



Cisco 7301 Router Troubleshooting and Configuration Notes

Purpose of This Document

The primary source of troubleshooting information for the Cisco 7301 router is an online and interactive online troubleshooting module. The troubleshooting module points to various Cisco documents for solutions.

This document is one of many Cisco documents referred to from the Troubleshooting Assistant module. While this document can be read as a standalone document, its purpose is to provide solutions to problems identified using the online Troubleshooting Assistant module.

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

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Password Recovery

If you have lost your password, follow this procedure to define a new password.

-
- Step 1** Attach a terminal or PC with terminal emulation to the console port of the router. Use the following terminal settings:
- 9600 baud rate
 - No parity
 - 8 data bits
 - 2 stop bits
 - No flow control
- The required console cable specifications are described in [Console and Auxiliary Port Signals and Pinouts](#).
- Step 2** If you still have access to the router EXEC prompt, enter **show version** and record the setting of the configuration register; it is usually 0x2102 or 0x102.
- Step 3** If you do not have access to the router EXEC prompt (because of a lost login or TACACS password), you can safely consider that your configuration register is set to 0x2102.
- Step 4** Using the power switch, turn off the router and then turn it back on.
- Step 5** Press the **Break** key within 60 seconds of the power-up to put the router into ROMmon. If the break sequence does not work, see [Standard Break Key Sequence Combinations During Password Recovery](#) for other key combinations.

- Step 6** Enter **confreg** at the `rommon 1>` prompt to change the software configuration register to boot from disk0: without loading the configuration. When prompted to change the configuration, enter **y** and respond to the dialog as indicated in the sample output.

```
rommon 1> confreg

Configuration Summary
enabled are:
load rom after netboot fails
console baud:9600
boot:image specified by the boot system commands
or default to:cisco2-c7300

do you wish to change the configuration? y/n [n]: y
enable "diagnostic mode"? y/n [n]:
enable "use net in IP bcast address"? y/n [n]:
disable "load rom after netboot fails"? y/n [n]:
enable "use all zero broadcast"? y/n [n]:
enable "break/abort has effect"? y/n [n]:
enable "ignore system config info"? y/n [n]: y
change console baud rate? y/n [n]:
change the boot characteristics? y/n [n]:
```

```
Configuration Summary
enabled are:
load rom after netboot fails
ignore system config info
console baud:9600
boot:image specified by the boot system commands
or default to:cisco2-c7300

do you wish to change the configuration? y/n [n]:
```

```
You must reset or power cycle for new config to take effect
>
```

- Step 7** Enter **reset** at the `rommon 2>` prompt. The router reboots but ignores its saved configuration.
- Step 8** Enter **no** when asked if you want to enter the initial configuration dialog or press **Ctrl-C** to skip the initial setup procedure.
- Step 9** Enter **enable** at the `Router>` prompt. You will be in enable mode and see the `Router#` prompt.
- Step 10** Enter **config mem** or **copy start running** to copy the startup configuration stored in nonvolatile random access memory (NVRAM) into memory.
- Step 11** Enter **wr term** or **show running**.
The **show running** and **wr term** commands show the configuration of the router. In this configuration, you see under all the interfaces the **shutdown** command, which means all interfaces are currently shutdown. Also, you can see the passwords either in encrypted or unencrypted format.
- Step 12** Enter **config term** and make the changes. The prompt is now `hostname(config)#`.
- Step 13** Enter **enable secret <password>**.
- Step 14** Enter the **no shutdown** command on every interface that is used. If you enter a **show ip interface brief** command, every interface that you want to use should indicate that the Status and Protocol are up.
- Step 15** Enter **config-register 0x2102**, or the value you recorded in [Step 2](#).
- Step 16** Enter **End** or type **Ctrl-Z** to leave the configuration mode. The prompt is now `hostname#`.
- Step 17** Enter **reload** to reboot the router and return it to the state it was in before creating a new password.

Step 18 Enter **write mem** or **copy running startup** to commit the changes.

Step 19 Log in to the router with the new password.

Example of Password Recovery Procedure

This example recovers a password on a Cisco 2600 router by defining a new password. This example will be almost exactly what you experience on the Cisco 7301 router.

```
Router> enable
Password:
Password:
Password:
% Bad secrets

Router> show version
Cisco Internetwork Operating System Software
IOS (tm) C2600 Software (C2600-IS-M), Version 12.0(7)T, RELEASE SOFTWARE (fc2)
Copyright (c) 1986-1999 by cisco Systems, Inc.
Compiled Tue 07-Dec-99 02:21 by phanguye
Image text-base: 0x80008088, data-base: 0x80C524F8

ROM: System Bootstrap, Version 11.3(2)XA4, RELEASE SOFTWARE (fc1)

Router uptime is 3 minutes
System returned to ROM by abort at PC 0x802D0B60
System image file is "flash:c2600-is-mz.120-7.T"

cisco 2611 (MPC860) processor (revision 0x202) with 26624K/6144K bytes of memory.
Processor board ID JAB031202NK (3878188963)
M860 processor: part number 0, mask 49
Bridging software.
X.25 software, Version 3.0.0.
Basic Rate ISDN software, Version 1.1.
2 Ethernet/IEEE 802.3 interface(s)
2 Serial(sync/async) network interface(s)
1 ISDN Basic Rate interface(s)
32K bytes of non-volatile configuration memory.
--More-- 8192K bytes of processor board System flash partition 1 (Read/Write)
8192K bytes of processor board System flash partition 2 (Read/Write)

Configuration register is 0x2102

Router>
!--- The router was just power cycled and during bootup a
!--- break sequence was sent to the router.
!

*** System received an abort due to Break Key ***

signal= 0x3, code= 0x500, context= 0x813ac158
PC = 0x802d0b60, Vector = 0x500, SP = 0x80006030
rommon 1> confreg

Configuration Summary
enabled are:
load rom after netboot fails
console baud:9600
boot:image specified by the boot system commands
or default to:cisco2-C2600

do you wish to change the configuration? y/n [n]: y
```

```

enable "diagnostic mode"? y/n [n]:
enable "use net in IP bcast address"? y/n [n]:
disable "load rom after netboot fails"? y/n [n]:
enable "use all zero broadcast"? y/n [n]:
enable "break/abort has effect"? y/n [n]:
enable "ignore system config info"? y/n [n]: y
change console baud rate? y/n [n]:
change the boot characteristics? y/n [n]:

