CHAPTER 5

Troubleshooting the System Hardware

This chapter provides basic troubleshooting information to help you identify some common problems that might occur with your Wide Area Virtualization Engine (WAVE).

This chapter contains the following sections:

Use the information in this chapter to determine whether a problem originates with the hardware or the software. For further assistance, contact your Cisco customer service representative.

Caution There are no customer-replaceable components inside your WAVE-274 or WAVE-474 appliance. All faulty components can only be replaced by a qualified service technician. Once you have identified a faulty component, contact the Cisco Technical Assistance Center (TAC).

Note The WAAS software does not support the use of a keyboard or mouse (Personal System/2 [PS/2] or Universal Serial Bus [USB]) for Linux and WAAS software troubleshooting. However, the keyboard and mouse are supported by the BIOS for power-on self-test (POST) and the diagnostic programs that are located in the device ROM.

When console redirection is enabled, all the tests available from a keyboard are accessible through the console connection as well. (Mouse support, however, is not available through the console connection.)

You can run all the diagnostics and tests that are supported by the BIOS, with a few exceptions. Tests for ports (such as the systems-management Ethernet connector and the SAS connector) that are not supported by the WAAS software are invalid.

Identifying System Problems

To identify system problems, follow these steps:

Step 1 Check the front panel LED indicators. (See Table 5-10 on page 5-13.)

Step 2 Power down the device and all external devices.

Step 3 Check all cables and power cords. (See the "Checking Connections and Switches" section on page 5-3.)

Step 4 Power up all external devices.

Step 5 Power up the device.

Step 6 Record any POST error messages that are displayed on the screen. If an error is displayed, look up the first error in the "Power-On Self Test (POST)" section on page 5-12.

Step 7 If you hear one or more beeps, find the beep code in the "Interpreting POST Diagnostic Front Panel LEDs and Beep Codes" section on page 5-16. If necessary, see the "Undetermined Problems" section on page 5-6.

Checking Connections and Switches

Improperly set switches and controls and loose or improperly connected cables are the most likely source of problems for the chassis or other external equipment. A quick check of all the switches, controls, and cable connections can easily solve these problems. (See Figure 1-1 for the location of front panel controls and indicators. See Figure 1-2 for the location of back panel connectors on the system.)

To check all the connections and switches, follow these steps:

Step 1 Power down the system. Disconnect all the power cables from their electrical outlets.

Step 2 If the system is connected to a power strip (or power distribution unit), turn the power strip off and then on again.

Is the power strip receiving power?

Yes. Go to Step 5.

No. Go to Step 3.

Step 3 Plug the power strip into another electrical outlet.

Is the power strip receiving power?

Yes. The original electrical outlet probably does not function. Use a different electrical outlet.

No. Go to Step 4.

Step 4 Plug a system that you know works into the electrical outlet.

Does the system receive power?

Yes. The power strip is probably not functioning properly. Use another power strip.

No. Go to Step 5.

Step 5 Reconnect the system to the electrical outlet or power strip.

Make sure that all connections fit tightly together.

Step 6 Power up the system.

Is the problem resolved?

Yes. The connections were loose. You have fixed the problem.

No. Call your customer service representative. (See the "Obtaining Documentation, Obtaining Support, and Security Guidelines" section on page xix.)

Troubleshooting the Ethernet Controller

This section provides troubleshooting information for problems that might occur with the 10/100/1000-Mbps Ethernet controller.

This section contains the following topics:

Network Connection Problems

If the Ethernet controller cannot connect to the network, check the following conditions:

- Make sure that the cable is installed correctly.

  The network cable must be securely attached at all connections. If the cable is attached but the problem remains, try a different cable.

  If you set the Ethernet controller to operate at either 100 Mbps or 1000 Mbps, you must use Category 5 or higher cabling.
- Determine whether the switch or device to which the WAVE appliance is connected supports autonegotiation. If it does not, try configuring the integrated Ethernet controller manually to match the speed and duplex mode of the switch.
- Check the Ethernet controller LEDs on the device back panel. (See Figure 1-2.)

  These LEDs indicate whether a problem exists with the connector, cable, or switch:

  - The Ethernet link status LED is on when the Ethernet controller receives a link pulse from the switch. If the LED is off, there might be a defective connector or cable or a problem with the switch.
  - The Ethernet activity LED is on when the Ethernet controller sends or receives data over the Ethernet network. If the Ethernet activity LED is off, make sure that the switch and network are operating and that the correct device drivers are installed.
- Make sure that you are using the correct device drivers that are supplied with your device and that the device drivers on the client and the device are using the same protocol.
- Check for operating system-specific causes for the problem.

