

33 Running Hardware Diagnostics

Introduction

Hardware diagnostics provide you with the software tools for diagnosing hardware-related problems on the OmniAccess 512 workgroup switch. These diagnostics allow you to test the switch off-line during network down time.

If a hardware failure occurs on the OmniAccess 512, the problem may be related to a number of different failures. As part of a systematic troubleshooting procedure, you can use the built-in diagnostic software to test basic connectivity and functionality.

OmniAccess 512 diagnostic software includes two basic types of tests: functionality tests and port tests. Functionality tests include memory, software loading, and CPU usage. Port tests check for basic connectivity.

◆ Note ◆

Functionality tests place the OmniAccess 512 in a non-functional state and the switch will require a reboot in order to restore it to a functional state. Port tests leave the OmniAccess 512 in a functional state, so a reboot is not required.

OmniAccess 512 tests can be run individually or sequentially. An option to run all tests will prompt the user to select between running the basic functionality tests or the port tests. An option to run all tests will not run both basic functionality tests and port tests sequentially.

The following tests are available for the OmniAccess 512:

- | | |
|--------------------|-------------------------------|
| • alpreg | Alpine Register Test |
| • ifled | Submodule Test |
| • ilb | Internal Loopback Test |
| • ilbstress | Internal Loopback Stress Test |
| • linkreg | Phy Link Test |
| • picocam | Pico CAM Test |
| • picomem | Pico Register and Memory Test |
| • mloopmac | Mammoth MAC Loopback Test |
| • phyreg | Physical Register Test |
| • port | Port and Traffic Test |
| • stress | Ethernet Port Stress Test |
| • sercable | Serial Cable Connection Test |
| • submem | Submodule Local Memory Test |

Getting Started

General Requirements

To function properly, hardware diagnostics must either be run offline (i.e., when the switch is not connected to a network) or during network downtimes.

Image File Requirements

There are two image files used for hardware diagnostics:

- **oa5diag.img** OmniAccess 512 diagnostics image file
- **dem4.img** OmniAccess 512 stress test image file

Stress and Ilbstress Test File Requirements

Running **stress** or **ilbstress** tests requires that you replace **em4.img** and **hem4.img** (if HRE-OSTK is installed) with **dem4.img**. To do this, follow the steps below:

1. Type **cp em4.img em4.img.orig** at the UI prompt and press **<Enter>**. The switch will save the original Ethernet image file as **em4.img.orig**.
2. Type **rm em4.img** at the UI prompt and press **<Enter>**. The following text will be displayed:
em4.img is an executable - are you sure you want to remove this? (n)
Type **y** and press **<Enter>**. The switch will take a few seconds to compact the file system memory.
3. If you have an HRE-OSTK installed, type **rm hem4.img** at the UI prompt and press **<Enter>**. The following text will be displayed:
hem4.img is an executable - are you sure you want to remove this? (n)
Type **y** and press **<Enter>**. The switch will take a few seconds to compact the file system memory.
4. Type **cp dem4.img em4.img** at the UI prompt and press **<Enter>**. The **dem4.img** file will be copied and rewritten as **em4.img**.
5. If you have an HRE-OSTK installed, type **cp dem4.img hem4.img** at the UI prompt and press **<Enter>**. The **dem4.img** file will be copied and rewritten as **hem4.img**.
6. Reboot the OmniAccess 512. The rewritten image file(s) will be loaded at reboot.

Configuration File Requirements

Diagnostics may not run if the **oa5.cfg** and **oa5.cnf** files are not in their default configurations. In addition, some diagnostics may affect the settings in configuration files. Therefore, any customized **oa5.cfg** and **oa5.cnf** files should be saved prior to testing. Once testing is completed, these files should be restored and the chassis rebooted prior to normal operation.

The default **oa5.cfg** and **oa5.cnf** files can be obtained by following the steps below:

1. Type **cp oa5.cfg oa5.cfg.orig** at the UI prompt and press **<Enter>**. The switch will save the original configuration file as **oa5.cfg.orig**.
2. Type **cp oa5.cnf oa5.cnf.orig** at the UI prompt and press **<Enter>**. The switch will save the original configuration file as **oa5.cnf.orig**.
3. Type **rm oa5.cfg** at the UI prompt and press **<Enter>**. The following text will be displayed:

**oa5.cfg is a configuration file - if you remove this file,
parameters will not be saved until you reboot; do you want to
remove this? (n)**

Type **y** and press **<Enter>**. The switch will take a few seconds to compact the file system memory.

