

How to Install Software Images Using a TFTP or RCP Server Application

Please provide your [feedback](#) on this document.

Contents

[Introduction](#)

[Before You Begin](#)

[Run From RAM Installation](#)

[Sample Output - Run From Ram Installation](#)

[Run From Flash Installation](#)

[Sample Output - Run From Flash Installation](#)

[Related Information](#)

Introduction

Note: The information in this document is based on Cisco IOS® Software Release 11.2 or later.

This describes how to install Cisco IOS software onto Cisco routers using a Trivial File Transfer Protocol (TFTP) server or Remote Copy Protocol (RCP) server application. For the Cisco 1600, 2500, CPA2500, AS100, and AS5200 Series Routers use the [run from flash](#) installation. For other Cisco routers, use the [run from RAM](#) installation.

Note: Because using a TFTP or RCP server requires familiarity with the Cisco IOS command line interface, we recommend using the Router Software Loader (RSL) application contained on every software feature pack CD-ROM instead of TFTP or RCP whenever possible. RSL is also available on CCO.

[Download RSL](#)

Before You Begin

A TFTP server or a RCP server application must be installed on a TCP/IP ready workstation. Once the application is installed, a minimal level of configuration must be performed. First of all, the TFTP application must be configured to operate as a TFTP server as opposed to a TFTP client. Secondly, the outbound file directory must be specified. This is the directory in which the Cisco IOS images are stored. Most TFTP applications provide a setup routine to assist in these configuration tasks.

Note: The TFTP server included on the software feature pack CD-ROM can be used only on a PC running Windows 95. For other operating systems, a number of TFTP or RCP applications are available from independent software vendors or as shareware from public sources on the World Wide Web. The

TFTP Server application included on the software feature pack CDs is also available on CCO.

[Download TFTP Server For Windows 95](#)

Run From RAM Installation

Note: For RCP applications, substitute RCP for every occurrence of TFTP. For example, use the **copy rcp flash** command instead of **copy tftp flash** command.

1. Install the IOS-image in the outbound directory of the TFTP server.

The TFTP server will use this directory to look for the file the router is asking for. Make sure that the IOS image you want to copy to your flash is in this directory. You can verify this with Explorer.

Note: Before you know where to put the image, make sure you have the right image available. In the outbound directory, you will also see what the memory requirements are for every specific image; verify the amount of memory you have with the [show version](#) command.

2. Establish a *console* session to the router.

This can be done with a direct console connection or virtual Telnet connection. A direct console connection is preferred over a Telnet connection because a Telnet connection will be lost during the reboot phase of the software installation. The console connection is made with a rolled cable (usually a flat black cable), and connects the console port of the router to the COM port of the PC. Open Hyperterminal on the PC, and use the following settings:

```
Speed 9600 bits per second
8 databits
0 parity bits
1 stop bit
No Flow Control
```

3. Verify TFTP server has IP connectivity to the router.

Check the IP addresses of the TFTP server and the router/access server targeted for the TFTP software upgrade to be sure the addresses are within the same range. Ping the router/access server to verify that a network connection exists between them. More information on IP addresses is available in [Common Problems in Installing Images Using TFTP or an RCP Server](#).

4. Copy the new software image from the TFTP server to the router/access server.

Note: We recommend that you keep a copy of the router/access server configuration before upgrading the router/access server software.

```
Router> enable
Password: password
Router#
Router# copy tftp flash
```

If needed, you can [copy an image](#) from device to another.

5. Specify the IP address of the TFTP server.

When prompted, enter the IP address of the TFTP server as in the following example:

```
Address or name of remote host [255.255.255.255]? 172.17.247.195
```

6. Specify the filename of the new Cisco IOS software image.

When prompted, enter the filename of the Cisco IOS software image to be installed, as in the following example:

```
Source file name? c2500-js-1_113-3.bin
```

Note: The image name varies depending on the file name of the image on the TFTP server.

7. Specify the destination file name.

This is the name the new software image will have when it is loaded onto the router. The image can be named anything, but common practice is to enter the UNIX image filename.

```
Destination file name? c2500-js-1_113-3.bin
```

8. Erase flash device before writing YES/NO.

When prompted:

- Enter **yes** to erase the existing software image resident in the router's flash memory before copying the new one.
- Enter **no** to keep the existing software image. Please be sure you've got enough memory to keep both.

```
Erase flash device before writing? [confirm] yes/no
```

The copying process takes several minutes; the time differs from network to network. During the copy process, messages are displayed to indicate which files have been accessed.