Ethernet Controller Troubleshooting Chart

Table 5-1 lists solutions to 10/100/1000-Mbps Ethernet controller problems.

Table 5-1 Ethernet Troubleshooting Chart

Ethernet Controller Problem	Actions
Ethernet link status LED does not work.	Check the following: • Make sure that the switch to which the WAVE appliance is connected is powered on. • Check all connections at the Ethernet controller and the switch. • Use another port on the switch. • If the switch does not support autonegotiation, manually configure the Ethernet controller to match the switch. • If you manually configured duplex mode, make sure that you also manually configure the speed. • Reseat or replace the adapter.
The Ethernet activity LED does not work.	Check the following: • The network might be idle. Try sending data from this device.

Table 5-1 Ethernet Troubleshooting Chart (continued)

Ethernet Controller Problem	Actions
Data is incorrect or sporadic.	Check the following: • Make sure that you are using Category 5 or higher cabling when operating the device at 100 Mbps or 1000 Mbps. • Make sure that the cables do not run close to noise-inducing sources such as fluorescent lights.
The Ethernet controller stopped working without apparent cause.	Check the following: • Try a different connector on the switch. • Reseat or replace the adapter.

Undetermined Problems

Use the information in this section if the diagnostic tests did not identify the failure, the devices list is incorrect, or the system is inoperative.

Note Damaged data in CMOS can cause undetermined problems.

Note Damaged data in the BIOS code can cause undetermined problems.

Check the front panel Power LED. If the LED indicates the power supply is working correctly, follow these steps:

Step 1 Power down the device.

Step 2 Make sure that the device is cabled correctly.

Step 3 Remove or disconnect the following devices (one at a time) until you find the failure (power up the device and reconfigure it each time):

- Any non-Cisco devices
- Surge suppressor device (on the device)

- Disk drives
- Memory modules

Caution Any component that is internal to the device must be serviced by trained and qualified personnel. Contact your Cisco customer service representative.

Step 4 Power up the device. If the problem remains, check the following parts in the order listed:

a. Power backplane

b. System board

Note If the problem goes away when you remove an adapter from the system, and replacing that adapter does not correct the problem, check the system board.

Note If you suspect a networking problem and all the system tests pass, check if there is a network cabling problem external to the system.

Problem-Solving Tips

Because of the variety of hardware and software combinations that can be encountered, use the following information to assist you in identifying the problems. If possible, have this information available when requesting technical assistance.

- Machine type and model
- Microprocessor or hard disk upgrades
- Failure symptom
  - What, when, where; single or multiple systems?
  - Is the failure repeatable?

  - Has this configuration ever worked?
  - If it has been working, what changes were made before it failed?
  - Is this the original reported failure?
- Hardware configuration
  - Print (print screen) configuration currently in use
  - BIOS level
- WAAS system software type and version level

To eliminate confusion, identical systems are considered identical only if they meet all these conditions:

- Are the exact machine type and models
- Have the same BIOS level
- Have the same adapters or attachments in the same locations
- Have the same address jumpers, terminators, and cabling
- Have the same WAAS software versions
- Have the same configuration options set in the system
- Have the same setup for the operating system control files

Comparing the configuration and software setup in working and nonworking systems might help to resolve the problem.

Symptoms and Solutions

This section lists symptoms, errors, and the possible causes. The most likely cause is listed first. You can use the error symptom tables to find solutions to problems that have definite symptoms.

In Table 5-2 through Table 5-9, the first entry in the "Cause and Action" column is the most likely cause of the symptom.

Caution Any component that is internal to the device must be serviced by trained and qualified personnel. Contact your Cisco customer service representative.

Table 5-2 CD-RW/DVD Drive Problems

Symptom	Cause and Action
CD-RW/DVD drive is not recognized.	1. Verify the following items: a. The IDE channel to which the CD-RW/DVD drive is attached (primary) is enabled in the configuration/setup utility program. b. All cables and jumpers are installed correctly. c. The correct device driver is installed for the CD-RW/DVD drive. 2. Check the CD-RW/DVD drive.
The CD-RW/DVD drive is not working correctly.	1. Clean the CD or DVD. 2. Check the CD-RW/DVD drive.
The CD-RW/DVD drive tray is not working.	1. Make sure that the device is turned on. 2. Insert the end of a straightened paper clip into the manual tray-release opening. 3. Check the CD-RW/DVD drive.

