# Configuring GOLD Health Monitoring for the Cisco ASR 903 Router

Generic Online Diagnostic (GOLD) is a health monitoring feature implemented on the Cisco ASR 903 Router. The GOLD functionality is developed to provide online diagnostic capabilities that run at bootup, in the background on a periodic basis, or based on demand from the CLI.

# Contents

# Restrictions for the GOLD feature

- GOLD test cases are designed on a per chip or per interface level and are not expected to monitor at a per modem or per service flow level.
- The Cisco ASR 903 Router currently supports the Error Counter Monitoring Test. Other GOLD tests are not supported.

# Information About GOLD

The following sections provide details of the GOLD feature:

- Limitations of Existing Logging Mechanism
- Understanding the Importance of GOLD Functionality
- Understanding the GOLD Feature

## Limitations of Existing Logging Mechanism

To provide high-availability for a router without any downtime it is imperative to analyze the stability of a system. The primary method of discovering the cause of system failure is system messages. However, there are certain system failures that do not send notifications. It is difficult to understand the cause of these system failures, as the existing logging mechanism fails to notify or maintain a log of these failures.

## Understanding the Importance of GOLD Functionality

As there are certain system failures that do not send any notification or keep a log of failure, it is essential to address these limitations. The GOLD feature has been designed specifically to provide error detection by polling for errors for those system modules that do not have any notification mechanism. GOLD has been implemented on the Cisco ASR 903 Routerto actively poll for system errors. Online diagnostics is one of the requirements for high availability (HA). HA is a a set of quality standards that seeks to limit the impact of equipment failures on the network. A key part of HA is detecting system failures and taking corrective actions while the system is running in a live network.

## Understanding the GOLD Feature

The GOLD feature is primarily used to poll for system errors targeted for those components, which do not send a notification upon failure. Although the infrastructure can be used to poll for both hardware and system errors, the main scope is to poll for status and error registers on physical hardware device. The Cisco ASR 903 Router uses a distributed GOLD implementation. In this model, the core Cisco IOS GOLD subsystem is linked on both the route service processor (RSP) and the interface modules.

Diagnostic tests can be registered either as local tests which run on the RP or as proxy tests which run on the line cards. When a proxy test is requested on the RP, a command is sent using Inter-Process Communication (IPC) to the line card to instruct it to run the test locally. The results are then returned to the RSP using IPC. Tests are specified by card type on a per slot/subslot basis. Diagnostic tests can be run either on bootup, periodically (triggered by a timer), or on demand from the CLI. GOLD feature is managed through a range of commands which are mainly used to provide on-demand diagnostic tests, schedule tests at particular intervals, monitor the system health on periodic basis and to view the diagnostic test results.

# Configuring Online Diagnostics

The following sections describe how to configure various types of diagnostics and view test reports:

# Configuring the Bootup Diagnostics Level

You can configure 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 and the **minimal** keyword to run minimal tests such as loopback. Enter the **no** form of the command to bypass all diagnostic tests. The default bootup diagnostics level is minimal.

> **Note** None of the currently implemented tests on the Cisco ASR 903 Router are bootup tests.

**SUMMARY STEPS**

1. **enable**
2. **configure terminal**
3. **diagnostic bootup level {minimal | complete}**

**DETAILED STEPS**

|  | Command or Action | Purpose |
|---|---|---|
| **Step 1** | `enable`<br><br>**Example:**<br>`Router> enable` | Enables privileged EXEC mode. Enter your password if prompted. |
| **Step 2** | `configure terminal`<br><br>**Example:**<br>`Router# configure terminal` | Enters global configuration mode. |
| **Step 3** | `Router(config)#` **`diagnostic bootup level {minimal | complete}`**<br><br>**Example:**<br>`Router(config)#` **`diagnostic bootup level complete`** | Configures the bootup diagnostic level. |

# Configuring On-Demand Diagnostics

You can run the on-demand 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.

**SUMMARY STEPS**

1. **enable**
2. **diagnostic ondemand** {**iteration** *iteration_count*} | {**action-on-error** {**continue** | **stop**}[*error_count*]}

3. **diagnostic start** {**slot** *slot-no*} **test** {*test-id* | *test-id-range* | **all** | **complete** | **minimal** | **non-disruptive**}