4. Type **rm oa5.cnf** at the UI prompt and press **<Enter>**. The following text will be displayed:

**oa5.cnf is a configuration file - if you remove this file,
parameters will not be saved until you reboot; do you want to
remove this? (n)**

Type **y** and press **<Enter>**. The switch will take a few seconds to compact the file system memory.

5. Reboot the system. Default **oa5.cfg** and **oa5.cnf** files will be automatically created when the OmniAccess 512's management processor module discovers that the files are missing from flash memory. Use these default **oa5.cfg** and **oa5.cnf** files when running diagnostic software.

Accessing the Diagnostics Submenu

You must log in to the **diag** account to access the hardware diagnostics functionality. The **diag** user can run all hardware diagnostics in addition to all of the capabilities available to the **admin** user. The default password for the **diag** user is **switch**.

Once logged in as a **diag** user, the Main Menu will display as follows.

Alcatel OmniAccess 512 - Copyright (c), 1994-1999 XYLAN Inc.	
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Command	Main Menu

File	Manage system files
Summary	Display summary info for VLANs, bridge, interfaces, etc.
VLAN	VLAN management
Networking	Configure/view network parameters such as routing, etc.
Interface	View or configure the physical interface parameters
Security	Configure system security parameters
System	View/set system-specific parameters
Services	View/set service parameters
Switch	Enter Any to Any Switching Menu
Help	Help on specific commands
Diag	Display diagnostic level commands
Exit/Logout	Log out of this session
?	Display the current menu contents

Note the menu listing for **Diag** underneath the **Help** sub-menu. To access the diagnostics sub-menu, enter **diag** at the prompt. If verbose mode is enabled, the diagnostics sub-menu will display as follows:

Command	Diagnostic Menu

maskta	Control masking of temperature alarm led
test	Run tests on one or more slot modules
testdisp	Display test blocks on one or all slot modules
testcfg	Configure test parameters on one or all slot modules

The **maskta** command has specialized functionality; you *are not* required to be logged in as **diag** (however, you must be logged in as **admin**).

The **test** command is the main interface into the diagnostics functionality; you must logged in as **diag** to run this command.

The **testdisp** and **testcfg** commands also require that you are logged in as **diag**. In addition, you must be connected directly to the OmniAccess 512's console port in order to execute the **test**, **testdisp**, and **testcfg** commands. These commands are not supported via Telnet.

Diagnostic Menu commands are further described in the following sections.

Temperature Masking

The **maskta** command provides a way of modifying the behavior of the temperature alarm to mask the effect of the temperature sensor. By masking the temperature alarm bits, you can ensure that the switch's TEMP LED never comes on or that it comes on but goes off after a specified delay time. By default, temperature masking is disabled.

To enable temperature masking, enter

maskta enable

This command masks the temperature alarm completely. The TEMP LED will not come on even if the temperature exceeds the set ranges. The following message confirms the masking:

Masking of Temperature Alarm enabled

You could also enable temperature alarm masking but not mask the alarm completely. If you enter an integer after the **maskta enable** command, the TEMP LED will still come on but it will go off after the number of minutes you specified. For example, if you enter the command

maskta enable 5

the temperature alarm will still turn on, but it will turn off automatically five (5) minutes after the alarm-initiating event occurs.

◆ Note ◆

Once you enter a minute value when enabling temperature alarm masking that value is saved even if you disable masking. To reset the minute value you must re-enable temperature alarm masking and set the minute value to zero (i.e., enter the command **maskta enable 0**).

To disable temperature alarm masking, enter:

maskta disable

This is the default setting, so you only need to specify this command if you had previously enabled alarm masking. The following message confirms that you disabled masking:

Masking of Temperature Alarm disabled

Initiating Hardware Tests

The OmniAccess 512's front panel is divided into several areas labeled S1, S2, S3, etc. These areas relate to the conceptual division of the switch into several modules, or slots. S1 is the management module (referred to as the MPM), S2 is an Ethernet module (if the switch supports an uplink module), and S3 is the WAN uplink module.