Table 5-3 Hard Disk Drive Problems

Symptom	Cause and Action
A hard disk drive was not detected while the operating system was being started.	Reseat all hard disk drives and cables. Run the hard disk drive diagnostic tests again.

Table 5-4 General Problems

Symptom	Cause and Action
Problems such as a broken cover latch or indicator LEDs not working.	Broken component. Call your customer service representative.

Table 5-5 Intermittent Problems

Symptom	Cause and Action
A problem occurs only occasionally and is difficult to detect.	1. Verify the following items: a. All cables are connected securely to the rear of the device. b. When the device is powered on, air is flowing from the rear of the device at the fan grille. If there is no airflow, the fans are not working. This problem causes the device to overheat and shut down. 2. Check the system error log. 3. See the "Undetermined Problems" section on page 5-6.

Table 5-6 Memory Problems

Symptom	Cause and Action
The amount of system memory displayed is less than the amount of physical memory installed.	1. Verify the following items: a. No error LEDs are lit on the front panel. b. The memory modules are seated properly. c. All banks of memory on the DIMMs are enabled. The device might have automatically disabled a DIMM bank when it detected a problem. 2. Check the POST error log: a. If a DIMM was disabled by a system management interrupt (SMI), the DIMM must be replaced. b. If the DIMM was disabled by the user or by POST, follow these steps: – Start the configuration/setup utility program. – Enable the DIMM. – Save the configuration and restart the device. 3. Check the DIMM. 4. Check the system board.

Table 5-7 Microprocessor Problems

Symptom	Cause and Action
The device emits a continuous tone during POST, indicating that the microprocessor is not working correctly.	1. Correct any errors that are indicated by the LEDs (see the "Interpreting POST Diagnostic Front Panel LEDs and Beep Codes" section on page 5-16). 2. Check the microprocessor and the VRM.

Table 5-8 Console Port (Serial Port) Problems

Symptom	FRU or Action
A serial device does not work. For more information about the serial port, see the "Console Port Serial Connector" section on page 1-6.	1. Verify the following items: a. The console device is connected only to the serial port labeled COM1 or CONSOLE a. The device is compatible with the WAVE appliance. b. The device is connected to the correct port (see the "Location of Ports and Connectors" section on page 1-3). 2. Check for a failing serial device. 3. Check the system board.

Table 5-9 Software Problems

Symptom	Cause and Action
Suspected software problem.	1. To determine if problems are caused by the software, verify the following items: a. Your device has the minimum memory needed to use the software. b. The software is designed to operate on your device. c. The software that you are using works on another device. 2. If you received any error messages when using the application, see the information that comes with the software for a description of the messages and suggested solutions to the problem.

Power-On Self Test (POST)

This section lists the error codes, error messages, and the various indicator light and beep sequences that you may encounter during the Power-On Self-Test (POST) or appliance restart, the probable source of the problem, and steps you can take to resolve the error condition.

The POST Message Disabled mode suppresses most system messages during POST, such as the memory count and non-error text messages. If a POST error occurs, the screen will display the error message. To switch to the POST Messages Enabled mode during POST, press any key (except F10 or F12). The default mode is POST Message Disabled.

This section contains the following topics:

POST Overview

When you power up the device, it performs a series of tests to check the operation of device components. This series of tests is called the power-on self-test, or POST.

If POST finishes without detecting any problems, no beeps sound, and the first screen of your operating system or application program appears.

If POST detects a problem, more than one beep sounds, and an error message appears on your screen. See the "POST Numeric Codes and Text Messages" section on page 5-13 and "Interpreting POST Diagnostic Front Panel LEDs and Beep Codes" section on page 5-16 for more information.

Note If you have a power-up password or administrator password set, you must enter the password and press **Enter** when prompted, before POST will continue.

Note A single problem might cause several error messages. When this situation occurs, you should correct the cause of the first error message. After you correct the cause of the first error message, the other error messages usually will not occur the next time that you run the test.

POST Numeric Codes and Text Messages

This section covers POST errors that have numeric codes associated with them. The section also includes some text messages that may be encountered during POST.

Note The computer will beep once after a POST text message is displayed on the screen.

