

# Hardware Troubleshooting for Cisco 1700 Series Routers

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## Introduction

Valuable time and resources are often wasted replacing hardware that actually functions properly. This document helps troubleshoot potential hardware issues with Cisco 1700 Series Routers, and can help you identify which component may be causing a hardware failure, depending on the type of error that the router is experiencing.

**Note:** This document does not cover any software-related failures except for those that are often mistaken as hardware issues.

## Prerequisites

## Requirements

Readers of this document should have knowledge of these topics:

- [17xx Series Hardware Installation Guides](#)
- [Troubleshooting Router Crashes](#)
- [1700 Series Router Technical Support Page](#)

## Components Used

The information in this document is based on these software and hardware versions:

- Cisco 17xx Series Routers

The information presented in this document was created from devices in a specific lab environment. All of the devices used in this document started with a cleared (default) configuration. If you are working in a live network, ensure that you understand the potential impact of any command before using it.

## Conventions

Refer to [Cisco Technical Tips Conventions](#) for more information on document conventions.

## Background Information

### Hardware-Software Compatibility and Memory Requirements

Whenever you install a new card, module, or Cisco IOS® software image, you must verify whether the router has enough memory, and that the hardware and software are compatible with the features you want to use.

Perform these recommended steps to check for hardware-software compatibility and memory requirements:

1. Use the [Software Advisor](#) ([registered](#) customers only) tool to choose software for your network device.

#### Tips:

- The [Software Support for Hardware](#) ( [registered](#) customers only) section helps you verify whether the desired Cisco IOS software version supports the modules and cards installed on the router.
  - The [Software Support for Features](#) ( [registered](#) customers only) section helps you determine the Cisco IOS software image needed by choosing the types of features you wish to implement.
2. Use the [Download Software Area](#) ( [registered](#) customers only) to check the minimum amount of memory (RAM and Flash) required by the Cisco IOS software, and/or download the Cisco IOS software image. To determine the amount of memory (RAM and Flash) installed on your router, refer to the *Memory Requirements* section of [How to Choose a Cisco IOS Software Release](#).

### Tips:

- If you want to keep the same features as the version that currently runs on your router, but you are not sure which feature set you use, enter the **show version** command on your router and paste the output into the [Output Interpreter](#) ( [registered](#) customers only) tool to find out. It is important to check for feature support, especially if you plan to use recent software features.
  - If you need to upgrade the Cisco IOS software image to a new version or feature set, refer to [How to Choose a Cisco IOS Software Release](#) for more information.
3. If you determine that a Cisco IOS software upgrade is necessary, follow the [Software Upgrade Procedure](#).

**Tip:** If your 1700 does not have a connection to the network or does not have a valid Cisco IOS software image, you need to use the console port of the router to perform an [Xmodem Console Download Procedure Using ROMmon](#). This procedure does not require the use of a Trivial File Transfer Protocol (TFTP) server.

4. If the router does not boot after a Cisco IOS software upgrade, refer to the [Router Does Not Boot](#) section of this document for more information.

## Error Messages

The [Error Message Decoder](#) ( [registered](#) customers only) tool allows you to check the meaning of an error message. Error messages appear on the console of Cisco products, usually in the following form:

```
%XXX-n-YYYY : [text]
```

Here is an example error message:

```
Router# %SYS-2-MALLOCFAIL: Memory allocation of [dec] bytes failed
from [hex],
pool [chars], alignment [DEC]
```

Some error messages are informational only, while others indicate hardware or software failures and require action. The [Error Message Decoder](#) ( [registered](#) customers only) tool provides an explanation of the message, a recommended action (if necessary), and if available, a link to a document that provides extensive information on how to troubleshoot the error message.

## Modules and Cards

The Cisco 1700 Series Routers include two WAN interface card slots. In addition, the Cisco 1750 and Cisco 1751 routers include one Voice Interface Card (VIC) slot that you can use only for a voice interface card. The Cisco 1760 router includes two VIC-only slots. However, the 1700 Series Router does not support all Cisco WAN Interface Cards (WICs), Voice Interface Cards (VICs), and Voice WAN Interface Cards (VWIC)s. These documents can help you verify whether support is available for the module or card:

- For WIC compatibility information, refer to the [WIC Hardware Compatibility Matrix](#).
- For VIC/VWIC compatibility information, refer to the [Voice Hardware Compatibility Matrix](#).