```

Configuration Summary

```

enabled are:
load rom after netboot fails
ignore system config info
console baud:9600
boot:image specified by the boot system commands
      or default to:cisco2-C2600

```

```
do you wish to change the configuration? y/n [n]:
```

```

You must reset or power cycle for new config to take effect
rommon 2 > reset

```

```

System Bootstrap, Version 11.3(2)XA4, RELEASE SOFTWARE (fc1)
Copyright (c) 1999 by cisco Systems, Inc.
TAC:Home:SW:IOS:Specials for info
C2600 platform with 32768 Kbytes of main memory

```

```
program load complete, entry point: 0x80008000, size: 0x6fdb4c
```

```

Self decompressing the image : #####
#####
#####
#####
##### [OK]

```

Restricted Rights Legend

```

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(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) C2600 Software (C2600-IS-M), Version 12.0(7)T, RELEASE SOFTWARE (fc2)
Copyright (c) 1986-1999 by cisco Systems, Inc.
Compiled Tue 07-Dec-99 02:21 by phanguye
Image text-base: 0x80008088, data-base: 0x80C524F8

```

```

cisco 2611 (MPC860) processor (revision 0x202) with 26624K/6144K bytes of memory.
Processor board ID JAB031202NK (3878188963)
M860 processor: part number 0, mask 49
Bridging software.
X.25 software, Version 3.0.0.

```

```
Basic Rate ISDN software, Version 1.1.
2 Ethernet/IEEE 802.3 interface(s)
2 Serial(sync/async) network interface(s)
1 ISDN Basic Rate interface(s)
32K bytes of non-volatile configuration memory.
8192K bytes of processor board System flash partition 1 (Read/Write)
8192K bytes of processor board System flash partition 2 (Read/Write)
```

--- System Configuration Dialog ---

Would you like to enter the initial configuration dialog? [yes/no]: **n**

Press RETURN to get started!

```
00:00:19: %LINK-3-UPDOWN: Interface BRI0/0, changed state to up
00:00:19: %LINK-3-UPDOWN: Interface Ethernet0/0, changed state to up
00:00:19: %LINK-3-UPDOWN: Interface Ethernet0/1, changed state to up
00:00:19: %LINK-3-UPDOWN: Interface Serial0/0, changed state to down
00:00:19: %LINK-3-UPDOWN: Interface Serial0/1, changed state to down
00:00:20: %LINEPROTO-5-UPDOWN: Line protocol on Interface BRI0/0, changed state to down
00:00:20: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/0, changed state to up
Router>
00:00:20: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state
to up
00:00:20: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/0, changed state
to down
00:00:20: %LINEPROTO-5-UPDOWN: Line protocol on Interface Serial0/1, changed state
to down
00:00:50: %SYS-5-RESTART: System restarted --
Cisco Internetwork Operating System Software
IOS (tm) C2600 Software (C2600-IS-M), Version 12.0(7)T, RELEASE SOFTWARE (fc2)
Copyright (c) 1986-1999 by cisco Systems, Inc.
Compiled Tue 07-Dec-99 02:21 by phanguye
00:00:50: %LINK-5-CHANGED: Interface BRI0/0, changed state to administratively down
00:00:52: %LINK-5-CHANGED: Interface Ethernet0/0, changed state to administratively
down
00:00:52: %LINK-5-CHANGED: Interface Serial0/0, changed state to administratively
down
00:00:52: %LINK-5-CHANGED: Interface Ethernet0/1, changed state to administratively
down
00:00:52: %LINK-5-CHANGED: Interface Serial0/1, changed state to administratively down
00:00:53: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/0, changed state
to down
00:00:53: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/1, changed state
to down
Router>
Router> enable
Router# copy start run
Destination filename [running-config]?
1324 bytes copied in 2.35 secs (662 bytes/sec)
Router#
00:01:24: %LINEPROTO-5-UPDOWN: Line protocol on Interface BRI0/0:1, changed state to
down
00:01:24: %LINEPROTO-5-UPDOWN: Line protocol on Interface BRI0/0:2, changed state to
down
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# enable secret cisco
Router(config)# ^z
00:01:54: %SYS-5-CONFIG_I: Configured from console by console
Router# show ip interface brief
```