Table 5-10 Diagnostic Front Panel LEDs and Beep Codes

Control Panel Message	Description
101-Option ROM Checksum Error	System ROM or expansion board option ROM checksum.
103-System Board Failure	DMA or timers.
110-Out of Memory Space for Option ROMs	Recently added PCI expansion card contains an option ROM too large to download during POST.
162-System Options Not Set	Configuration incorrect. RTC (real-time clock) battery may need to be replaced.
163-Time & Date Not Set	Invalid time or date in configuration memory. The RTC (real-time clock) battery may need to be replaced.
163-Time & Date Not Set	CMOS jumper may not be properly installed.
164-Memory Size Error	Memory amount has changed since the last boot (memory added or removed).
164-Memory Size Error	Memory configuration incorrect.

Table 5-10 Diagnostic Front Panel LEDs and Beep Codes (continued)

Control Panel Message	Description
201-Memory Error	RAM failure.
213-Incompatible Memory Module in Memory Socket(s) X, X, ...	A memory module in memory socket identified in the error message is missing critical SPD information or is incompatible with the chip set.
214-DIMM Configuration Warning	Populated DIMM configuration is not optimized.
219-ECC Memory Module Detected ECC Modules not supported on this Platform	Recently added memory module(s) support ECC memory error correction.
301-Keyboard Error	Keyboard failure.
303-Keyboard Controller Error	I/O board keyboard controller.
304-Keyboard or System Unit Error	Keyboard failure.
404-Parallel Port Address Conflict Detected	Both external and internal ports are assigned to parallel port X.
410-Audio Interrupt Conflict	IRQ address conflicts with another device.
411-Network Interface Card Interrupt Conflict	IRQ address conflicts with another device.
501-Display Adapter Failure	Graphics display controller.
510-Flash Screen Image Corrupted	Flash Screen image has errors.
511-CPU, CPUA, or CPUB Fan not Detected	CPU fan is not connected or may have malfunctioned.
512-Chassis, Rear Chassis, or Front Chassis Fan not Detected	Chassis, rear chassis, or front chassis fan is not connected or may have malfunctioned.
514-CPU or Chassis Fan not Detected	CPU or chassis fan is not connected or may have malfunctioned.
610-External Storage Device Failure	External tape drive not connected.
611-Primary Floppy Port Address Assignment Conflict	Configuration error.
660-Display cache is detected unreliable	Integrated graphics controller display cache is not working properly and will be disabled.
912-Computer Cover Has Been Removed Since Last System Startup	Computer cover was removed since last system startup.

Table 5-10 Diagnostic Front Panel LEDs and Beep Codes (continued)

Control Panel Message	Description
917-Front Audio Not Connected	Front audio harness has been detached or unseated from motherboard.
918-Front USB Not Connected	Front USB harness has been detached or unseated from motherboard.
922-This system only supports SDVO/ADD2 cards in the x16 slot	The SDVO connector on the system board has the physical appearance of a PCI Express x16 connector; however, the platform does NOT support the use of conventional PCI Express cards or reversed layout ADD2 cards.
1151-Serial Port A Address Conflict Detected	Both external and internal serial ports are assigned to COM1.
1152-Serial Port B Address Conflict Detected	Both external and internal serial ports are assigned to COM2.
1155-Serial Port Address Conflict Detected	Both external and internal serial ports are assigned to the same IRQ.
1201-System Audio Address Conflict Detected	Device IRQ address conflicts with another device.
1202-MIDI Port Address Conflict Detected	Device IRQ address conflicts with another device.
1203-Game Port Address Conflict Detected	Device IRQ address conflicts with another device.
1720-SMART Hard Drive Detects Imminent Failure	Hard drive is about to fail. (Some hard drives have a hard drive firmware patch that will fix an erroneous error message.)
1796-SATA Cabling Error	One or more SATA devices are improperly attached.
1797-SATA Drivelock is not supported in RAID mode.	Drivelock is enabled on one or more SATA hard drives, and they cannot be accessed while the system is configured for RAID mode.
1801-Microcode Patch Error	Processor is not supported by ROM BIOS.
2216-Powered USB cable not attached	Powered USB cable is not properly attached to the USB PlusPower expansion card or to the system board.
Invalid Electronic Serial Number	Electronic serial number has become corrupted.
Memory Parity Error	Parity RAM failure.

Table 5-10 Diagnostic Front Panel LEDs and Beep Codes (continued)

Control Panel Message	Description
Network Server Mode Active and No Keyboard Attached	Keyboard failure while Network Server Mode enabled.
Parity Check 2	Parity RAM failure.
System will not boot without fan	CPU fan not installed or disconnected in VSFF chassis.