## DSP Optimization on the Cisco 1751 and Cisco 1760 Routers

- In order to find software configuration information to change the codec complexity of the analog Voice Interface Cards (VICs) and optimize the Digital Signal Processor (DSP) resources among the analog and BRI VICs on the Cisco 1751 and Cisco 1760 routers, refer to [DSP Optimization on the Cisco 1751 and Cisco 1760 Routers](#).
- The [DSP Calculator tool](#) ( [registered](#) customers only) can help you determine the DSP requirements for the Cisco 1751 and the Cisco 1760 routers, on the basis of the interface modules selected and their codec configurations. This tool supports Cisco IOS Software Releases 12.2(8) YN and later versions.

## WIC-1ENET Module

The Cisco WIC-1ENET is a single-port Ethernet interface card that supports 10BASE-T Ethernet. The card provides the Cisco 1700 Series Router with additional Ethernet interfaces.

Only the Cisco 1700 series routers support the Cisco WIC-1ENET card, which requires Cisco IOS Software Release 12.2(2)XJ or later if the card is installed in any WIC slot other than slot 0, or if more than one card is installed. You can use the card with Cisco IOS Software Release 12.2(4)T, but you must ensure that you install the card in slot 0, and that only one Cisco WIC-1ENET card is installed in the router.

For information on compatibility and hardware and software requirements for the Cisco WIC-1ENET card, refer to [Configuring a Single-Port Ethernet WIC on a Cisco 1700 Series Router](#).

## Identify the Issue

This section explains what you must do to determine the cause of potential hardware issues.

In order to determine the cause, the first step is to capture as much information about the problem as possible. This information is essential to determine the cause of the problem:

- Console logs—For more information, refer to [Applying Correct Terminal Emulator Settings for Console Connections](#).

- Syslog information—If the router is set up to send logs to a syslog server, you can obtain information on what happened. For details, refer to the *How to Configure Cisco Devices for Syslog* section of [Resource Manager Essentials and Syslog Analysis: How-To](#).
- **show technical-support** command output—The **show technical-support** command is a compilation of many different commands including **show version**, **show running-config**, and **show stacks**. TAC engineers usually ask for this information to troubleshoot hardware issues. You must collect the **show technical-support** information before you reload or power-cycle the router, because these actions can cause all information about the problem to be lost.
- The complete bootup sequence if the router experiences boot errors.

If you have the output of a **show** command from your Cisco device (including **show technical-support**), you can use the [Output Interpreter](#) ([registered](#) customers only) to display potential issues and fixes. In order to use the [Output Interpreter](#) ([registered](#) customers only), you must be logged in and have JavaScript enabled.

## Troubleshoot ISDN Interfaces

Here is a list of references you can use in order to troubleshoot ISDN interfaces:

- [Troubleshooting ISDN BRI Layer 1](#)
- [Troubleshooting ISDN BRI Layer 2](#)
- [Troubleshooting ISDN BRI Layer 3](#)

## Troubleshoot Router Hangs

Refer to [Troubleshooting Router Hangs](#) to resolve this issue.

## Troubleshoot Bus Error Crashes

The system encounters a bus error when the processor tries to access a memory location that either does not exist (a software error) or does not respond properly (a hardware problem). In order to identify a bus error, look at the output of the **show version** command that the router provides. However, this output is useful only if you have not power-cycled or manually reloaded the router.

Here are two examples of bus error crashes:

```
Router uptime is 2 days, 21 hours, 30 minutes
System restarted by bus error at PC 0x30EE546, address 0xBB4C4
System image file is "flash:igs-j-1.111-24.bin", booted via flash
.....
```

At the console prompt, you can also encounter this error message during a bus error:

```

*** System received a Bus Error exception ***
signal= 0xa, code= 0x8, context= 0x608c3a50
PC = 0x60368518, Cause = 0x20, Status Reg = 0x34008002

```

For more information on this issue, refer to [Troubleshooting Bus Error Crashes](#).

## Router Does Not Boot

You must capture information from the console of the router in order to troubleshoot a router that does not boot. Log the console output in a file for later analysis or for the Cisco Technical Assistance Center (TAC) if you open a TAC service request.