Interface	IP-Address	OK?	Method	Status	Protocol
-----------	------------	-----	--------	--------	----------

```

Ethernet0/0    10.200.40.37    YES    TFTP    administratively down    down
Serial0/0     unassigned      YES    TFTP    administratively down    down
BRI0/0       193.251.121.157  YES    unset   administratively down    down
BRI0/0:1     unassigned      YES    unset   administratively down    down
BRI0/0:2     unassigned      YES    unset   administratively down    down
Ethernet0/1   unassigned      YES    TFTP    administratively down    down
Serial0/1     unassigned      YES    TFTP    administratively down    down
Loopback0     193.251.121.157  YES    TFTP    up          up
Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)# int Ethernet0/0
Router(config-if)# no shut
Router(config-if)#
00:02:14: %LINK-3-UPDOWN: Interface Ethernet0/0, changed state to up
00:02:15: %LINEPROTO-5-UPDOWN: Line protocol on Interface Ethernet0/0, changed state
to up
Router(config-if)# int BRI0/0
Router(config-if)# no shut
Router(config-if)#
00:02:26: %LINK-3-UPDOWN: Interface BRI0/0:1, changed state to down
00:02:26: %LINK-3-UPDOWN: Interface BRI0/0:2, changed state to down
00:02:26: %LINK-3-UPDOWN: Interface BRI0/0, changed state to up
00:02:115964116991: %ISDN-6-LAYER2UP: Layer 2 for Interface BR0/0, TEI 68 changed
to up
Router(config-if)# ^z
Router#
00:02:35: %SYS-5-CONFIG_I: Configured from console by console
Router# copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
Router# show version
Cisco Internetwork Operating System Software
IOS (tm) C2600 Software (C2600-IS-M), Version 12.0(7)T, RELEASE SOFTWARE (fc2)
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Compiled Tue 07-Dec-99 02:21 by phanguye
Image text-base: 0x80008088, data-base: 0x80C524F8

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System image file is "flash:c2600-is-mz.120-7.T"

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Basic Rate ISDN software, Version 1.1.
2 Ethernet/IEEE 802.3 interface(s)
2 Serial(sync/async) network interface(s)
1 ISDN Basic Rate interface(s)
32K bytes of non-volatile configuration memory.
--More-- 8192K bytes of processor board System flash partition 1 (Read/Write)
8192K bytes of processor board System flash partition 2 (Read/Write)

Configuration register is 0x2142

Router# configure terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#config-reg 0x2102
Router(config)#^z
00:03:20: %SYS-5-CONFIG_I: Configured from console by console

```

```

Router# show version
Cisco Internetwork Operating System Software
IOS (tm) C2600 Software (C2600-IS-M), Version 12.0(7)T, RELEASE SOFTWARE (fc2)
Copyright (c) 1986-1999 by cisco Systems, Inc.
Compiled Tue 07-Dec-99 02:21 by phanguye
Image text-base: 0x80008088, data-base: 0x80C524F8

ROM: System Bootstrap, Version 11.3(2)XA4, RELEASE SOFTWARE (fc1)

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Basic Rate ISDN software, Version 1.1.
2 Ethernet/IEEE 802.3 interface(s)
2 Serial(sync/async) network interface(s)
1 ISDN Basic Rate interface(s)
32K bytes of non-volatile configuration memory.
--More-- 8192K bytes of processor board System flash partition 1 (Read/Write)
8192K bytes of processor board System flash partition 2 (Read/Write)

Configuration register is 0x2142 (will be 0x2102 at next reload)

Router#

```

Installing Software Images Using a TFTP or RCP Server Application

This section explains how to install Cisco IOS software onto “Run from RAM” Cisco routers using a Trivial File Transfer Protocol (TFTP) server or Remote Copy Protocol (RCP) server application.

Routers that run an IOS software image by first decompressing the executable code in RAM and then executing that code are “Run from RAM” routers. The Cisco 7301 router is such a router.



Note

To use the troubleshooting tools described in this document, you must be a registered user and you must be logged in.

Procedure Overview

**Note**

Some of the documents referred to in this procedure might not contain commands and output specific to the 7301 router. If you encounter references to slot0: or bootflash:, assume it is disk0: and bootdisk:, respectively, for the 7301 router.

- Install a TFTP Server.

A TFTP server or an RCP server application must be installed on a TCP/IP-ready workstation or PC. Once the application is installed, a minimal level of configuration must be performed.

- The TFTP application must be configured to operate as a TFTP *server* as opposed to a TFTP *client*.
- The outbound file directory must be specified. This is the directory in which the Cisco IOS software 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 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 Cisco.com.

- Download a [TFTP Server for Windows 95/98/NT](#).
- Download the [Cisco IOS software image](#) onto your workstation or PC.

You also need to have a valid Cisco IOS software image for your router. Make sure the image supports your hardware and software features, and that your router has enough memory to run it. If you do not yet have a Cisco IOS software image, or if you are not sure the image you have meets all the necessary requirements, see [How to Choose a Cisco IOS Software Release](#).

Software Installation or Upgrade Procedure

Use this procedure to install Cisco IOS software using a TFTP server or RCP server application.



