Cisco 7304 Router Troubleshooting and Configuration Notes

Purpose of This Document

The primary source of troubleshooting information for the Cisco 7304 router is an online and interactive module in the Troubleshooting Assistant. The Troubleshooting Assistant 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.

Contents

CISCO SYSTEMS

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FastEthernet Restriction

The FastEthernet port on the Cisco 7304 is for management purposes only. Any other use of the FastEthernet port is not supported.

Network Services Engine 100 Hardware Revision IOS Compatibility Note

If you are using a Network Services Engine 100 (NSE-100) with a hardware revision of 5.0 or later, Cisco IOS Release 12.1(12c)EX1 is required to operate your router.

To check your hardware revision number, enter the **show diag** *slot-number* command (where *slot-number* is the slot containing the NSE-100) and view the hardware revision output. If your hardware revision number is greater than 5.0 and you are not running Cisco IOS Release 12.1(12c)EX1 or later, upgrade your IOS to a supported release.

The output below shows how to view the hardware revision number. When viewing the revision number, ensure that you are viewing the NSE hardware revision and not a revision number for another component.

```
Router(boot)# show diag 0
Slot 0/1:
        NSE Card state:Primary
        Insertion time:00:00:28 ago
C7300 NSE Mainboard EEPROM:
        Hardware Revision        :5.0
        PCB Serial Number        :CAB0529JQGB
        Part Number              :73-5198-02
...
```

PXF Features

The PXF feature, example, and restriction information, as well as additional information related to PXF on the Cisco 7304 router, can now be located in the *PXF Information for Cisco 7304 Routers* document on cisco.com.

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]:

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]:
change the boot characteristics? 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 7304 router.

```
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]:

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]:
change the boot characteristics? y/n [n]:

You must reset or power cycle for new config to take effect
rommon 2 > reset
System Bootstrap, Version 12.1(12r)EX1, RELEASE SOFTWARE (fc1)
TAC Support: http://www.cisco.com/tac
Copyright (c) 2002 by cisco Systems, Inc.
C7300 platform with 524288 Kbytes of main memory
Currently running ROMMON from ROM 0
Self decompressing the image : ##################################################
################################################################################
################################################################################
################################################################################
################### [OK]
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 IOS Software, 7300 Software (C7300-JS-M), Version 12.2(nightly_RLS5.S05052
4) NIGHTLY BUILD, synced to flo_isp V122_24_8_S
Copyright (c) 1986-2005 by Cisco Systems, Inc.
Compiled Tue 24-May-05 18:55 by
Image text-base: 0x40008CE4, data-base: 0x430EC000

Downloading default microcode: system:pxf/ucode1.
Successfully downloaded the production microcode.
Currently running ROMMON from ROM 0
cisco 7300 (NSE100) processor (revision E) with 491520K/32768K bytes of memory.
Processor board ID SCA084001C7
R7000 CPU at 350Mhz, Implementation 39, Rev 3.3, 256KB L2, 1024KB L3 Cache
4 slot midplane, Version 67.49
Last reset from software reset or reload
PXF processor tmc0 'system:pxf/ucode1' is running ( v4.1 ).
PXF processor tmc1 'system:pxf/ucode1' is running ( v4.1 ).
1 FastEthernet interface
4 Gigabit Ethernet interfaces
509K bytes of non-volatile configuration memory.
31360K bytes of ATA compact flash in bootdisk (Sector size 512 bytes).
250368K bytes of ATA compact flash in disk0 (Sector size 512 bytes).
--- System Configuration Dialog ---
Would you like to enter the initial configuration dialog? [yes/no]: n

Press RETURN to get started!

00:00:15: %LINK-5-CHANGED: Interface FastEthernet0, changed state to reset
00:00:15: %LINK-3-UPDOWN: Interface GigabitEthernet0/0, changed state to down
00:00:15: %LINK-3-UPDOWN: Interface GigabitEthernet0/1, changed state to down
```

```
00:00:16: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0, changed
state to up
00:00:16: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/0, ch
anged state to down
00:00:16: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet0/1, ch
anged state to down
00:00:17: %LINK-3-UPDOWN: Interface FastEthernet0, changed state to up
00:00:28: %SYS-5-RESTART: System restarted --
Cisco IOS Software, 7300 Software (C7300-JS-M), Version 12.2(nightly_RLS5.S05052
4) NIGHTLY BUILD, synced to flo_isp V122_24_8_S
Copyright (c) 1986-2005 by Cisco Systems, Inc.
Compiled Tue 24-May-05 18:55 by
00:00:30: %LINK-5-CHANGED: Interface FastEthernet0, changed state to administrat
ively down
00:00:30: %LINK-5-CHANGED: Interface GigabitEthernet0/0, changed state to admini
stratively down
00:00:30: %LINK-5-CHANGED: Interface GigabitEthernet0/1, changed state to admini
stratively down
00:00:30: %LINK-5-CHANGED: Interface GigabitEthernet5/0/0, changed state to admi
nistratively down
00:00:30: %LINK-5-CHANGED: Interface GigabitEthernet5/0/1, changed state to admi
nistratively down
00:00:31: %WS_ALARM-6-INFO: ASSERT CRITICAL NSE100 Cutover
00:00:31: %WS_ALARM-6-INFO: ASSERT INFO FastEthernet0 Physical Port Administrati
ve State Down
00:00:31: %WS_ALARM-6-INFO: ASSERT INFO GigabitEthernet0/0 Physical Port Adminis
trative State Down
00:00:31: %WS_ALARM-6-INFO: ASSERT INFO GigabitEthernet0/1 Physical Port Adminis
trative State Down
00:00:31: %WS_ALARM-6-INFO: ASSERT CRITICAL SFP Slot 5/0/0 SFP is missing
00:00:31: %LINEPROTO-5-UPDOWN: Line protocol on Interface FastEthernet0, changed
state to down
00:00:31: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet5/0/0,
changed state to down
00:00:31: %LINEPROTO-5-UPDOWN: Line protocol on Interface GigabitEthernet5/0/1,
changed state to down
00:00:32: %WS_ALARM-6-INFO: CLEAR CRITICAL SFP Slot 5/0/0 SFP is missing
00:00:32: %WS_ALARM-6-INFO: CLEAR CRITICAL SFP Slot 5/0/1 SFP is missing
Router>enable
Router#copy start run
Destination filename [running-config]?
GigabitEthernet5/0/0: Changing media to GBIC.
You may need to update the speed and duplex settings for this interface.
GigabitEthernet5/0/1: Changing media to GBIC.
You may need to update the speed and duplex settings for this interface.
2177 bytes copied in 0.312 secs (6978 bytes/sec)
Router# config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#enable secret cisco
Router(config)#^Z
Router#show ip interface brief
Interface IP-Address OK? Method Status Protocol
FastEthernet0 21.1.5.135 YES TFTP administratively down down
GigabitEthernet0/0 unassigned YES TFTP administratively down down
GigabitEthernet0/1 unassigned YES TFTP administratively down down
GigabitEthernet5/0/0 unassigned YES TFTP administratively down down
GigabitEthernet5/0/1 unassigned YES TFTP administratively down down
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#int fast0
Router(config-if)#no shut
```

```
Router(config-if)#end
Router#show ip interface brief
Interface IP-Address OK? Method Status Protocol
FastEthernet0 21.1.5.135 YES TFTP up up
GigabitEthernet0/0 unassigned YES TFTP administratively down down
GigabitEthernet0/1 unassigned YES TFTP administratively down down
GigabitEthernet5/0/0 unassigned YES TFTP administratively down down
GigabitEthernet5/0/1 unassigned YES TFTP administratively down down
Router#copy run start
Destination filename [startup-config]?
Building configuration...
[OK]
Router#show version
Cisco IOS Software, 7300 Software (C7300-JS-M), Version 12.2(nightly_RLS5.S05052
4) NIGHTLY BUILD, synced to flo_isp V122_24_8_S
Copyright (c) 1986-2005 by Cisco Systems, Inc.
Compiled Tue 24-May-05 18:55 by
ROM: System Bootstrap, Version 12.1(12r)EX1, RELEASE SOFTWARE (fc1)
Currently running ROMMON from ROM 0
Router uptime is 3 minutes
Uptime for this control processor is 3 minutes
System returned to ROM by power-on
System image file is "disk0:c7300-js-mz.0524"
cisco 7300 (NSE100) processor (revision E) with 491520K/32768K bytes of memory.
Processor board ID SCA084001C7
R7000 CPU at 350Mhz, Implementation 39, Rev 3.3, 256KB L2, 1024KB L3 Cache
4 slot midplane, Version 67.49
Last reset from software reset or reload
PXF processor tmc0 'system:pxf/ucode1' is running ( v4.1 ).
PXF processor tmc1 'system:pxf/ucode1' is running ( v4.1 ).
1 FastEthernet interface
4 Gigabit Ethernet interfaces
509K bytes of non-volatile configuration memory.
31360K bytes of ATA compact flash in bootdisk (Sector size 512 bytes).
250368K bytes of ATA compact flash in disk0 (Sector size 512 bytes).
Configuration register is 0x2142
Router#config terminal
Enter configuration commands, one per line. End with CNTL/Z.
Router(config)#config-reg 0x2102
Router(config)#^Z
Router#show version
Cisco IOS Software, 7300 Software (C7300-JS-M), Version 12.2(nightly_RLS5.S05052
4) NIGHTLY BUILD, synced to flo_isp V122_24_8_S
Copyright (c) 1986-2005 by Cisco Systems, Inc.
Compiled Tue 24-May-05 18:55 by
ROM: System Bootstrap, Version 12.1(12r)EX1, RELEASE SOFTWARE (fc1)
Currently running ROMMON from ROM 0
Router uptime is 4 minutes
Uptime for this control processor is 4 minutes
System returned to ROM by power-on
System image file is "disk0:c7300-js-mz.0524"
cisco 7300 (NSE100) processor (revision E) with 491520K/32768K bytes of memory.
Processor board ID SCA084001C7
R7000 CPU at 350Mhz, Implementation 39, Rev 3.3, 256KB L2, 1024KB L3 Cache
4 slot midplane, Version 67.49
Last reset from software reset or reload
PXF processor tmc0 'system:pxf/ucode1' is running ( v4.1 ).
PXF processor tmc1 'system:pxf/ucode1' is running ( v4.1 ).
```

```
1 FastEthernet interface
4 Gigabit Ethernet interfaces
509K bytes of non-volatile configuration memory.
31360K bytes of ATA compact flash in bootdisk (Sector size 512 bytes).
250368K bytes of ATA compact flash in disk0 (Sector size 512 bytes).
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 7304 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 Cisco 7304 router. If you encounter references to slot0: or bootflash:, assume it is disk0: and bootdisk:, respectively, for the Cisco 7304 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 the "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 the "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 the "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 the "Common Problems Installing Images Using a TFTP or RCP Server" section on page 12.

Cisco 7304 Router Sample Output