The exclamation point (!) indicates that the copy process is taking place. Each exclamation point (!) indicates that ten packets were transferred successfully. A checksum verification of the image occurs after the image is written to flash memory. The router/access server reloads itself with the new image when the software upgrade is complete.

Information about troubleshooting software transfer problems is available in [Common Problems in Installing Images Using TFTP or an RCP Server](#).

9. Before reloading, verify that the following things are correct:

Verify that the image is properly installed and that the boot system commands point to the proper file to load. Information about verifying the image and boot commands is available in [Common Problems in Installing Images Using TFTP or an RCP Server](#).

To reload, type:

```
Router(boot)#reload
*Mar 1 00:30:49.972: %SYS-5-CONFIG_I: Configured from console by console
System configuration has been modified. Save? [yes/no]: NO
Proceed with reload? [confirm] YES
```

10. Verify that the router is running with the proper image.

After the reload is complete, the router should be running the desired Cisco IOS image. Use the [show version](#) command to verify.

Information about problems with verifying the image is available in [Common Problems in Installing Images Using TFTP or an RCP Server](#).

Sample Output - Run From Ram Installation

```
Router#copy tftp flash
**** 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:
File Length Name/status
  1 3612396 igs-i-1.110-16
[3612460 bytes used, 13164756 available, 16777216 total]
Address or name of remote host [255.255.255.255]? 171.71.93.192
Source file name? c2500-js-l_113-3.bin
Destination file name [c2500-js-l_113-3.bin]? c2500-js-l_113-3.bin
Accessing file 'c2500-js-l_113-3.exe' on 171.71.93.192...
Loading c2500-js-l_113-3.exe from 171.71.93.192 (via Ethernet0): ! [OK]

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

Copy 'c2500-js-l_113-3.exe' from server
  as 'c2500-js-l_113-3.bin' into Flash WITH erase? [yes/no]y

%SYS-5-RELOAD: Reload requested
%FLH: c2500-js-l_113-3.bin from 171.71.93.192 to flash ...

System flash directory:
File Length Name/status
  1 3612396 igs-i-1.110-16
[3612460 bytes used, 13164756 available, 16777216 total]
Accessing file 'c2500-js-l_113-3.bin' on 171.71.93.192...
Loading c2500-js-l_113-3.bin from 171.71.93.192 (via Ethernet0): ! [OK]

Erasing device... eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee
ee ...erased
Loading c2500-js-l_113-3.exe from 171.71.93.192 (via Ethernet0): !!!!!!!!!!!!!!!
<...snip...>
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
[OK - 8900924/16777216 bytes]

Verifying checksum... OK (0x8ABE)
Flash copy took 0:04:57 [hh:mm:ss]
%FLH: Re-booting system after download
```

Run From Flash Installation

Note: For RCP applications, substitute RCP for every occurrence of TFTP. For example, use the **copy rcp flash** command instead of **copy tftp flash** command.

1. Install the IOS-image in the outbound directory of the TFTP server.

The TFTP server will use this directory to look for the file the router is asking for. Make sure that the IOS image you want to copy to your flash is in this directory. You can verify this with Explorer.

Note: Before you know where to put the image, make sure you have the right image available. In the outbound directory, you will also see what the memory requirements are for every specific image; verify the amount of memory you have with the [show version](#) command.

2. Establish a *console* session to the router.

This can be done with a direct console connection or virtual Telnet connection. A direct console connection is preferred over a Telnet connection because a Telnet connection will be lost during the reboot phase of the software installation. The console connection is made with a rolled cable (usually a flat black cable), and connects the console port of the router to the COM port of the PC. Open Hyperterminal on the PC, and use the following settings:

```
Speed 9600 bits per second
8 databits
0 parity bits
1 stop bit
No Flow Control
```

3. Copy config register value and set default gateway, if needed.

Write down the value of the config register appearing in the last line of the [show version](#) command output; you will need it later to restore normal operation.

Add the default gateway if your tftp server is not in the same network as the router, or if the workstation where you start your Telnet is not in the same network than the router. More information on the default gateway is available in [Common Problems in Installing Images Using TFTP or an RCP Server](#).