This table lists symptoms and recommended actions to take if you encounter boot problems:

Symptom	Recommended Action
No LEDs are on after you power on the router.	Verify that the power supply is plugged in firmly. If that does not resolve the issue, replace the power supply. If the problem persists, replace the router.
LEDs are on after the router is powered on, but the console is blank.	<p>Complete these steps to connect the PC or terminal to the router:</p> <ol style="list-style-type: none"> <li>1. Verify that your PC or terminal emulation software is configured to communicate with the switch through hardware flow control.</li> <li>2. Configure the baud rate and character format of the PC or terminal to match these console port default characteristics: 9600 baud, 8 data bits, 1 stop bit, No parity.</li> <li>3. Use the supplied rollover cable to insert the RJ-45 connector into the console port.</li> <li>4. Attach the supplied RJ-45-to-DB-9 female DTE adapter to a PC, or attach an appropriate adapter to the terminal.</li> <li>5. Insert the other end of the supplied rollover cable in the attached adapter.</li> <li>6. Run the terminal emulation program if you use a PC or a terminal.</li> </ol> <p>If that does not help, verify whether the equipment you use in order to connect to the console operates properly. In order to do so, connect to a known good router to check your console equipment. If the equipment is successfully tested, but the</p>

<p>Router displays the System Bootstrap version and hangs at that point, or falls into a booting loop, and repeats the same information over and over:</p> <pre>System Bootstrap, Version 11.1(7)AX (7)AX], EARLY DEPLOYMENT RELEASE SOFTWARE (fc2) Copyright (c) 1994-1996 by cisco Systems, Inc.</pre>	<p>problem remains, replace the router.</p> <p>Check whether the memory is well-seated. First, try to re-seat (remove and then re-insert) the Dynamic RAM (DRAM) single inline memory module (SIMM) memory. If the router still does not boot, replace the router.</p> <p>You can find information on the location of the DRAM SIMMs in the <a href="#">Cisco 1700 Series Routers Support Documentation</a>.</p>
<p>Router boots in ROMmon. There are no error messages on the console.</p>	<p>Set the configuration register to 0x2102 and reload the router:</p> <pre>rommon 1 &gt; confreg 0x2102 rommon 2 &gt; reset</pre> <p>If the router remains in ROMmon, follow the procedure described in <a href="#">ROMmon Recovery for the Cisco 1700 Series Router</a>.</p>
<p>Router boots in boot mode. There are no error messages on the console.</p>	<p>Set the configuration register to 0x2102 and reload the router. You do not need to save the running configuration before you reload:</p> <pre>router(boot)#<b>configure terminal</b> Enter configuration commands, one per line. End with CNTL/Z. router(boot)(config)#<b>config-register 0x2102</b> router(boot)(config)#<b>end</b> router(boot)#<b>reload</b> System configuration has been modified. Save? [yes/no]: <b>no</b> Proceed with reload? [confirm]</pre> <p><b>Note:</b> The <b>config-register</b> command is the only Cisco IOS software configuration command that does not get saved in nonvolatile RAM (NVRAM). This command changes the configuration register immediately, but this change takes effect only during the next boot.</p>

Router boots in boot mode with these messages on the console:

```
getdevnum warning: device "PCMCIA
slot 1" has size of zero
```

```
getdevnum warning: device "PCMCIA
slot 1" has size of zero
```

```
pen: read error...requested 0x4
bytes, got 0x0
```

```
trouble reading device magic number
```

```
boot: cannot open "flash:"
```

```
boot: cannot determine first file
name on device "flash:"
```

The Flash card is removed or badly inserted. Verify the presence of the Flash card with the **show flash** command:

```
router(boot)#show flash
```

```
%Device in REMOVED state
```

Insert or reseal the Flash. If the problem persists, replace the Flash card. If that does not resolve the problem, replace the router.

Router boots in boot mode, with these messages on the console:

```
device does not contain a valid
magic number
```

```
boot: cannot open "flash:"
```

```
boot: cannot determine first file
name on device "flash:"
```

The Flash is empty or the filesystem is corrupt. Copy a valid image on the Flash, and while you copy, you are prompted to erase the old Flash (if one exists). Then reload the router.

Refer to [Software Upgrade Procedure](#) for instructions on how to copy a valid image onto the Flash.

Router boots in boot mode, with this message on the console:

```
SYSTEM INIT: INSUFFICIENT
```

```
MEMORY TO BOOT THE IMAGE!
```

This message only occurs when you load images that run from RAM. Cisco 1700 Series routers support images that run in RAM and images that run directly from Flash (for example, relocatable images), there are two solutions for this problem:

- Upgrade the DRAM
- Load a relocatable image; load an image from Flash

For more information on image types, refer to [Image Naming Conventions](#).