Interpreting POST Diagnostic Front Panel LEDs and Beep Codes

This section covers the front panel LED codes as well as the beep codes that may occur before or during POST that do not necessarily have an error code or text message associated with them.

Table 5-11 lists the recommended actions in the order in which they should be performed.

Caution There are no customer-replaceable components inside your WAVE-274 or WAVE-474 appliance. All faulty components can only be replaced by a qualified service technician. Once you have identified a faulty component, contact the Cisco Technical Assistance Center (TAC).

Table 5-11 POST Diagnostic Front Panel LEDs and Beep Codes

Activity	Beeps	Possible Cause	Recommended Action
Green Power LED On.	None	Computer on.	None
Green Power LED flashes every two seconds.	None	Computer in Suspend to RAM mode (some models only) or normal Suspend mode.	None required. Press any key or move the mouse to wake the computer.

Table 5-11 POST Diagnostic Front Panel LEDs and Beep Codes (continued)

Activity	Beeps	Possible Cause	Recommended Action
Red Power LED flashes two times, once every second, followed by a 2-second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	2	Processor thermal protection activated: A fan may be blocked or not turning or the heatsink/fan assembly is not properly attached to the processor.	1. Ensure that the computer air vents are not blocked and the processor cooling fan is running. 2. Open hood, press power button, and see if the processor fan spins. If the processor fan is not spinning, make sure that the fan's cable is plugged onto the system board header. 3. If the fan is plugged in, but it is not spinning, the fan assembly is faulty. 4. Contact Cisco TAC.
Red Power LED flashes three times, once every second, followed by a 2-second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	3	Processor not installed (not an indicator of bad processor).	1. Check to see that the processor is present. 2. Reseat the processor. 3. Contact Cisco TAC.

Table 5-11 POST Diagnostic Front Panel LEDs and Beep Codes (continued)

Activity	Beeps	Possible Cause	Recommended Action
Red Power LED flashes four times, once every second, followed by a 2-second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	4	Power failure (power supply is overloaded).	1. Open the hood and ensure the 4 or 6-wire power supply cable is seated into the connector on the system board. 2. Check if a device is causing the problem by removing all attached devices such as hard drives, optical drives, and expansion cards. Power on the system. If the system enters the POST, then power off and replace one device at a time and repeat this procedure until a failure occurs. Replace the device that is causing the failure. Continue adding devices one at a time to ensure that all the devices are functioning properly. 3. Contact Cisco TAC.
Red Power LED flashes five times, once every second, followed by a 2-second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	5	Pre-video memory error. CAUTION: To avoid damage to the DIMMs or the system board, you must unplug the computer power cord before attempting to reseat, install, or remove a DIMM module.	1. Reseat DIMMs. 2. Contact Cisco TAC.
Red Power LED flashes six times, once every second, followed by a 2-second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	6	Pre-video graphics error.	Contact Cisco TAC.

Table 5-11 POST Diagnostic Front Panel LEDs and Beep Codes (continued)

Activity	Beeps	Possible Cause	Recommended Action
Red Power LED flashes seven times, once every second, followed by a 2-second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	7	System board failure (ROM detected failure prior to video).	Contact Cisco TAC.
Red Power LED flashes eight times, once every second, followed by a 2-second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	8	Invalid ROM based on bad checksum.	Contact Cisco TAC.
Red Power LED flashes nine times, once every second, followed by a 2-second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	9	System powers on but is unable to boot.	Contact Cisco TAC.

Table 5-11 POST Diagnostic Front Panel LEDs and Beep Codes (continued)

Activity	Beeps	Possible Cause	Recommended Action
Red Power LED flashes ten times, once every second, followed by a 2-second pause. Beeps stop after fifth iteration but LEDs continue until problem is solved.	10	Bad option card.	1. Check installed cards by removing the card (one at a time if multiple cards), and then power on the system to see if fault goes away. 2. Once a bad card is identified, remove and replace the bad card. 3. Contact Cisco TAC.
System does not power on and LEDs are not flashing.	None	System unable to power on.	Press and hold the power button for less than 4 seconds. If the hard drive LED turns green, the power button is working correctly. If the hard drive LED does not turn on green then try the following: 1. Check that the unit is plugged into a working AC outlet. 2. Check that the power button harness is connected to the system board. 3. Check that both power supply cables are properly connected to the system board. 4. Contact Cisco TAC.