CHAPTER 55

Configuring Generic Online Diagnostics

This chapter describes how to configure the generic online diagnostics (GOLD) on the Cisco 7600 series routers.

Note For complete syntax and usage information for the commands used in this chapter, refer to the *Cisco IOS Master Command List*, Release 12.2SX, at this URL:

http://www.cisco.com/en/US/docs/ios/mcl/122sxmcl/12_2sx_mcl_book.html

This chapter consists of these sections:

Tip For additional information (including configuration examples and troubleshooting information), see the documents listed on this page:

http://www.cisco.com/en/US/products/hw/routers/ps368/tsd_products_support_series_home.html

Understanding How Online Diagnostics Work

With online diagnostics, you can test and verify the hardware functionality of the Cisco 7600 series router while the router is connected to a live network.

The online diagnostics contain packet switching tests that check different hardware components and verify the data path and control signals. Disruptive online diagnostic tests, such as the built-in self-test (BIST) and the disruptive loopback test, and nondisruptive online diagnostic tests, such as packet switching, run during bootup, line card online insertion and removal (OIR), and system reset. The nondisruptive online diagnostic tests run as part of background health monitoring or at the user's request (on-demand).

The online diagnostics detect problems in the following areas:

- Hardware components
- Interfaces (GBICs, Ethernet ports, and so forth)
- Connectors (loose connectors, bent pins, and so forth)
- Solder joints
- Memory (failure over time)

Online diagnostics is one of the requirements for the high availability feature. High availability is a set of quality standards that seek to limit the impact of equipment failures on the network. A key part of high availability is detecting hardware failures and taking corrective action while the router runs in a live network. Online diagnostics in high availability detect hardware failures and provide feedback to high availability software components to make switchover decisions.

Online diagnostics are categorized as bootup, on-demand, scheduled, or health monitoring diagnostics. Bootup diagnostics run during bootup; on-demand diagnostics run from the CLI; schedule diagnostics run at user-designated intervals or specified times when the router is connected to a live network; and health-monitoring runs in the background.

Configuring Online Diagnostics

These sections describe how to configure online diagnostics:

Setting Bootup Online Diagnostics Level

You can set the bootup diagnostics level as minimal or complete or you can bypass the bootup diagnostics entirely. Enter the **complete** keyword to run all bootup diagnostic tests; enter the **minimal** keyword to run only EARL tests and loopback tests for all ports in the router. Enter the **no** form of the command to bypass all diagnostic tests. The default bootup diagnositcs level is minimal.

To set the bootup diagnostic level, perform this task:

Command	Purpose
`Router(config)# diagnostic bootup level {minimal | complete}`	Sets the bootup diagnostic level.

This example shows how to set the bootup online diagnostic level:

```
Router(config)# diagnostic bootup level complete
Router(config)#
```

This example shows how to display the bootup online diagnostic level:

```
Router(config)# do show diagnostic bootup level
Router(config)#
```

Configuring On-Demand Online Diagnostics

You can run the on-demand online diagnostic tests from the CLI. You can set the execution action to either stop or continue the test when a failure is detected or to stop the test after a specific number of failures occur by using the failure count setting. You can configure a test to run multiple times using the iteration setting.

You should run packet-switching tests before memory tests.

Note Do not use the **diagnostic start all** command until all of the following steps are completed.

Because some on-demand online diagnostic tests can affect the outcome of other tests, you should perform the tests in the following order:

1. Run the non-disruptive tests.
2. Run all tests in the relevant functional area.
3. Run the TestTrafficStress test.
4. Run the TestEobcStressPing test.
5. Run the exhaustive memory tests.

To run on-demand online diagnostic tests, perform this task:

Step 1 Run the non disruptive tests.

To display the available tests and their attributes, and determine which commands are in the non disruptive category, enter the **show diagnostic content** command.

Step 2 Run all tests in the relevant functional area.

Packet-switching tests fall into specific functional areas. When a problem is suspected in a particular functional area, run all tests in that functional area. If you are unsure about which functional area you need to test, or if you want to run all available tests, enter the **complete** keyword.

Step 3 Run the TestTrafficStress test.

This is a disruptive packet-switching test. This test switches packets between pairs of ports at line rate for the purpose of stress testing. During this test all of the ports are shut down, and you may see link flaps. The link flaps will recover after the test is complete. The test takes several minutes to complete.

Disable all health-monitoring tests f before running this test by using the **no diagnostic monitor module 1 test all** command.

Step 4 Run the TestEobcStressPing test.

This is a disruptive test and tests the Ethernet over backplane channel (EOBC) connection for the module. The test takes several minutes to complete. You cannot run any of the packet-switching tests described in previous steps after running this test. However, you can run tests described in subsequent steps after running this test.