For information on memory requirements, refer to the [Release Notes](#) for your version of Cisco IOS software.

Refer to the Cisco 1700 Series Router Documentation for where to locate the DRAM SIMMs to install and upgrade the

[1720](#), [1750](#), [1751](#), and [1760](#).

Router boots in boot mode, with this message on the console:

```
loadprog: error - Invalid image for platform
```

The Cisco IOS software image is not appropriate for the 1700 router, or is corrupt. Erase the Flash and download a new valid Cisco IOS software image.

For more information on how to load new software on the 1700 router, refer to [Software Upgrade Procedure](#).

## Router Crashes

A "system crash" means a situation where the system detects an unrecoverable error and restarts. Software problems, hardware problems, or both, can cause a crash. This section deals with hardware-caused crashes and crashes that are software-related, but can be mistaken for hardware problems.

**Important:** If the router reloads after the crash (for example, through a power-cycle or the **reload** command), important information about the crash is lost, so try to collect **show technical-support** and **show log** output, as well as the crashinfo file (if possible) before you reload the router!

Refer to [Troubleshooting Router Crashes](#) for more information on this issue.

## Watchdog Timeouts

Cisco processors have timers that guard against certain types of system hangs. The CPU periodically resets a watchdog timer. The watchdog timer basically controls the time of each process. If the timer is not reset, a trap occurs. If a process is longer than the process must run, the watchdog timer escapes from the process.

There are two main types of watchdog timeouts.

A software problem usually causes the first type of watchdog timeout, which the router console logs report as:

```
%SYS-2-WATCHDOG: Process aborted on watchdog timeout
```

The second type of watchdog timeout is usually due to a hardware problem, and is reported in one or both of these two ways:

- The **show version** command output shows:

```
System returned to ROM by watchdog timer expired
```

- The console logs show:

```
*** Watch Dog Timeout ***
```

Refer to [Troubleshooting Watchdog Timeouts](#) to further troubleshoot this issue.

## Router Drops Packets

Packet losses due to hardware problems are fairly easy to identify. This section uses the output of the **show interfaces** command to identify packet losses.

## Cyclic Redundancy Check (CRC) and Frame Errors

If CRC errors or frame errors constantly increase on the interface check for a hardware problem.

```
router#show interface ethernet 0
Ethernet0/0 is up, line protocol is up
...
    121 input errors, 102 CRC, 19 frame, 0 overrun, 0 ignored
```

An exception to this case is when CRC and frame errors occur on channelized interfaces. Such errors can indicate clocking problems as well. The fault that causes the errors can be anywhere between two connected interfaces: on cables, intermediate devices, or on interfaces. The techniques to troubleshoot these issues differ slightly for different interface types.

## Ethernet Interfaces

For Ethernet interfaces, troubleshooting differs between a shared environment (devices connected through a hub or with a coaxial cable) and a switched environment (devices connected to a switch).

In a switched environment, there are only three components that can cause the error:

- cable
- local interface (port)
- remote interface (port)

Consequently, the steps to troubleshoot the issue are simple. For example, if a router is connected to a switch, perform these steps in order to troubleshoot:

1. Replace the cable.
2. If this does not solve the problem, try another port on the switch.
3. If the problem persists, replace the router.

In a shared environment, the source of the problem is a lot harder to find. Every piece of hardware that makes up the shared segment can be the cause. You must test all components (cables, connectors, and so on) one by one.

## Ignored Packets

```
router#show interfaces ethernet 0
Ethernet0/0 is up, line protocol is up
```

```
...
    21 input errors, 0 CRC, 0 frame, 0 overrun, 21 ignored
```

Packets are ignored if there are no free buffers to accept the new packet. This can happen due to a traffic overload on the router, but can also occur if the interface is faulty. If "ignores" are present on all interfaces, the router is probably overloaded, or does not have sufficient free buffers in the pool that match the maximum transmission unit (MTU) on interfaces. In the latter case, an increment of the no buffer counter follows an increment of the ignored counter:

```
router#show interfaces serial 0
...
    1567 packets input, 0 bytes, 22 no buffer
    22 input errors, 0 CRC, 0 frame, 0 overrun, 22 ignored, 0 abort
```

You can also see an increase in the buffer failures counter in the pool that matches the MTU size:

```
router#show buffers
...
Big buffers, 1524 bytes (total 50, permanent 50):
    50 in free list (5 min, 150 max allowed)
    3066 hits, 189 misses, 0 trims, 24 created
    12 failures (0 no memory)
```

The number of previously configured permanent, free, and maximum allowed buffers may not be completely compatible for every environment. You can read more about this and how to avoid it in [Buffer Tuning](#).