The **test** command initiates one or more test routines on a specified slot. As an option, you can test all slots in one test session. Test status, instructions, and a summary of results are provided as output. To start a diagnostic test session, use the following command syntax:

```
test <slot-number> [repeat-count] [test-name]
```

where

<i>slot-number</i>	Indicates the slot number in the OmniAccess 512 for the module on which you want to run tests. If you enter all for this parameter, then all switching modules in the chassis will be tested. This parameter is required; if you do not enter a slot number then the test session will not start.
<i>repeat-count</i>	Indicates the number of times to run the specified tests on the module. This value can be an integer between 0 and 999. A value of zero (0) repeats the test infinitely. The default value is 1. This default will be assumed if you do not enter a repeat count value.
<i>test-name</i>	Indicates the test to be performed on the module. You can indicate the test name or all to run all off-board tests or the port test. You can enter only one test name or all . The default is all . This default will be assumed if you do not enter a test name.

◆ Note ◆

A combination of *repeat-count* set to **0** and *test_name* set to **all** allows the user to run either the port test infinitely or all off-board tests infinitely.

OmniAccess 512 Diagnostic Tests and Descriptions

alpreg	Tests the Alpine registers and the Alpine control logic, register and data/address lines.
ifled	Tests the Control/Status LED register. Tests the write function of the Control/Status LED register, LED data lines, and LEDs.
ilb	Performs port test using the internal loopback at the PHY or framer interface. Packets are generated by the MPM, sent out to the port, and then returned through an internal loopback within the PHY or framer. The MPM verifies the packets on a bit-by-bit basis. (See description for port test below.)
ilbstress	Performs stress test using the internal loopback at the PHY or framer interface. Packets are generated by the MPM, sent out to the port, and then returned through an internal loopback within the PHY or framer. The MPM verifies the packets on a bit-by-bit basis. (See description for stress test below.) This test requires the dem4.img file to be loaded in place of the em4.img . Refer to <i>Stress and Ilbstress Test File Requirements</i> on page 33-2 for more information.
linkreg	Tests the physical receiver link status and link register for the OmniAccess 512. (Not all OmniAccess 512s require this test.)
picocam	Tests the Pico CAM, Pico CAM control logic, CAM access, and data lines and buffers.

picomem	Tests the Pico registers and memory. Includes testing the Pico control logic, registers, internal memory, external SDRAM, SRAM, and data/address lines.
mloopmac	Performs a port test using the internal loopback within the Mammoth MAC chip. Packets are generated by the OmniAccess 512's MPM and sent out to the port and returned through an internal loopback within the Mammoth MAC chip. The MPM verifies the packets on a bit-by-bit basis.
phyreg	Tests the PHY registers. Tests the PHY control logic, registers, and data/address lines.
port	Functional testing of physical ports with a burst of data packets generated by the MPM. Packets are generated by the MPM, sent out the physical port, looped back through external cables or wrap plugs, and returned to the MPM. The returned packets are verified bit-by-bit by the MPM. This test requires the use of external cables or wrap plugs. The system will provide the user with instructions for setting up external cables or wrap plugs for port test and also prompts the user for input upon completion of setup. This test can be bypassed if cables are not available. For information on cables required for port test, see Port Test Wrap Cable/Plug Requirements Table on page 33-8.
sercable	Tests the switch's capability of identifying whether a serial cable is connected or not and what type of serial cable is connected to its port(s). Includes testing of serial cable line, transceiver, and PLD.
stress	Functional testing of physical ports with continuous full-wire traffic. The data packets are initially generated by the MPM, sent out the physical port, and looped back through external cables or wrap plugs. Once the packets are returned, the diagnostic image dem4.img and modifications in the packets destination address allows the packets to continuously circulate between the NI CPU and the external cables or wrap plugs for a predefined period. Once the predefined period is reached the packets are returned to the MPM. The packets are checked on a bit-by-bit basis. This test requires the dem4.img to be loaded in place of the em4.img . Refer to <i>Stress and Ilbstress Test File Requirements</i> on page 33-2 for more information.
submem	Tests the NI local memory. Includes testing local memory control logic, data/address lines, and local memory.