Note

For RCP applications, substitute RCP for every occurrence of TFTP. For example, use the **copy rcp disk0:** command instead of the **copy tftp disk0:** command. Also note that extra configuration is required on the router for RCP applications, as compared to TFTP.

Step 1 Establish a console session to the router.

This can be done with a direct console connection or a virtual Telnet connection. A direct console connection is preferred over a Telnet connection because a Telnet connection is terminated 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 the Hyperterminal accessory application on the PC, and use the following settings:

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

Step 2 Verify that the TFTP server has IP connectivity to the router.

Verify that the TFTP server has IP connectivity to the router by confirming that the router IP address and default gateway (if necessary) are set. Ping the router to verify that a network connection exists between it and the TFTP server. More information on IP addresses is available in [“Common Problems Installing Images Using a TFTP or RCP Server”](#) section on page 12.

Step 3 Copy the new software image from the TFTP server to the router.

```
Router> enable
Password: password
Router#
Router# copy tftp disk0:
```

If you get a `>` or `rommon >` prompt after connecting to the router through the console port, your router is in ROM monitor (ROMmon) mode. For a ROMmon recovery procedure, see [ROMmon prompt: rommon#>](#).

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



Note

Keep a copy of the router configuration before upgrading the router software. The upgrade itself does not affect the configuration, which is stored in NVRAM.

Step 4 Specify the IP address of the TFTP server.

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

Step 5 Specify the filename of the Cisco IOS software image to be installed. The image name varies depending on the filename of the image on the TFTP server.

```
Source file name? c7300-js-mz.121-9.EX
```

- Step 6** Specify the destination 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? c7300-js-mz.121-9.EX
```

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 have been transferred successfully. A checksum verification of the image occurs after the image is written to disk0:.

Information about troubleshooting software transfer problems is available in [“Common Problems Installing Images Using a TFTP or RCP Server”](#) section on page 12.

- Step 7** Before reloading, verify the correct installation and commands.

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 Installing Images Using a TFTP or RCP Server”](#) section on page 12.

```
Router# 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
```

- Step 8** Verify that the router is running with the proper image. After the reload is complete, the router should be running the desired Cisco IOS software image. Use the **show version** command to verify.

Information about problems with verifying the image is available in [“Common Problems Installing Images Using a TFTP or RCP Server”](#) section on page 12.

7301 Router Sample Output

```
Router# dir disk0:

Directory of disk0:/

 1  -rw-      4970544   Jul 02 2001 08:25:54 c7301-js-mz.121-9.EX
16273408 bytes total (13488128 bytes free)

Router# copy tftp disk0:
Address or name of remote host []? 172.17.247.195
Source filename []?c7300-js-mz.121-9.EX
Destination filename [c7300-js-mz.121-9.EX]?
Accessing tftp://172.17.247.195/ c7300-js-mz.121-9.EX...
Loading c7300-js-mz.121-9.EX from 172.17.247.195 (via Ethernet0/0):
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
(...)
!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!
Verifying checksum... OK (0x6BA0)
4970544 bytes copied in 125.731 secs (67263 bytes/sec)

Router# reload
Proceed with reload? [confirm]
6d23h: %SYS-5-RELOAD: Reload requested
...
```

Common Problems Installing Images Using a TFTP or RCP Server



Note

Some of the documents referred to in this procedure might not contain commands and output specific to the 7304 router. If you encounter references to slot0: or bootflash:, assume it is disk0: and bootdisk:, respectively, for the 7304 router.



Note

For RCP applications, substitute RCP for every occurrence of TFTP. For example, use the **copy rcp disk0:** command instead of the **copy tftp disk0:** command.

Saving While in Boot Mode

Do not use the saving commands (**write mem** or **copy running-config startup-config**) and answer **no** to any prompt suggesting that you save your current configuration. If you save while you are in boot mode, your configuration can be partially or completely erased.

```
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]

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

Default Gateway

A default gateway can be set only if the following are true:

- The router is running a boot image that has no routing support.
- IP routing is disabled.

Adding the Default Gateway in the Configuration

After determining the IP address of the default gateway, enter the following command in configuration mode:

```
ip default-gateway [ip address]
```

Verifying the TFTP Server and the Router Are in the Same Network

You need to compare the IP addresses and masks of the TFTP server and the Ethernet interface of the router as described in the following two examples:

- The TFTP server IP address is 172.17.247.195 and the mask is 255.255.0.0. The interface Ethernet 0 of the router IP address is 172.17.3.192 and the mask is 255.255.0.0. In this example, the TFTP server and this interface of the router are in the same network so a default gateway is not required.
- The TFTP server IP address is 172.17.247.195 and the mask is 255.255.0.0. The interface Ethernet 0 of the router IP address is 172.10.3.192 and the mask is 255.255.0.0. In this example, they are on different IP networks so it is necessary to configure a default gateway on the router.

Determining if a Default Gateway Is Configured

The default gateway is always the next hop that any packet has to cross to reach the workstation where you have the TFTP server or Telnet session source, or both. If a default gateway is configured for the router, the **show running-config | include default-gateway** command shows the IP address of the default gateway.

```
Router# show running-config | include default-gateway
ip default gateway 172.19.251.37
```

IP Addresses

Determining the IP Address and Mask on the Router

Look for the **IP address** command under the interface Ethernet statement in your configuration as shown in the following example:

```
Router> en
Password:
Router# show run
Building configuration...

Current configuration:
!
version 12.1
service timestamps debug uptime
.....

interface fastEthernet 0/0
  ip address 172.17.3.192 255.255.0.0
```

Determining the IP Address of the TFTP Server on Windows 95

From the toolbar, select **Start** and then **Run**. Enter **winipcfg** and then click **OK** to display the IP configuration dialog box.