If "ignores" only increase on one interface and you do not see a corresponding increment of the no buffer counter, and the interface is not heavily loaded, check whether the interface is faulty. In that case, capture the output of the **show technical-support** command and contact the TAC. You can view the load on the interface in the output of the **show interfaces** command:

```
router#show interfaces serial 0
...
    reliability 255/255, txload 100/255, rxload 122/255
```

## Input and Output Queue Drops

Hardware problems never cause input queue drops. Hardware issues can cause output queue drops only if the output queue is constantly full and no packets go out of the interface. You can read more about these kinds of drops in [Troubleshooting Input Queue Drops and Output Queue Drops](#).

If the issue you face does not appear on this page, please read through the documents in the [Related Information](#) section. If you still need assistance, please contact the Cisco Technical Assistance Center.

## Memory Leaks

Memory allocation failure means either that the router has used all available memory (temporarily or permanently) or that the memory has fragmented into such small pieces that the router cannot find a usable block that is available. This situation can occur with the processor memory (that the Cisco Internet Operating System [IOS] uses) or with the packet

memory (that incoming and outgoing packets use).

Symptoms of memory allocation failure include, but are not limited to:

- The console or log message: "%SYS-2-MALLOCFAIL: Memory allocation of 1028 bytes failed from 0x6015EC84, Pool Processor, alignment 0".
- Telnet sessions fail.
- The **show processor memory** command appears no matter what command you type on a console.
- There is no output from some **show** commands.
- You see "Low on memory" messages.
- You see the console message "Unable to create EXEC - no memory or too many processes".
- The router hangs and there is no console response.

For more information on this issue, refer to [Troubleshooting Memory Problems](#).

## Summary

If you have identified a component that needs replacement, contact your Cisco partner or reseller to request a replacement for the hardware component that causes the issue.

**If you still need assistance after following the troubleshooting steps above and want to [open a service request](#) ( [registered customers only](#)) with the Cisco TAC, be sure to include this information:**

- Troubleshooting performed before you opened the service request.
- **show technical-support** output (in enable mode if possible).
- **show log** output or console captures, if available.
- **execute-on slot [slot #] show tech** for the slot which experienced the line card crash.

Please attach the collected data to your service request in non-zipped, plain text format (.txt). You can attach information to your service request by uploading it using the [TAC Service Request tool](#)

( [registered](#) customers only) . If you cannot access the Service Request tool, you can send the information in an email attachment to [attach@cisco.com](mailto:attach@cisco.com) with your service request number in the subject line of your message.

**Note:** Please do not manually reload or power-cycle the router before you collect the above information unless required to troubleshoot a line card crash on the Cisco 12000 Series Internet Router, as a reload or power-cycle can cause important information to be lost that is necessary to determine the root cause of the problem.

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#### Network Infrastructure: LAN Routing and Switching

[I input aaa auth login... and got authorization failed. I am locked. routing](#) - Jun 11, 2009

[Catalyst 2950 / 2960 port bandwidth limit](#) - Jun 11, 2009

[show interfaces | include input errors](#) - Jun 11, 2009

[Using the interface range command on subinterfaces \(CAT6500\)](#) - Jun 11, 2009

#### Network Infrastructure: WAN Routing and Switching

[DDNS w freedns.afraid.org](#) - Jun 11, 2009

[BGP - ORF policy](#) - Jun 11, 2009

[Prefix-List](#) - Jun 11, 2009

[IPv6 and FR inverse ARP](#) - Jun 11, 2009

[UP/DOWN SITUATION. PLS HELP](#) - Jun 11, 2009

## Related Information

- [Cisco 1700 Series Routers Documentation](#)
- [ROMmon Recovery for the Cisco 1700 Series Router](#)
- [Image Naming Conventions](#)
- [Software Upgrade Procedure](#)
- [Capacity and Performance Management: Best Practices](#)
- [How to Choose a Cisco IOS Software Release – Memory Requirements](#)
- [Buffer Tuning for all Cisco Routers](#)
- [Troubleshooting Input Queue Drops and Output Queue Drops](#)
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