4. Change the router into Rxboot mode.

Change the config register to the value **0x2101** as follows:

```
Router>enable
Password: password
Router#
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#config-register 0x2101
Router(config)#^Z
Router#
%SYS-5-CONFIG_I: Configured from console by console
Router#wr mem
Building configuration...
[OK]
Router#
Router#reload
```

Note: If you are connected through Telnet, after the reload the session will be lost. Wait a few minutes and try again.

5. Restore the previous config register value for next reload.

Note: Don't save anything while you are in boot mode. Avoid using the saving commands (**write mem** or **copy run start**) and answer NO to any prompt suggesting that you save your current configuration. If you save while you are in this mode, your configuration can be partially or completely erased.

Use the config-register value copied in [step 3](#) instead of ***** in the following sequence of

commands:

```
Router(boot)>
Router(boot)>en
Password: password
Router(boot)#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(boot)(config)#con
Router(boot)(config)#config-register 0x****
Router(boot)(config)#^Z
```

Note: If you didn't copy the config register in step 3, you can use **0x2102** in this step.

6. Verify TFTP server has IP connectivity to the router.

Check the IP addresses of the TFTP server and the router/access server targeted for the TFTP software upgrade to be sure the addresses are within the same range. Ping the router/access server to verify that a network connection exists between them. More information on IP addresses is available in [Common Problems in Installing Images Using TFTP or an RCP Server](#).

7. Copy the new software image from the TFTP server to the router/access server.

Note: We recommend that you keep a copy of the router/access server configuration before upgrading the router/access server software.

```
Router> enable
Password: password
Router#
Router# copy tftp flash
```

8. Specify the IP address of the TFTP server.

When prompted, enter the IP address of the TFTP server as in the following example:

```
Address or name of remote host [255.255.255.255]? 172.17.247.195
```

9. Specify the filename of the new Cisco IOS software image.

When prompted, enter the filename of the Cisco IOS software image to be installed, as in the following example:

```
Source file name? c1600-y-1.112-18.P
```

Note: The image name varies depending on the file name of the image on the TFTP server.

10. Specify the destination image filename.

This is the name the new software image will have when it is loaded onto the router. The image can be named anything, but common practice is to enter the UNIX image filename.

```
Destination file name [c1600-y-1.112-18.P]? c1600-y-1.112-18.P
```

11. Erase flash device before writing YES/NO.

When prompted:

- Enter **yes** to erase the existing software image resident in the router's flash memory before copying the new one.

- Enter **no** to keep the existing software image. Please be sure you've got enough memory to keep both.

```
Erase flash device before writing? [confirm] yes/no
```

The copying process takes several minutes; the time differs from network to network. During the copy process, messages are displayed to indicate which files have been accessed.

The exclamation point (!) indicates that the copy process is taking place. Each exclamation point (!) indicates that ten packets were transferred successfully. A checksum verification of the image occurs after the image is written to flash memory. The router/access server reloads itself with the new image when the software upgrade is complete.

Information about troubleshooting software transfer problems is available in [Common Problems in Installing Images Using TFTP or an RCP Server](#).

12. Before reloading, verify that the following things are correct:

Verify that the image is properly installed in flash memory and that the boot system commands point to the proper file to load. Information about verifying the image and boot commands is available in [Common Problems in Installing Images Using TFTP or an RCP Server](#).

To reload, type:

```
Router(boot)#reload
*Mar 1 00:30:49.972: %SYS-5-CONFIG_I: Configured from console by console
System configuration has been modified. Save? [yes/no]: NO
Proceed with reload? [confirm] YES
```

13. Verify that the router is running with the proper image.

After the reload is complete, the router should be running the desired Cisco IOS image. Use the [show version](#) command to verify.

Information about problems with verifying the image is available in [Common Problems in Installing Images Using TFTP or an RCP Server](#).