Determining the IP Address of the TFTP Server on a UNIX Workstation

Enter the command **netstat -in**. The IP addresses of the interfaces on your workstation are displayed. Select the one that goes into the router network.

Troubleshooting Errors During Software Transfer

“Text checksum verification failure” During the Copy Operation

If you have seen many periods (.) instead of exclamation points (!) during the copy operation, you might see a message similar to the following example:

```
COPY: Text checksum verification failure
TFTP from 172.17.247.195 failed/aborted
Verifying checksum... invalid (expected 0x62B7,
computed 0x60B9)
```

If you enter a **dir disk0:** command, you might see something similar to the following example:

```
router# dir disk0:
Directory of disk0:/
 1 -rw- 3437967 c7300-js-mz.121-9.EX
 2 -rw- 3489036 c7300-js-mz.121-9.EX
 3 -rw- 290304 c7300-js-mz.121-9.EX [invalid checksum]
```

In both cases, a checksum failure indicates that the file has not been properly copied into the memory and you need to copy it again. First verify that the file you copied to the TFTP server is the same size as the original file. (Be aware that the size is listed in bytes in the router and is sometimes listed in kilobytes in TFTP servers.) If the network is very busy, you may also see this behavior; try the copy again when the network is not so loaded, or establish a direct Ethernet connection between the TFTP server and the router to download the file.

"Error opening tftp"

The following shows an example of the “error opening tftp” error:

```
router# copy tftp disk0:
Address or name of remote host [172.17.0.5]?
Source filename [c7300-js-mz.121-9.EX]?
Destination filename [c7300-js-mz.121-9.EX]?
Accessing tftp://172.17.0.5/c7300-js-mz.121-9.EX...
%Error opening tftp://172.17.0.5/c7300-js-mz.121-9.EX (No such file or directory)
```

Verify that the file is in the root directory of the TFTP server, and check to see if you entered the correct filename. Some easily mistaken letters are I (uppercase i), l (lowercase L) and 1 (the numeral one).

Timeout Error Messages

Verify that the TFTP server is open on your PC. Also, make sure the file is in the root directory (from the TFTP application software menu bar, select **View—>Options**).

“Can't open file"

Verify that the TFTP server is running on your PC. Verify that you have copied the exact filename. Some easily mistaken letters are I (uppercase i), l (lowercase L), and 1 (the numeral one).

Specifying the Device When Copying a Software Image from One Device to Another

The following table contains a list of command options for specifying the device in certain commands, for example, the **copy tftp**, **copy rcp**, and **dir** commands. The command options vary depending on the platform. The options marked with an asterisk (*) are not valid for the Cisco 7304 router.

Command Option	Option Description
bootdisk:	Copy to bootdisk: file system
disk0:	Copy to disk0: file system
flash:*	Copy to flash: file system
ftp:	Copy to ftp: file system
lex:	Copy to lex: file system
null:	Copy to null: file system
nvrn:	Copy to nvrn: file system
rep:	Copy to rcp: file system
running-config	Update (merge with) current system configuration
slot0:*	Copy to slot0: file system
slot1:*	Copy to slot1: file system
startup-config	Copy to startup configuration
system:	Copy to system: file system
tftp:	Copy to tftp: file system

* Indicates a **copy tftp** or **copy rcp** command option that is not valid on the Cisco 7304 router.

Command option examples:

```
Router# copy tftp disk0:
Address or name of remote host [255.255.255.255]? 172.17.247.195
Source file name? c7300-js-mz.121-9.EX
Destination file name? c7300-js-mz.121-9.EX
. . . .

Router# dir disk0:
Directory of disk0:/

   1  -rw-      2351828   Jul 02 2001 08:25:54 c7300-js-mz.121-9.EX

16273408 bytes total (13488128 bytes free)
```

Before Reloading the New Software Image

- Verify that the new software image has been stored properly.

Use the **dir disk0:** command to make sure that the file has been saved, that the size is correct, and that you do not have an invalid checksum message. If the file does not appear, if it appears followed by “[invalid checksum],” or if the size does not correspond to the file size on the TFTP server, you need to start the installation again. (The size is listed in bytes in the router and is sometimes listed in kilobytes in TFTP servers.)

- Verify that the boot environment variable points to the correct software image.

To display the contents of the BOOT environment variable, the name of the configuration file pointed to by the CONFIG_FILE environment variable, the contents of the BOOTLDR environment variable, and the configuration register setting, use the **show bootvar** command.

The BOOT environment variable specifies a list of bootable images on various devices. The CONFIG_FILE environment variable specifies the configuration file used during system initialization. The BOOTLDR environment variable specifies the device and filename containing the boot image that ROM uses for booting. You set these environment variables with the **boot system**, **boot config**, and **boot bootldr** commands, respectively.

```
Router> en
Password:
Router# show bootvar
BOOT variable = disk0:c7300-p-mz.121-99.WS_DAILY_BUILD_20010706,12
CONFIG_FILE variable does not exist
BOOTLDR variable =
Configuration register is 0x2102
```

- Verify that the boot system commands are in the right order in the configuration.