4. **diagnostic stop** {**slot** *slot-no*}

## DETAILED STEPS

| | Command or Action | Purpose |
|---|---|---|
| Step 1 | `enable`<br><br>**Example:**<br>`Router> enable` | Enables privileged EXEC mode. Enter your password if prompted. |
| Step 2 | `diagnostic ondemand {iteration iteration_count}`<br>`| {action-on-error {continue |`<br>`stop}[error_count]}`<br><br>**Example:**<br>`Router# diagnostic ondemand iteration 3` | Configures on-demand diagnostic tests to run, how many times to run (iterations), and what action to take when errors are found. |
| Step 3 | `diagnostic start {slot slot-no} test {test-id |`<br>`test-id-range | all | complete | minimal |`<br>`non-disruptive}`<br><br>**Example:**<br>`Router# diagnostic start slot 1 test 5` | Starts the on-demand diagnostic test on the specified slot. |
| Step 4 | `diagnostic stop {slot slot-no}`<br><br>**Example:**<br>`Router# diagnostic stop slot 1` | Stops the diagnostic test running on the specified slot. |

# Scheduling 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, follow these steps:

## SUMMARY STEPS

1. **enable**

2. **configure terminal**

3. **diagnostic schedule** {**slot** *slot-no*} **test** {*test-id* | *test-id-range* | **all** | **complete** | **minimal** | **non-disruptive**} {**daily** *hh:mm* | **on** *mm dd year hh:mm* | **weekly** *day-of-week hh:mm*}

**DETAILED STEPS**

| | Command or Action | Purpose |
|---|---|---|
| Step 1 | `enable`<br><br>**Example:**<br>`Router> enable` | Enables privileged EXEC mode. Enter your password if prompted. |
| Step 2 | `configure terminal`<br><br>**Example:**<br>`Router# configure terminal` | Enters global configuration mode. |
| Step 3 | `diagnostic schedule` {`slot` *slot-no*} `test` {*test-id* \| *test-id-range* \| `all` \| `complete` \| `minimal` \| `non-disruptive`} {`daily` *hh:mm* \| `on` *mm dd year hh:mm* \| `weekly` *day-of-week hh:mm*}<br><br>and<br><br>`diagnostic schedule` {`subslot` *slot/sub-slot*} `test` {*test-id* \| *test-id-range* \| `all` \| `complete` \| `minimal` \| `non-disruptive` \| `per-port` {`daily` *hh:mm* \| `on` *mm dd year hh:mm* \| `weekly` *day-of-week hh:mm* \| `port` {{*num* \| *port#-range* \| `all`}{`daily` *hh:mm* \| `on` *mm dd year hh:mm* \| `weekly` *day-of-week hh:mm*}}}}<br><br>**Example:**<br>This example shows how to schedule the diagnostic testing on a specific date and time for a specific slot:<br><br>`Router(config)# diagnostic schedule slot 1 test 1 on september 2 2009 12:00`<br>This example shows how to schedule the diagnostic testing to occur daily at a certain time for a specific slot:<br><br>`Router(config)# diagnostic schedule slot 1 test complete daily 08:00` | 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. |

# Configuring Health-Monitoring Diagnostics

You can configure health-monitoring diagnostic testing while the system 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.

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**Note** Before enabling the diagnostic monitor test, you first need to set the interval to run the diagnostic test. An error message is displayed if the interval is not configured before enabling the monitoring.

**SUMMARY STEPS**

1. **enable**

2. **configure terminal**

3. **diagnostic monitor interval** {**slot** *slot-no*} **test** {*test-id* | *test-id-range* | **all**} {*hh:mm:ss*} {*milliseconds*} {*number-of-days*}

4. **diagnostic monitor** {**slot** *slot-no*} **test** {*test-id* | *test-id-range* | **all**}

5. **diagnostic monitor syslog**

6. **diagnostic monitor threshold** {**slot** *slot-no*} **test** {*test-id* | *test-id-range* | **all**} {**failure count** *no-of-allowed-failures*}

**DETAILED STEPS**

| | Command or Action | Purpose |
|---|---|---|
| Step 1 | **enable**<br><br>**Example:**<br>Router> enable | Enables privileged EXEC mode. Enter your password if prompted. |
| Step 2 | **configure terminal**<br><br>**Example:**<br>Router# configure terminal | Enters global configuration mode. |
| Step 3 | **diagnostic monitor interval** {**slot** *slot-no*} **test** {*test-id* | *test-id-range* | **all**} {*hh:mm:ss*} {*milliseconds*} {*number-of-days*}<br><br>**Example:**<br>The following example shows how to configure the periodic interval for running diagnostic tests on the Cisco ASR 903 Routerbefore enabling monitoring:<br><br>Router(config)# diagnostic monitor interval slot 1/0 test 2 06:00:00 100 10 | 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 4 | **diagnostic monitor** {**slot** *slot-no*} **test** {*test-id* | *test-id-range* | **all**}<br><br>**Example:**<br>The following example shows a sample output of an error message displayed when monitoring is enabled before configuring the test interval:<br><br>Router(config)# diagnostic monitor slot 1 test 2 | Enables or disables health-monitoring diagnostic tests. |
| Step 5 | **diagnostic monitor syslog**<br><br>**Example:**<br>Router(config)# diagnostic monitor syslog | Enables the generation of a system logging messages when a health-monitoring test fails. |
| Step 6 | **diagnostic monitor threshold** {**slot** *slot-no*} **test** {*test-id* | *test-id-range* | **all**} {**failure count** *no-of-allowed-failures*}<br><br>**Example:**<br>Router(config)# diagnostic monitor threshold slot 1 test 2 failure count 10 | Configures the failure threshold value for the slot. |

