks logo, HSSI, IGRP, IPX, Kalpana, the Kalpana logo, LightStream, MultiNet, MultiWare, OptiClass, Personal Ethernet, Phase/IP, RPS, StrataCom, TGV, the TGV logo, and UniverCD are registered trademarks of Cisco Systems, Inc. All other trademarks, service marks, registered trademarks, or registered service marks mentioned in this document are the property of their respective owners.

Copyright © 1996, Cisco Systems, Inc.  
All rights reserved. Printed in USA.  
969R