Disable all health-monitoring tests before running this test by using the **no diagnostic monitor module 1 test all** command. The EOBC connection is disrupted during this test and will cause the health-monitoring tests to fail and take recovery action.

Step 5 Run the exhaustive-memory tests.

Before running the exhaustive memory tests, all health-monitoring tests should be disabled because the tests will fail with health monitoring enabled and the switch will take recovery action. Disable the health-monitoring diagnostic tests by using the **no diagnostic monitor module 1 test all** command.

Perform the exhaustive memory tests in the following order:

1. TestFibTcamSSRAM
2. TestAclQosTcam
3. TestNetFlowTcam
4. TestAsicMemory
5. TestAsicMemory

You must reboot the after running the exhaustive memory tests before it is operational again. You cannot run any other tests on the router after running the exhaustive memory tests. Do not save the configuration when rebooting as it will have changed during the tests. After the reboot, reenable the health monitoring tests using the **diagnostic monitor module 1 test all** command

To set the bootup diagnostic level, perform this task:

Command	Purpose
Router# **diagnostic ondemand** {**iteration** *iteration_count*} | {**action-on-error** {**continue** | **stop**}[*error_count*]}	Configures on-demand diagnostic tests to run, how many times to run (iterations), and what action to take when errors are found.

This example shows how to set the on-demand testing iteration count:

```
Router# diagnostic ondemand iteration 3
Router#
```

This example shows how to set the execution action when an error is detected:

```
Router# diagnostic ondemand action-on-error continue 2
Router#
```

Scheduling Online Diagnostics

You can schedule online diagnostics to run at a designated time of day or on a daily, weekly, or monthly basis. You can schedule tests to run only once or to repeat at an interval. Use the **no** form of this command to remove the scheduling.

To schedule online diagnostics, perform this task:

Command	Purpose
Router(config)# **diagnostic schedule module 1 test** {*test_id* | *test_id_range* | **all**} [**port** {*num* | *num_range* | **all**}] {**on** *mm dd yyyy hh*:*mm*} | {**daily** *hh*:*mm*} | {**weekly** *day_of_week hh*:*mm*}	Schedules on-demand diagnostic tests for a specific date and time, how many times to run (iterations), and what action to take when errors are found.

This example shows how to schedule diagnostic testing on a specific date and time for a specific port:

```
Router(config)# diagnostic schedule module 1 test 1,2,5-9 port 3 on january 3 2003 23:32
Router(config)#
```

This example shows how to schedule diagnostic testing to occur daily at a certain time for a specific port:

```
Router(config)# diagnostic schedule module 1 test 1,2,5-9 port 3 daily 12:34
Router(config)#
```

This example shows how to schedule diagnostic testing to occur weekly on a certain day for a specific port:

```
Router(config)# diagnostic schedule module 1 test 1,2,5-9 port 3 weekly friday 09:23
Router(config)#
```

Configuring Health-Monitoring Diagnostics

You can configure health-monitoring diagnostic testing while the router is connected to a live network. You can configure the execution interval for each health monitoring test, whether or not to generate a system message upon test failure, or to enable or disable an individual test. Use the **no** form of this command to disable testing.

To configure health monitoring diagnostic testing, perform this task:

	Command	Purpose
Step 1	`Router(config)# diagnostic monitor interval module 1 test {test_id | test_id_range | all} [hour hh] [min mm] [second ss] [millisec ms] [day day]`	Configures the health-monitoring interval of the specified tests . The **no** form of this command will change the interval to the default interval, or zero.
Step 2	`Router(config)#[no] diagnostic monitor module 1 test {test_id | test_id_range | all}`	Enables or disables health-monitoring diagnostic tests.

This example shows how to configure the specified test to run every two minutes:

```
Router(config)# diagnostic monitor interval module 1 test 1 min 2
Router(config)#
```

This example shows how to run the test if health monitoring has not previously been enabled:

```
Router(config)# diagnostic monitor module 1 test 1
```

This example shows how to enable the generation of a syslog message when any health monitoring test fails:

```
Router(config)# diagnostic monitor syslog
Router(config)#
```

Running Online Diagnostic Tests

After you configure online diagnostics, you can start or stop diagnostic tests or display the test results. You can also see which tests are configured and what diagnostic tests have already run.

These sections describe how to run online diagnostic tests after they have been configured:

Note

- We recommend that before you enable any online diagnostics tests that you enable the logging console/monitor to see all warning messages.
- We recommend that when you are running disruptive tests that you only run the tests when connected through console. When disruptive tests are complete a warning message on the console recommends that that you reload the system to return to normal operation: strictly follow this warning.
- While tests are running, all ports are shut down as a stress test is being performed with looping ports internally and external traffic might skew the test results. The entire switch must be rebooted to bring the switch to normal operation. When you issure the command to reload the switch, the system will ask you if the configuration should be saved.
- Do not save the configuration.
- If you are running the tests on a supervisor engine, after the test is initiated and complete, you must reload or power down and then power up the entire system.
- If you are running the tests on a module that is not the supervisor engine, after the test is initiated and complete, you must reset the module.