# 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.

**SUMMARY STEPS**

1. **enable**

2. **show diagnostic content** [**all** | **slot** *slot-no*]

3. **show diagnostic result** [[ **slot** *slot-no*] {**detail** | **test** {*test-id* | *test-id-range* | **all**}} | **all**]

4. **show diagnostic schedule** [**all** | **slot** *slot-no*]

5. **show diagnostic events** [**slot** *slot-no* | **event-type** {*error* | *info* | *warning*}]

**DETAILED STEPS**

| | Command or Action | Purpose |
|---|---|---|
| Step 1 | `enable`<br><br>**Example:**<br>`Router> enable` | Enables privileged EXEC mode. Enter your password if prompted. |
| Step 2 | `show diagnostic content` [`all` \| `slot` *slot-no*]<br><br>**Example:**<br>`Router# show diagnostic content slot 1` | Displays the online diagnostics tests and test attributes that are configured. |
| Step 3 | `show diagnostic result` [[`slot` *slot-no*] {`detail` \| `test` {*test-id* \| *test-id-range* \| `all`}} \| `all`]<br><br>**Example:**<br>`Router# show diagnostic result all` | Displays the diagnostic test results (pass, fail, or untested) for a slot. |
| Step 4 | `show diagnostic schedule` [`all` \| `slot` *slot-no*]<br><br>**Example:**<br>`Router# show diagnostic schedule slot 1` | Displays the current scheduled diagnostic tasks. |
| Step 5 | `show diagnostic events` [`slot` *slot-no* \| `event-type` {*error* \| *info* \| *warning*}]<br><br>**Example:**<br>`Router# show diagnostic events slot 1` | Displays the diagnostic event log details for the specified slot. |

# Supported GOLD Tests on the Cisco ASR 903 Router

This section discusses the GOLD test cases that have been implemented on Cisco ASR 903 Router. The Cisco ASR 903 Router supports the following categories of GOLD tests:

- Boot-up test

- On-demand test

- Health monitoring test

The following tests are currently supported:

- Error Counter Monitoring Test—The error counter monitoring test is defined as a health monitoring test. The error counter monitoring test detects errors on ASICs attached to the active RSP. If errors exceed a certain threshold, the router displays a syslog message containing details including ASIC, register identifier, ASIC ID, ASIC instance, and counter values. The interval for polling for errors is fixed to 5 seconds.

  For an example of an error counter monitoring test configuration, see Configuration Examples for GOLD Feature, page 12.

# How to Manage Diagnostic Tests

This section describes how to manage the diagnostic tests. The following GOLD commands are used to to manage the ondemand and periodic diagnostic tests:

**SUMMARY STEPS**

1. **diagnostic ondemand**
2. **show diagnostic ondemand**
3. **diagnostic start** {*slot*}
4. **show diagnostic content**
5. **show diagnostic result**
6. **show diagnostic events**
7. **diagnostic stop** {*slot*}
8. **configure terminal**
9. **diagnostic bootup level** {**minimal** | **complete**}
10. **show diagnostic bootup level**
11. **diagnostic event-log size** *size*
12. **diagnostic monitor interval** {*slot*} **test** {*test-id* | *test-id-range* | **all**} *hh:mm:ss milliseconds days*
13. **diagnostic schedule module** {*module-number* | *slot/subslot*} **test** {*test-id* | **all** | **complete** | **minimal** | **non-disruptive** | **per-port**}
14. **show diagnostic schedule**