Sample Command Lines

There are numerous ways to specify a test session via the **test** command. Sample command lines are described below.

The the command line

test all 100 picocam

runs either the **picocam** test on all the slots in the chassis that are capable of executing the **mamcam** test 100 times.

In another example, the command line

test 3 0 all

infinitely runs either all the off-board tests or the port test on slot 3.

Finally, the command line

test 4 5

runs all the off-board tests or port tests on slot 4 a total of five consecutive times.

Halting Diagnostic Tests in Progress

Depending on how many tests and repeat iterations you specify, a test session could take some time to complete. If you need to halt in-progress tests, enter **<CTRL-C>**. This key sequence pauses the testing and provides a test summary report. You will be prompted to restart the testing after the pause.

◆ Note◆

The **<CTRL-C>** will not be immediately processed during certain phases of diagnostic testing. This delay may last several seconds.

Port Test Wrap Cable/Plug Requirements	
Module Type	Cable Type
OmniAccess 512	10BaseT/100BaseTx Full Duplex - ESM Wrap Plug. Refer to ESM Wrap Plug - RJ45 Connector. Half Duplex - Ethernet Crossover Wrap Cable Refer to Ethernet Crossover Wrap Cable - Category 5 UTP Copper Cable with RJ-45 Connectors
OA-512-FT1	Multimode fiber optic wrap plug sieth SC connectors
OA-512-FE1	Multimode fiber optic wrap plug sieth SC connectors
OA-512-BRI-U	Multimode fiber optic wrap plug sieth SC connectors
OA-512-BRI-S/T	Multimode fiber optic wrap plug sieth SC connectors
OA-512-USP	Multimode fiber optic wrap plug sieth SC connectors

Sample Test Session

Test sessions and results will vary among various OmniAccess 512 switches and uplink submodules. This section shows the output from a test session executed on slot 2 of an OmniAccess 512 and all tests were requested to be run one time. The command to start this test is

test 3

After you enter the **test** command line, the following displays:

**Port Tests are available for the selected slot(s).
These tests require external cabling and are
mutually exclusive of all other tests.**

Do you wish to run the Port Tests (y/n) (y)

Enter whether or not you want to run port tests. If you select to run the port tests, you must first make sure that the applicable ports are cabled. If not, only summary tests will be run.

If You Run Port Tests

If you select to run the port tests, you will be instructed on how to cable the ports. This cabling will vary depending on the module type, number of ports, and cable type. In this example, the following displays:

**Connect the following cables on Slot 2:
RJ45 wrap plug in Port 1
RJ45 wrap plug in Port 2**

Press <Enter> when finished.

Cable the ports according to these instructions. For Ethernet tests, you should use wrap-around plugs or cross-over cables to connect the ports. Use the table on page 33-8 to find out the type of cable needed. Press **<Enter>** when you have finished the cabling. The screen displays continue as shown on the following page.

Testing Slot 3 - Ether 10/100
Test In Progress: PORT Test (3-0) - Passed

Test Summation:

Started: WED OCT 27 09:20:32 1999

Slot 3	Passes	Fails
Ether 10/100 (3-0) SN 80454550		
MAMMEM	0	0
MAMCAM	0	0
WHSREG	0	0
ALPREG	1	0
LINKREG	0	0
MVBUS	0	0
MLOOPMAC	0	0
ILB	0	0
PORT	0	0
STRESS	0	0
ILBSTRESS	0	0

Completed: WED OCT 27 09:20:42 1999

Disconnect the following cables on Slot 2:
RJ45 wrap plug in Port 1
RJ45 wrap plug in Port 2

Press <Enter> when finished.

The tests are complete at this point. A summary of the test results and failures is displayed at the end of the test sequence. In this example, the module passed all tests. If a failure does occur, the **Failure Summation** section displays only the first three failures when you request multiple test iterations.

If a failure does occur during diagnostic tests, the OK2 LED on the failed module will display solid red. At this point, the OmniAccess 512 must be rebooted for operational use.

You should now disconnect the cables used in the external loopback tests. Press <Enter> and the module will be restored to its normal, pre-testing state.