The router stores and executes the boot system commands in the order in which you enter them in the configuration file. If a boot system command entry in the list specifies an invalid device or filename, the router skips that entry.

```
router> en
Password:
Router# conf t
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#
Router(config)#boot system flash disk0:c7300-js-mz.121-9.EX
Router(config)#boot system flash disk0:
```

Troubleshooting Software Image Verification

Incorrect Version

If the version that is appearing in the output of the **show version** command is not the file that you just loaded, follow the procedures in [“Before Reloading the New Software Image”](#) section on page 16.

Boot Prompt Still Displayed

If, after reloading you still see the boot prompt, follow the procedures in [“Before Reloading the New Software Image”](#) section on page 16.

Verify that the config register value is correct. The last digit should be a 2. You can check this with the **show version** command. If the value is not correct, you need to restore a valid value and reload the router.

Debugging PPP Negotiation

This section shows sample output when **debug ppp negotiation** is enabled, including what you should see when PPP is working correctly and what is displayed when there are problems in PPP negotiation.

Successful PPP Negotiation

In successful PPP negotiation, the line protocol must be up and the Link Control Protocol (LCP) state must be open.

```
Router#
*Mar 16 15:14:41.757:Se0/1 LCP:O CONFREQ [Listen] id 91 len 10
*Mar 16 15:14:41.757:Se0/1 LCP: MagicNumber 0x521AE3AB (0x0506521AE3AB)
*Mar 16 15:14:41.757:Se0/1 LCP:I CONFREQ [Listen] id 1 len 10
*Mar 16 15:14:41.757:Se0/1 LCP: MagicNumber 0x51C7619B (0x050651C7619B)
*Mar 16 15:14:41.761:Se0/1 LCP:O CONFACK [Listen] id 1 len 10
*Mar 16 15:14:41.761:Se0/1 LCP: MagicNumber 0x51C7619B (0x050651C7619B)
*Mar 16 15:14:41.761:Se0/1 LCP:I CONFACK [ACKsent] id 91 len 10
*Mar 16 15:14:41.761:Se0/1 LCP: MagicNumber 0x521AE3AB (0x0506521AE3AB)
*Mar 16 15:14:41.761:Se0/1 LCP:State is Open
*Mar 16 15:14:41.765:Se0/1 PPP:Phase is UP
```

The following describes the exchange in the example:

O CONFREQ

Outgoing Configuration Request packet is sent to the remote router

I CONFREQ

Incoming Configuration Request packet is sent by the remote router

O CONFACK

Outgoing Configuration Acknowledgement is sent to the remote router. This ACKs the CONFREQ sent by remote router. In this packet, the Magic Number must match what was sent in the CONFREQ packet.

I CONFACK

Incoming Configuration Acknowledgement is sent from remote router. This ACKs the CONFREQ sent by the local router. In this packet, the Magic Number must match what was sent in the CONFREQ packet.

The following example uses the **show interface** command to display information about the interface using PPP encapsulation:

```
Router# sh int s0/1
Serial0/1 is up, line protocol is up
  Hardware is PQQUICC with Fractional T1 CSU/DSU
  Internet address is 172.16.1.2/24
  MTU 1500 bytes, BW 384 Kbit, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation PPP, loopback not set
  Keepalive set (10 sec)
  LCP Open
  Open:IPCP, CDPCP
  Last input 00:00:00, output 00:00:00, output hang never
  Last clearing of "show interface" counters 00:09:13
  Input queue:0/75/0/0 (size/max/drops/flushes); Total output drops:0
  Queueing strategy:weighted fair
  Output queue:0/1000/64/0 (size/max total/threshold/drops)
    Conversations 0/1/128 (active/max active/max total)
    Reserved Conversations 0/0 (allocated/max allocated)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    31 packets input, 1034 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    123 packets output, 3196 bytes, 0 underruns
    0 output errors, 0 collisions, 23 interface resets
    0 output buffer failures, 0 output buffers swapped out
    0 carrier transitions
  DCD=up DSR=up DTR=up RTS=up CTS=up
```

Local Router Is Not Receiving Packets from Its Remote Peer

In this example, the local router is sending LCP CONFREQs and timing out because the remote peer router is not sending a reply. If this is the problem you are experiencing, check:

- Remote peer is configured for PPP encapsulation
- Remote peer is receiving CONFREQ packets by enabling **debug ppp neg** on the remote peer

```
Router#
*Mar 16 15:07:28.811:Se0/1 LCP:O CONFREQ [REQsent] id 5 len 10
*Mar 16 15:07:28.811:Se0/1 LCP:  MagicNumber 0x52142927 (0x050652142927)
*Mar 16 15:07:30.814:Se0/1 LCP:TIMEout:State REQsent
*Mar 16 15:07:30.814:Se0/1 LCP:O CONFREQ [REQsent] id 6 len 10
*Mar 16 15:07:30.814:Se0/1 LCP:  MagicNumber 0x52142927 (0x050652142927)
*Mar 16 15:07:32.814:Se0/1 LCP:TIMEout:State REQsent
*Mar 16 15:07:32.814:Se0/1 LCP:O CONFREQ [REQsent] id 7 len 10
*Mar 16 15:07:32.814:Se0/1 LCP:  MagicNumber 0x52142927 (0x050652142927)
*Mar 16 15:07:34.817:Se0/1 LCP:TIMEout:State REQsent
*Mar 16 15:07:34.817:Se0/1 LCP:O CONFREQ [REQsent] id 8 len 10
*Mar 16 15:07:34.817:Se0/1 LCP:  MagicNumber 0x52142927 (0x050652142927)
```

```

Router# sh int s0/1
Serial0/1 is up, line protocol is down
  Hardware is PQIICC with Fractional T1 CSU/DSU
  Internet address is 172.16.1.2/24
  MTU 1500 bytes, BW 384 Kbit, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation PPP, loopback not set
  Keepalive set (10 sec)
  LCP Listen
  Closed:IPCP, CDPCP
  Last input 2w1d, output 00:00:03, output hang never
  Last clearing of "show interface" counters 00:00:21
  Input queue:0/75/0/0 (size/max/drops/flushes); Total output drops:0
  Queueing strategy:weighted fair
  Output queue:0/1000/64/0 (size/max total/threshold/drops)
    Conversations 0/1/128 (active/max active/max total)
    Reserved Conversations 0/0 (allocated/max allocated)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    0 packets input, 0 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    9 packets output, 126 bytes, 0 underruns
    0 output errors, 0 collisions, 0 interface resets
    0 output buffer failures, 0 output buffers swapped out
    0 carrier transitions
    DCD=up DSR=up DTR=up RTS=up CTS=up

```

Remote Peer Is Not Receiving Packets from the Local Router

In this example, the local router is sending CONFREQ, receiving CONFREQ, and sending CONFACK to its remote peer. However, the remote peer is probably not sending CONFACK back because it is not receiving the CONFREQ packet. If this is the problem you are experiencing, there is probably something wrong on the local router. Check:

- Local router configuration
- Remote peer debug output by enabling **debug ppp negotiation** on the remote peer

```

Router#
*Mar 16 15:14:41.757:Se0/1 LCP:O CONFREQ [Listen] id 91 len 10
*Mar 16 15:14:41.757:Se0/1 LCP: MagicNumber 0x521AE3AB (0x0506521AE3AB)
*Mar 16 15:14:41.757:Se0/1 LCP:I CONFREQ [Listen] id 1 len 10
*Mar 16 15:14:41.757:Se0/1 LCP: MagicNumber 0x51C7619B (0x050651C7619B)
*Mar 16 15:14:41.761:Se0/1 LCP:O CONFACK [Listen] id 1 len 10
*Mar 16 15:14:41.761:Se0/1 LCP: MagicNumber 0x51C7619B (0x050651C7619B)
*Mar 16 15:14:43.761:Se0/1 LCP:TIMEout:State ACKsent
*Mar 16 15:14:43.761:Se0/1 LCP:O CONFREQ [ACKsent] id 92 len 10
*Mar 16 15:14:41.761:Se0/1 LCP: MagicNumber 0x521AE3AB (0x0506521AE3AB)
*Mar 16 15:14:45.761:Se0/1 LCP:TIMEout:State ACKsent
*Mar 16 15:14:45.761:Se0/1 LCP:O CONFREQ [ACKsent] id 93 len 10
*Mar 16 15:14:41.761:Se0/1 LCP: MagicNumber 0x521AE3AB (0x0506521AE3AB)

```

```
Router# sh int s0/1
Serial0/1 is up, line protocol is down
  Hardware is PQUICC with Fractional T1 CSU/DSU
  Internet address is 172.16.1.2/24
  MTU 1500 bytes, BW 384 Kbit, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation PPP, loopback not set
  Keepalive set (10 sec)
  LCP ACKSENT
  Open:IPCP, CDPCP
  Last input 00:00:00, output 00:00:00, output hang never
  Last clearing of "show interface" counters 00:09:13
  Input queue:0/75/0/0 (size/max/drops/flushes); Total output drops:0
  Queueing strategy:weighted fair
  Output queue:0/1000/64/0 (size/max total/threshold/drops)
    Conversations 0/1/128 (active/max active/max total)
    Reserved Conversations 0/0 (allocated/max allocated)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    31 packets input, 1034 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    123 packets output, 3196 bytes, 0 underruns
    0 output errors, 0 collisions, 23 interface resets
    0 output buffer failures, 0 output buffers swapped out
    0 carrier transitions
  DCD=up DSR=up DTR=up RTS=up CTS=up
```

A Loop in the Network

If the local router is receiving the same packets back that it is sending out, there is a loop in the network. The line in between the local router and its remote peer router is in a loop.