Starting and Stopping Online Diagnostic Tests

After you configure diagnostic tests to run, you can use the **start** and **stop** to begin or end a diagnostic test.

To start or stop an online diagnostic command, perform one of these tasks:

Command	Purpose
diagnostic start module 1 test {*test_id* | *test_id_range* | **minimal** | **complete** | **basic** | **per-port** | **non-disruptive** | **all**} **[port** {*num* | *port#_range* | **all**}]	Starts a diagnostic test on a port or range of ports.
diagnostic stop module 1	Stops a diagnostic test.

This example shows how to start a diagnostic test:

```
Router# diagnostic start module 1 test 5
Module 1:Running test(s) 5 may disrupt normal system operation
Do you want to run disruptive tests? [no]yes
00:48:14:Running OnDemand Diagnostics [Iteration #1] ...
00:48:14:%DIAG-SP-6-TEST_RUNNING:Module 1:Running TestNewLearn{ID=5} ...
00:48:14:%DIAG-SP-6-TEST_OK:Module 1:TestNewLearn{ID=5} has completed successfully
00:48:14:Running OnDemand Diagnostics [Iteration #2] ...
00:48:14:%DIAG-SP-6-TEST_RUNNING:Module 1:Running TestNewLearn{ID=5} ...
00:48:14:%DIAG-SP-6-TEST_OK:Module 1:TestNewLearn{ID=5} has completed successfully
Router#
```

This example shows how to stop a diagnostic test:

```
Router# diagnostic stop module 1
Router#
```

Displaying Online Diagnostic Tests and Test Results

You can display the online diagnostic tests that are configured and check the results of the tests using the **show** commands.

To display the diagnostic tests that are configured, perform this task:

Command	Purpose
show diagnostic content [**module 1**]	Displays the online diagnostics that are configured.

This example shows how to display the online diagnostics that are configured:

```
Router# show diagnostic content module 1

Module 1:

  Diagnostics test suite attributes:
    M/C/* - Minimal bootup level test / Complete bootup level test / NA
      B/* - Basic ondemand test / NA
    P/V/* - Per port test / Per device test / NA
    D/N/* - Disruptive test / Non-disruptive test / NA
      S/* - Only applicable to standby unit / NA
      X/* - Not a health monitoring test / NA
      F/* - Fixed monitoring interval test / NA
      E/* - Always enabled monitoring test / NA
      A/I - Monitoring is active / Monitoring is inactive
      R/* - Power-down line cards and need reset supervisor / NA
      K/* - Require resetting the line card after the test has completed / NA

                                                      Testing Interval
  ID   Test Name                                Attributes   (day hh:mm:ss.ms)
  ==== ================================== ============ =================
    1) TestScratchRegister -------------> ***N****A**  000 00:00:30.00
    2) TestSPRPInbandPing --------------> ***N****A**  000 00:00:15.00
    3) TestTransceiverIntegrity --------> **PD****I**  not configured
    4) TestActiveToStandbyLoopback -----> M*PDS***I**  not configured
    5) TestLoopback --------------------> M*PD****I**  not configured
    6) TestNewLearn --------------------> M**N****I**  not configured
    7) TestIndexLearn ------------------> M**N****I**  not configured
    8) TestDontLearn -------------------> M**N****I**  not configured
    9) TestConditionalLearn ------------> M**N****I**  not configured
   10) TestBadBpdu ---------------------> M**D****I**  not configured
   11) TestTrap ------------------------> M**D****I**  not configured
   12) TestMatch -----------------------> M**D****I**  not configured
   13) TestCapture ---------------------> M**D****I**  not configured
   14) TestProtocolMatch ---------------> M**D****I**  not configured
   15) TestChannel ---------------------> M**D****I**  not configured
   16) TestFibDevices ------------------> M**N****I**  not configured
   17) TestIPv4FibShortcut -------------> M**N****I**  not configured
   18) TestL3Capture2 ------------------> M**N****I**  not configured
   19) TestIPv6FibShortcut -------------> M**N****I**  not configured
   20) TestMPLSFibShortcut -------------> M**N****I**  not configured
   21) TestNATFibShortcut --------------> M**N****I**  not configured
   22) TestAclPermit -------------------> M**N****I**  not configured
   23) TestAclDeny ---------------------> M**D****I**  not configured
   24) TestQoSTcam ---------------------> M**D****I**  not configured
   25) TestL3VlanMet -------------------> M**N****I**  not configured
   26) TestIngressSpan -----------------> M**N****I**  not configured
   27) TestEgressSpan ------------------> M**N****I**  not configured
   28) TestNetflowInlineRewrite --------> C*PD****I**  not configured
```

```
  29) TestFabricSnakeForward ----------> M**N****I**  not configured
  30) TestFabricSnakeBackward ---------> M**N****I**  not configured
  31) TestFibTcamSSRAM ----------------> ***D****IR*  not configured
  32) ScheduleSwitchover --------------> ***D****I**  not configured


Router#
```