Sample Output - Run From Flash Installation

```
Router>en
Password:
Router#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#config-register 0x2101
Router(config)#^Z
Router#
*Mar 1 00:03:32.656: %SYS-5-CONFIG_I: Configured from console by console
riou#wr mem
Building configuration...
[OK]
Router#reload
Proceed with reload? [confirm]

*Mar 1 00:03:49.211: %SYS-5-RELOAD: Reload requested

System Bootstrap, Version 11.1(7)AX [kuong (7)AX], EARLY DEPLOYMENT RELEASE SO
WARE (fc2)
```

Copyright (c) 1994-1996 by cisco Systems, Inc.
C1600 processor with 18432 Kbytes of main memory

program load complete, entry point: 0x4018060, size: 0x1da950

Restricted Rights Legend

Use, duplication, or disclosure by the Government is subject to restrictions as set forth in subparagraph (c) of the Commercial Computer Software - Restricted Rights clause at FAR sec. 52.227-19 and subparagraph (c) (1) (ii) of the Rights in Technical Data and Computer Software clause at DFARS sec. 252.227-7013.

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

Cisco Internetwork Operating System Software
IOS (tm) 1600 Software (C1600-BOOT-R), Version 11.1(7)AX, EARLY DEPLOYMENT RELEASE SOFTWARE (fc2)
Copyright (c) 1986-1996 by cisco Systems, Inc.
Compiled Fri 18-Oct-96 00:20 by kuong
Image text-base: 0x04018060, data-base: 0x02005000

cisco 1600 (68360) processor (revision C) with 17920K/512K bytes of memory.
Processor board ID 05317740
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
Basic Rate ISDN software, Version 1.0.
1 Ethernet/IEEE 802.3 interface.
1 Serial(sync/async) network interface.
1 ISDN Basic Rate interface.
System/IO memory with parity disabled
8K bytes of non-volatile configuration memory.
12288K bytes of processor board PCMCIA flash (Read/Write)

Press RETURN to get started!

```
%LINEPROTO-5-UPDOWN: Line protocol on Interface BRI0, changed state to down
.....
*Mar 1 00:00:20.404: %SYS-5-CONFIG_I: Configured from memory by console
*Mar 1 00:00:20.415: %SYS-5-RESTART: System restarted --
Cisco Internetwork Operating System Software
IOS (tm) 1600 Software (C1600-BOOT-R), Version 11.1(7)AX, EARLY DEPLOYMENT RELEASE SOFTWARE (fc2)
Copyright (c) 1986-1996 by cisco Systems, Inc.
Compiled Fri 18-Oct-96 00:20 by kuong
Router(boot)>en
Password:
Router(boot)#
Router(boot)#conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(boot)(config)#con
Router(boot)(config)#config-register 0x2102
Router(boot)(config)#^Z
Router(boot)#
Router(boot)#ping 172.17.247.195

Type escape sequence to abort.
Sending 5, 100-byte ICMP Echoes to 172.17.247.195, timeout is 2 seconds:
!!!!
Success rate is 100 percent (5/5), round-trip min/avg/max = 1/200/1000 ms

Router(boot)#copy tftp flash
```

```
PCMCIA flash directory:
File Length Name/status
 1 3489036 c1600-y-l.112-19.P1

[3489036 bytes used, 8593876 available, 12582912 total]
Address or name of remote host [255.255.255.255]?172.17.247.195
Source file name? c1600-y-l.112-18.P
Destination file name [c1600-y-l.112-18.P]?
Accessing file 'c1600-y-l.112-18.P' on 172.17.247.195...
Loading c1600-y-l.112-18.P from 172.17.247.195 (via Ethernet0): ! [OK]

Erase flash device before writing? [confirm] NO

Copy 'c1600-y-l.112-18.P' from server
  as 'c1600-y-l.112-18.P' into Flash WITHOUT erase? [yes/no] YES
Loading c1600-y-l.112-18.P .from 172.17.247.195 (via Ethernet0):!!!!!!!!!!!!!!
.....
[OK - 3487556/5365412 bytes]

Verifying checksum... OK (0x975A)
Flash device copy took 00:06:40 [hh:mm:ss]

Router(boot)#reload
*Mar 1 00:30:49.972: %SYS-5-CONFIG_I: Configured from console by consoled

System configuration has been modified. Save? [yes/no]: NO
Proceed with reload? [confirm] YES

*Mar 1 00:30:58.932: %SYS-5-RELOAD: Reload requested

System Bootstrap, Version 11.1(7)AX [kuong (7)AX], EARLY DEPLOYMENT RELEASE SO
WARE (fc2)
Copyright (c) 1994-1996 by cisco Systems, Inc.
C1600 processor with 18432 Kbytes of main memory

program load complete, entry point: 0x4018060, size: 0x1da950

%SYS-4-CONFIG_NEWER: Configurations from version 11.2 may not be correctly und
stood.
```

Restricted Rights Legend

Use, duplication, or disclosure by the Government is subject to restrictions as set forth in subparagraph (c) of the Commercial Computer Software - Restricted Rights clause at FAR sec. 52.227-19 and subparagraph (c) (1) (ii) of the Rights in Technical Data and Computer Software clause at DFARS sec. 252.227-7013.