If You Do Not Run Port Tests

If you select *not* to run the port tests, all off-board tests will be run. A prompt will warn you that the OmniAccess 512 will not be left in an operational state once testing has begun and you will be given an option to discontinue testing.

The selected test(s) require portions of the OmniAccess 512 to be reset. You must reboot to restore operational status of the OmniAccess 512 once testing has begun.

Do you wish to continue? (y/n) (y)

After you enter **y** at this prompt, messages continue to display as follows:

Test Summation:

Started: WED OCT 27 09:20:32 1999

Slot 3	Passes	Fails
Ether 10/100 (3-0) SN 80454550		
PICOMEM	0	0
PICOCAM	0	0
ALPREG	0	0
PHYREG	1	0
LINKREG	0	0
MLOOPMAC	0	0
ILB	0	0
PORT	0	0
STRESS	0	0
ILBSTRESS	0	0

Completed: WED OCT 27 09:20:42 1999

The OmniAccess 512 state is unstable and requires a reboot to attain operational status.

The tests are complete at this point. A summary of the test results and failures is displayed at the end of the test sequence. In this example, the module passed all tests. If a failure does occur, the **Failure Summation** section displays only the first three failures when you request multiple test iterations.

If a failure occurs during diagnostic tests, the OK2 LED on the failed module will display solid red. At this point, the OmniAccess 512 must be rebooted for operational use.

Displaying Available Diagnostic Tests

The **testdisp** command provides the user with a display of applicable tests for a particular slot or for all slots on the OmniAccess 512.

No default value is set and input must be provided at the time of entering the command. For example, to display available diagnostic tests for slot 3, enter:

testdisp 3

at the system prompt. The following is a sample display.

```
Ether 10/100 (3-0)
  PICOMEM - Tests PicoMemory
  PICOCAM - Tests Pico CAMs
  ALPREG - Tests the Alpine Registers
  PHYREG - Tests Phy Registers
  LINKREG - Tests Phy Link Register
  MLOOPMAC - Tests the Mammoth MAC Loopback
  ILB - Tests the Internal Loopback Test
  PORT - Tests the Ports
  STRESS - Stress Tests the Ports
  ILBSTRESS - Tests the Internal Loopback Stress Test
```

To display all available diagnostic tests for the entire OmniAccess 512 chassis, enter.

testdisp all

at the system prompt. The tests are displayed per slot starting from slot 1.

Configuring the Diagnostic Test Environment

The **testcfg** command allows the user to tailor diagnostic testing characteristics for a particular slot.

To configure diagnostic tests for a single slot, enter the **testcfg** command followed by the slot number. For example:

```
testcfg 2
```

◆ Note ◆

You cannot use the **testcfg** command on slot 1 (MPM).

The **testcfg** command allows the user to bypass testing individual slots when running the **test all** command. In addition, the **testcfg** command allows the user to configure the port speed and port mode for applicable Ethernet modules for tailoring of individual slots during diagnostic testing.

No default value is set and input must be provided at the time of entering the command. For example, to configure applicable diagnostic tests for slot 4, enter:

```
testcfg 2
```

at the system prompt. The following is a typical example for an Ethernet slot.

Test Configuration for slot 2

```
1) Skip this slot during test { No (1),
                             Yes (2) } : No
```

```
Enter (option=value/save/cancel) :
```

Note that for all slots other than applicable Ethernet slots, the **Skip this slot during test** option is the only available option. See *Configuring Tests for Ethernet Slots* on page 33-14 for information on using the **testcfg** command with Ethernet modules.

Skip this slot during test. Allows the user to bypass the specified slot when the **test all** command is issued. The default is **No**. If you want the **test all** command to skip this module, enter

```
1=2
```

The following will then be displayed.

Test Configuration for slot 2

```
1) Skip this slot during test { No (1),
                             Yes (2) } : Yes
```

```
Enter (option=value/save/cancel) :
```

Enter **save** if you want to make this change. If you enter **save**, the change will be made and the following will be displayed.