```
Router# dir disk0:

Directory of disk0:/

1  -rw-     4970544   Jul 02 2001 08:25:54 c7300-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 Cisco 7304 router. If you encounter references to slot0: or bootflash:, assume it is disk0: and bootdisk:, respectively, for the Cisco 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, the addresses 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
nvram:	Copy to nvram: file system
rcp:	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 the "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 the "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 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 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 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 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 PQUICC 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

Cisco provides several ways to obtain documentation, technical assistance, and other technical resources. These sections explain how to obtain technical information from Cisco Systems.

Cisco.com

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

http://www.cisco.com/univercd/home/home.htm

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http://www.cisco.com/go/subscription

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You can find instructions for ordering documentation at this URL:

http://www.cisco.com/univercd/cc/td/doc/es_inpck/pdi.htm

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- Registered Cisco.com users (Cisco direct customers) can order Cisco product documentation from the Networking Products MarketPlace:

  http://www.cisco.com/en/US/partner/ordering/index.shtml

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  http://www.cisco.com/go/subscription

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We categorize Cisco TAC inquiries according to urgency:

- 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.

Cisco TAC Website

You can use the Cisco TAC website 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 website, go to this URL:

http://www.cisco.com/tac

All customers, partners, and resellers who have a valid Cisco service contract have complete access to the technical support resources on the Cisco TAC website. Some services on the Cisco TAC website require 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 this URL to register:

http://tools.cisco.com/RPF/register/register.do

If you are a Cisco.com registered user, and you cannot resolve your technical issues by using the Cisco TAC website, you can open a case online at this URL:

http://www.cisco.com/en/US/support/index.html

If you have Internet access, we recommend that you open P3 and P4 cases through the Cisco TAC website so that you can describe the situation in your own words and attach any necessary files.

Cisco TAC Escalation Center

The Cisco TAC Escalation Center addresses priority level 1 or priority level 2 issues. 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 automatically opens a case.

To obtain a directory of toll-free Cisco TAC telephone numbers for your country, go to this 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). When you call the center, please have available your service agreement number and your product serial number.

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  http://www.cisco.com/en/US/products/products_catalog_links_launch.html

- Cisco Press publishes a wide range of networking publications. Cisco suggests these titles for new and experienced users: *Internetworking Terms and Acronyms Dictionary, Internetworking Technology Handbook, Internetworking Troubleshooting Guide,* and the *Internetworking Design Guide.* For current Cisco Press titles and other information, go to Cisco Press online at this URL:

  http://www.ciscopress.com

- *Packet* magazine is the Cisco monthly periodical that provides industry professionals with the latest information about the field of networking. You can access *Packet* magazine at this URL:

  http://www.cisco.com/en/US/about/ac123/ac114/about_cisco_packet_magazine.html

- *iQ Magazine* is the Cisco monthly periodical that provides business leaders and decision makers with the latest information about the networking industry. You can access *iQ Magazine* at this URL:

  http://business.cisco.com/prod/tree.taf%3fasset_id=44699&public_view=true&kbns=1.html

- *Internet Protocol Journal* is a quarterly journal published by Cisco Systems for engineering professionals involved in the design, development, and operation of public and private internets and intranets. You can access the *Internet Protocol Journal* at this URL:

  http://www.cisco.com/en/US/about/ac123/ac147/about_cisco_the_internet_protocol_journal.html

- Training—Cisco offers world-class networking training, with current offerings in network training listed at this URL:

  http://www.cisco.com/en/US/learning/le31/learning_recommended_training_list.html

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