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

Cisco Internetwork Operating System Software
IOS (tm) 1600 Software (C1600-Y-L), Version 11.2(19)P1, RELEASE SOFTWARE (fc1
Copyright (c) 1986-1999 by cisco Systems, Inc.
Compiled Wed 18-Aug-99 10:22 by jaturner
Image text-base: 0x08364770, data-base: 0x02005000

cisco 1603 (68360) processor (revision C) with 13824K/4608K bytes of memory.
Processor board ID 05317740, with hardware revision 00000000
Bridging software.
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
Basic Rate ISDN software, Version 1.0.
1 Ethernet/IEEE 802.3 interface(s)
1 serial(sync/async) network interface(s)
1 ISDN Basic Rate interface(s)
System/IO memory with parity disabled

```
2048K bytes of DRAM onboard 16384K bytes of DRAM on SIMM
System running from FLASH
8K bytes of non-volatile configuration memory.
12288K bytes of processor board PCMCIA flash (Read ONLY)
```

Press RETURN to get started!

```
*Mar 1 00:00:18.940: %LINK-3-UPDOWN: Interface BRI0, changed state to up
*Mar 1 00:00:18.944: %LINK-3-UPDOWN: Interface Ethernet0, changed state to up
*Mar 1 00:00:24.019: %SYS-5-CONFIG_I: Configured from memory by console
*Mar 1 00:00:24.023: %SYS-5-RESTART: System restarted --
Cisco Internetwork Operating System Software
IOS (tm) 1600 Software (C1600-Y-L), Version 11.2(18)P, RELEASE SOFTWARE (fc1)
Copyright (c) 1986-1999 by cisco Systems, Inc.
Compiled Wed 18-Aug-99 10:22 by jaturner
Router>sh ver
Cisco Internetwork Operating System Software
IOS (tm) 1600 Software (C1600-Y-L), Version 11.2(18)P, RELEASE SOFTWARE (fc1)
Copyright (c) 1986-1999 by cisco Systems, Inc.
Compiled Wed 18-Aug-99 10:22 by jaturner
Image text-base: 0x08364770, data-base: 0x02005000

ROM: System Bootstrap, Version 11.1(7)AX [kuong (7)AX], EARLY DEPLOYMENT RELEA
SOFTWARE (fc2)
ROM: 1600 Software (C1600-BOOT-R), Version 11.1(7)AX, EARLY DEPLOYMENT RELEASE
OFTWARE (fc2)

riou uptime is 9 minutes
System restarted by reload
System image file is "flash:c1600-y-l.112-18.P", booted via flash

cisco 1603 (68360) processor (revision C) with 13824K/4608K bytes of memory.
Processor board ID 05317740, with hardware revision 00000000
Bridging software.
X.25 software, Version 2.0, NET2, BFE and GOSIP compliant.
Basic Rate ISDN software, Version 1.0.
1 Ethernet/IEEE 802.3 interface(s)
1 serial(sync/async) network interface(s)
1 ISDN Basic Rate interface(s)
System/IO memory with parity disabled
2048K bytes of DRAM onboard 16384K bytes of DRAM on SIMM
System running from FLASH
8K bytes of non-volatile configuration memory.
12288K bytes of processor board PCMCIA flash (Read ONLY)

Router>
```

Related Information

- [General Technical Tips for Cisco's Router Platforms](#)
- [Common Problems in Installing Images Using TFTP or an RCP Server](#)

[Cisco Systems TAC Certified](#)

[Learn more about Cisco TAC Certification...](#)

Home	What's New	How to Buy	Login	Register	Feedback	Search	Map/Help
----------------------	----------------------------	----------------------------	-----------------------	--------------------------	--------------------------	------------------------	--------------------------

All contents copyright © 1992--2000 Cisco Systems Inc. [Important Notices](#) and [Privacy Statement](#).