The output of **debug ppp negotiation** contains a message indicating the line might be looped. There is a loop in the network. Report this problem to your service provider.

```
Router# sh int s0/0:0
Serial0/0:0 is up, line protocol is down (looped)
  Hardware is PQIICC Serial
  MTU 1500 bytes, BW 128 Kbit, DLY 20000 usec,
    reliability 255/255, txload 1/255, rxload 1/255
  Encapsulation PPP, crc 16, loopback not set
  Keepalive set (10 sec)
  LCP Listen
  Last input 00:00:07, output 00:00:07, output hang never
  Last clearing of "show interface" counters 00:00:29
  Input queue:0/75/0 (size/max/drops); Total output drops:0
  Queueing strategy:weighted fair
  Output queue:0/1000/64/0 (size/max total/threshold/drops)
    Conversations 0/1/256 (active/max active/max total)
    Reserved Conversations 0/0 (allocated/max allocated)
  5 minute input rate 0 bits/sec, 0 packets/sec
  5 minute output rate 0 bits/sec, 0 packets/sec
    20 packets input, 280 bytes, 0 no buffer
    Received 0 broadcasts, 0 runts, 0 giants, 0 throttles
    0 input errors, 0 CRC, 0 frame, 0 overrun, 0 ignored, 0 abort
    20 packets output, 280 bytes, 0 underruns
    0 output errors, 0 collisions, 2 interface resets
    0 output buffer failures, 0 output buffers swapped out
    0 carrier transitions

Router#debug ppp neg
PPP protocol negotiation debugging is on
2d23h:Se0/0:0 LCP:TIMEout:State REQsent
2d23h:Se0/0:0 LCP:O CONFREQ [REQsent] id 13 len 10
2d23h:Se0/0:0 LCP:  MagicNumber 0x117C9F70 (0x0506117C9F70)
2d23h:Se0/0:0 LCP:I CONFREQ [REQsent] id 13 len 10
2d23h:Se0/0:0 LCP:  MagicNumber 0x117C9F70 (0x0506117C9F70)
2d23h:Se0/0:0 LCP:O CONFNAK [REQsent] id 13 len 10
2d23h:Se0/0:0 LCP:  MagicNumber 0x117CA73C (0x0506117CA73C)
2d23h:Se0/0:0 LCP:I CONFNAK [REQsent] id 13 len 10
2d23h:Se0/0:0 LCP:  MagicNumber 0x117CA73C (0x0506117CA73C)
2d23h:Se0/0:0 PPP:Line appears to be looped back
```

In this example, the Magic Number for the O CONFREQ is the same as for I CONFREQ. This implies that the router is getting the exact same packet back as it is sending out, as indicated in the PPP debug message.

Obtaining Documentation

The following sections explain how to obtain documentation from Cisco Systems.

World Wide Web

You can access the most current Cisco documentation on the World Wide Web at the following URL:

<http://www.cisco.com>

Translated documentation is available at the following URL:

http://www.cisco.com/public/countries_languages.shtml

Documentation CD-ROM

Cisco documentation and additional literature are available in a Cisco Documentation CD-ROM package, which is shipped with your product. The Documentation CD-ROM is updated monthly and may be more current than printed documentation. The CD-ROM package is available as a single unit or through an annual subscription.

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- Registered Cisco Direct Customers can order Cisco product documentation from the Networking Products MarketPlace:
http://www.cisco.com/cgi-bin/order/order_root.pl
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<http://www.cisco.com/go/subscription>
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The Cisco TAC is available to all customers who need technical assistance with a Cisco product, technology, or solution. Two types of support are available through the Cisco TAC: the Cisco TAC Web Site and the Cisco TAC Escalation Center.

Inquiries to Cisco TAC are categorized according to the urgency of the issue:

- Priority level 4 (P4)—You need information or assistance concerning Cisco product capabilities, product installation, or basic product configuration.
- Priority level 3 (P3)—Your network performance is degraded. Network functionality is noticeably impaired, but most business operations continue.
- Priority level 2 (P2)—Your production network is severely degraded, affecting significant aspects of business operations. No workaround is available.
- Priority level 1 (P1)—Your production network is down, and a critical impact to business operations will occur if service is not restored quickly. No workaround is available.

Which Cisco TAC resource you choose is based on the priority of the problem and the conditions of service contracts, when applicable.

Cisco TAC Web Site

The Cisco TAC Web Site allows you to resolve P3 and P4 issues yourself, saving both cost and time. The site provides around-the-clock access to online tools, knowledge bases, and software. To access the Cisco TAC Web Site, go to the following URL:

<http://www.cisco.com/tac>

All customers, partners, and resellers who have a valid Cisco services contract have complete access to the technical support resources on the Cisco TAC Web Site. The Cisco TAC Web Site requires a Cisco.com login ID and password. If you have a valid service contract but do not have a login ID or password, go to the following URL to register:

<http://www.cisco.com/register/>

If you cannot resolve your technical issues by using the Cisco TAC Web Site, and you are a Cisco.com registered user, you can open a case online by using the TAC Case Open tool at the following URL:

<http://www.cisco.com/tac/caseopen>

If you have Internet access, it is recommended that you open P3 and P4 cases through the Cisco TAC Web Site.

Cisco TAC Escalation Center

The Cisco TAC Escalation Center addresses issues that are classified as priority level 1 or priority level 2; these classifications are assigned when severe network degradation significantly impacts business operations. When you contact the TAC Escalation Center with a P1 or P2 problem, a Cisco TAC engineer will automatically open a case.

To obtain a directory of toll-free Cisco TAC telephone numbers for your country, go to the following URL:

<http://www.cisco.com/warp/public/687/Directory/DirTAC.shtml>

Before calling, please check with your network operations center to determine the level of Cisco support services to which your company is entitled; for example, SMARTnet, SMARTnet Onsite, or Network Supported Accounts (NSA). In addition, please have available your service agreement number and your product serial number.

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