**DETAILED STEPS**

| | Command or Action | Purpose |
|---|---|---|
| Step 1 | **diagnostic ondemand**<br><br>**Example:**<br>Router# diagnostic ondemand iteration 50 | Configures the ondemand diagnostic parameters such as iteration-count and action-on-error. These parameters signify the number of times the test is run and the execution action when a failure is detected. These parameters are used when the command **diagnostic start** is executed. In the given example, the iteration count to the same ondemand diagnostic test again is configured as 50.<br><br>**Note**    By default, iteration-count is 1, action-on-error is continue, and error count is 0. |
| Step 2 | **show diagnostic ondemand settings**<br><br>**Example:**<br>Router# show diagnostic ondemand settings | Displays the ondemand diagnostic settings configured using the command **diagnostic ondemand**. |
| Step 3 | **diagnostic start** {**slot** *slot-no*} **test** {*test-id* \| *test-id-range* \| **all** \| **complete** \| **minimal** \| **non-disruptive**}<br><br>**Example:**<br>Router# diagnostic start slot 1 test 1 all | Starts an ondemand diagnostic test.<br><br>• **slot** *slot-no*—Indicates the slot number of the full-height line card where the diagnostic test is executed. The slot keyword is used to refer a full-height line card on the router. The valid range for slot is from 1 to 8.<br><br>• **test**— Specifies a test to run.<br><br>• *test-id*—Identification number for the test to run.<br><br>• *test-id-range*—Range of identification numbers for tests to run.<br><br>• **minimal**—Runs minimal bootup diagnostic tests.<br><br>• **complete**—Runs complete bootup diagnostic tests.<br><br>• **non-disruptive**—Runs the non disruptive health-monitoring tests.<br><br>• **all**—Runs all diagnostic tests. |
| Step 4 | **show diagnostic content**<br><br>**Example:**<br>Router# show diagnostic content | Displays the registered tests, attributes, and the configured interval at which the test runs. |
| Step 5 | **show diagnostic result**<br><br>**Example:**<br>Router# show diagnostic result | Displays the diagnostic test results for an interface module. |
| Step 6 | **show diagnostic events**<br><br>**Example:**<br>Router# show diagnostic events | Displays the diagnostic event log details for all interface modules installed on the Cisco ASR 903 Router. |

| | Command or Action | Purpose |
|---|---|---|
| **Step 7** | `diagnostic stop {slot slot-no} test {test-id \| test-id-range \| all \| complete \| minimal \| non-disruptive}`<br><br>**Example:**<br>`Router# diagnostic stop slot 1 all` | Stops the ondemand diagnostic test. |
| **Step 8** | `configure terminal`<br><br>**Example:**<br>`Router# configure terminal` | Enters global configuration mode. |
| **Step 9** | `diagnostic bootup level {minimal \| complete}`<br><br>**Example:**<br>`Router(config)# diagnostic bootup level complete` | Configures the bootup diagnostic level.<br><br>• **minimal**—Specifies minimal diagnostics.<br><br>• **complete**—Specifies complete diagnostics. |
| **Step 10** | `show diagnostic bootup level`<br><br>**Example:**<br>`Router# show diagnostic bootup` | Displays the configured bootup diagnostic level. |
| **Step 11** | `diagnostic event-log size size`<br><br>**Example:**<br>`Router(config)# diagnostic event log size 10000` | Modifies the diagnostic event log size dynamically.<br><br>• *size*—Diagnostic event-log sizes. The valid values range from 1 to 10000 entries. |
| **Step 12** | `diagnostic monitor interval {slot slot-no} test {test-id \| test-id-range \| all} hh:mm:ss milliseconds days`<br><br>**Example:**<br>`Router(config)# diagnostic monitor interval slot 1 test 2 06:00:00 100 20` | Configures the health monitoring diagnostic test interval to rerun the tests.<br><br>• *hh:mm:ss*—Hours, minutes, and seconds interval configured to run the test again.<br><br>• *milliseconds*—Number of milliseconds between tests.<br><br>• *days*—Number of days between tests. The valid range is from 0 to 20. |
| **Step 13** | `diagnostic schedule module {module-number \| slot/subslot} test {test-id \| all \| complete \| minimal \| non-disruptive \| per-port}`<br><br>**Example:**<br>`Router(config)# diagnostic schedule slot 1 test complete daily 08:00` | Schedules the online diagnostic test to run at a designated time, or on daily, weekly or monthly basis.<br><br>• *module-number*—Specifies the module number.<br><br>• *per-port*—Selects the per-port test suite. |
| **Step 14** | `show diagnostic schedule`<br><br>**Example:**<br>`Router# show diagnostic schedule` | Displays the current scheduled diagnostic tests. |

# Configuration Examples for GOLD Feature

The following example shows a sample output of the test configuration, test attributes, and the supported coverage test levels for each test and for each slot:

```
Router#show diagnostic description slot R0 test ?

  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


                                                   Test Interval    Thre-
  ID   Test Name                      Attributes   day hh:mm:ss.ms shold
  ==== ================================ ============ =============== =====
    1) TestErrorCounterMonitor --------> ***N**F*A    000 00:00:05.00 50
```