Configuration Saved

If you want to cancel this change, enter **cancel** and the **testcfg** command will terminate and the following will be displayed.

```
Exiting menu - Test Configuration not modified
```

Configuring Tests for Ethernet Slots

Tailoring of applicable Ethernet slots includes selection of Port Speeds and of Port Modes. To configure applicable diagnostic tests for Ethernet 10/100 ports in slot 2, enter:

testcfg 2

at the system prompt. The following is a sample display of the test configuration:

Test Configuration for slot 2

```
1) Skip this slot during test { No (1),  
                               Yes (2) } : No  
2) Port Speed { 10/100 (1),  
                100   (2),  
                10    (3) } : 10/100  
3) Port Mode { Full Duplex (1),  
              Half Duplex (2) } : Full Duplex  
  
Enter (option=value/save/cancel) :
```

To change any of the values above, enter the line number, followed by an equal sign, and followed by the new value. For example, to change the **Port Mode** field to half duplex, enter

3=2

at the prompt. The configurable fields displayed by the **testcfg** command are described below.

Skip this slot during test. Allows the user to select to bypass the specified slot when the **test all** command is issued. The default is **No**.

Port Speed. Allows the user to select module port speed during the diagnostic port test. Selection includes 10/100BaseT, 100BaseT, or 10BaseT. The default is **10/100BaseT**, which alternates the speed of the port test from 10 to 100 on each pass of the port test.

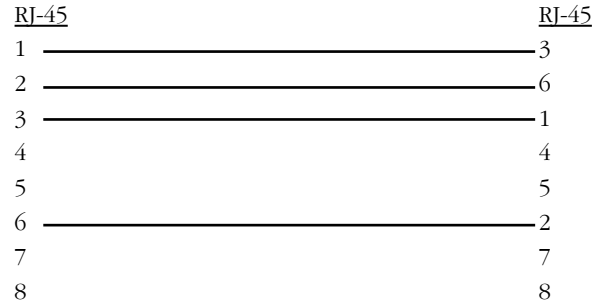
Port Mode. Allows the user to select module port mode during diagnostic port test. Selection includes Full Duplex or Half Duplex. The default value is **Full Duplex**.

Enter **save** if you want to make this change. If you want to cancel this change, enter **cancel** and the **testcfg** command will terminate.

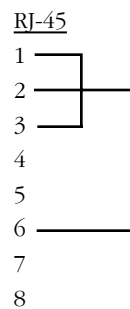
The configuration is stored in volatile memory. As a result, the default configurations are restored if the OmniAccess 512 is rebooted.

Diagnostic Test Cable Schematics

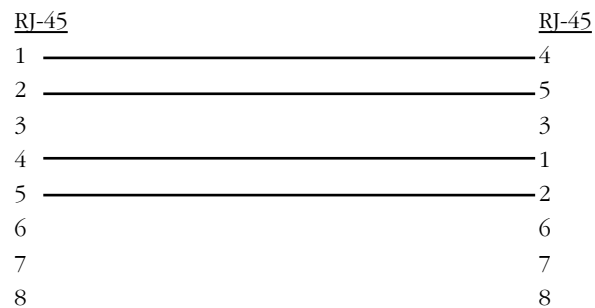
The figures below and on the following pages provide information on port test cables and plugs.



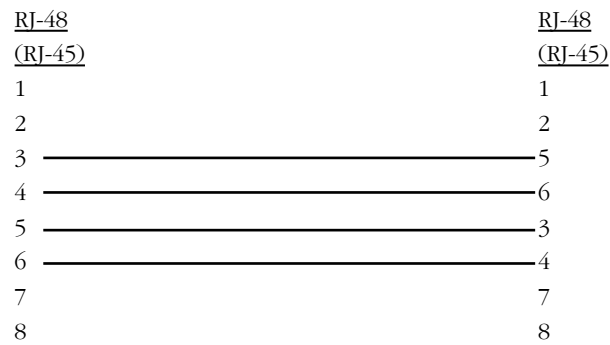
Ethernet Crossover Wrap Cable — Category 5 UTP Copper Cable with RJ-45 Connectors



ESM Wrap Plug – RJ-45 Connector



T1/E1 Crossover Wrap Cable — Category 5 UTP Copper Cable with RJ-45 Connectors



BRI S/T Crossover Wrap Cable — Category 5 UTP Copper Cable with RJ-48 (RJ-45) Connectors