This example shows how to display the online diagnostic results :

```
Router# show diagnostic result module 1
Current bootup diagnostic level:minimal

Module 1:

  Overall Diagnostic Result for Module 1 :PASS
  Diagnostic level at card bootup:minimal

  Test results:(. = Pass, F = Fail, U = Untested)

    1) TestScratchRegister -------------> .
    2) TestSPRPInbandPing --------------> .
    3) TestGBICIntegrity:

      Port  1  2
      ----------
            U  U


    4) TestActiveToStandbyLoopback:

      Port  1  2
      ----------
            U  U


    5) TestLoopback:

      Port  1  2
      ----------
            .  .


    6) TestNewLearn --------------------> .
    7) TestIndexLearn ------------------> .
    8) TestDontLearn -------------------> .
    9) TestConditionalLearn ------------> .
   10) TestBadBpdu ---------------------> .
   11) TestTrap ------------------------> .
   12) TestMatch -----------------------> .
   13) TestCapture ---------------------> .
   14) TestProtocolMatch ---------------> .
   15) TestChannel ---------------------> .
   16) TestIPv4FibShortcut -------------> .
   17) TestL3Capture2 ------------------> .
   18) TestL3VlanMet -------------------> .
   19) TestIngressSpan -----------------> .
   20) TestEgressSpan ------------------> .
   21) TestIPv6FibShortcut -------------> .
   22) TestMPLSFibShortcut -------------> .
   23) TestNATFibShortcut --------------> .
   24) TestAclPermit -------------------> .
   25) TestAclDeny ---------------------> .
   26) TestQoSTcam ---------------------> .
```

```
   27) TestNetflowInlineRewrite:

      Port  1  2
      ----------
            U  U


   28) TestFabricSnakeForward ----------> .
   29) TestFabricSnakeBackward ---------> .
   30) TestFibTcam - RESET -------------> U
Router#
```

This example shows how to display the detailed online diagnostic results:

```
Router# show diagnostic result module 1 detail
Current bootup diagnostic level:minimal

Module 1:

  Overall Diagnostic Result for Module 1 :PASS
  Diagnostic level at card bootup:minimal

  Test results:(. = Pass, F = Fail, U = Untested)
  ____________________________________________________________________________

    1) TestScratchRegister -------------> .

          Error code ------------------> 0 (DIAG_SUCCESS)
          Total run count -------------> 330
          Last test execution time ----> May 12 2003 14:49:36
          First test failure time -----> n/a
          Last test failure time ------> n/a
          Last test pass time ---------> May 12 2003 14:49:36
          Total failure count ---------> 0
          Consecutive failure count ---> 0
  ____________________________________________________________________________

    2) TestSPRPInbandPing --------------> .

          Error code ------------------> 0 (DIAG_SUCCESS)
          Total run count -------------> 660
          Last test execution time ----> May 12 2003 14:49:38
          First test failure time -----> n/a
          Last test failure time ------> n/a
          Last test pass time ---------> May 12 2003 14:49:38
          Total failure count ---------> 0
          Consecutive failure count ---> 0
  ____________________________________________________________________________

    3) TestGBICIntegrity:

      Port  1  2
      ----------
            U  U

          Error code ------------------> 0 (DIAG_SUCCESS)
          Total run count -------------> 0
          Last test execution time ----> n/a
          First test failure time -----> n/a
          Last test failure time ------> n/a
          Last test pass time ---------> n/a
          Total failure count ---------> 0
          Consecutive failure count ---> 0
  ____________________________________________________________________________
```

Performing Memory Tests

Most online diagnostic tests do not need any special setup or configuration. However, the memory tests, which include the TestFibTcamSSRAM and TestLinecardMemory tests, have some required tasks and some recommended tasks that you should complete before running them.

Before you run any of the online diagnostic memory tests, perform the following tasks:

- Required tasks
  - Isolate network traffic by disabling all connected ports.
  - Do not send test packets during a memory test.
  - Reset the system before returning the system to normal operating mode.
- Turn off all background health monitoring tests using the **no diagnostic monitor module 1 test all** command.

Tip For additional information (including configuration examples and troubleshooting information), see the documents listed on this page:

http://www.cisco.com/en/US/products/hw/routers/ps368/tsd_products_support_series_home.html