CHAPTER 8

Configuring RMON

RMON is an Internet Engineering Task Force (IETF) standard monitoring specification that allows various network agents and console systems to exchange network monitoring data. You can use the RMON alarms and events to monitor Cisco MDS 9000 Family switches running the Cisco SAN-OS Release 2.0(1b) or later or Cisco NX-OS Release 4.1(3) or later software.

This chapter includes the following sections:

Information About RMON

RMON is disabled by default, and no events or alarms are configured in the switch.

All switches in the Cisco MDS 9000 Family support the following RMON functions (defined in RFC 2819):

- Alarm—Each alarm monitors a specific management information base (MIB) object for a specified interval. When the MIB object value exceeds a specified value (rising threshold), the alarm condition is set and only one event is triggered regardless of how long the condition exists. When the MIB object value falls below a certain value (falling threshold), the alarm condition is cleared. This allows the alarm to trigger again when the rising threshold is crossed again.
- Event—Determines the action to take when an event is triggered by an alarm. The action can be to generate a log entry, an SNMP trap, or both.

For agent and management information, see the *Cisco MDS 9000 Family MIB Quick Reference.*

For information on an SNMP-compatible network management station, see the "Configuring SNMP" section on page 9-1 .

This section includes the following topics:

RMON Configuration Information

RMON is disabled by default and no events or alarms are configured in the switch. You can configure your RMON alarms and events by using the CLI or an SNMP-compatible network management station.

Tip We recommend an additional, generic RMON console application on the network management station (NMS) to take advantage of RMON's network management capabilities.

RMON Configuration Using Threshold Manager

RMON is disabled by default and no events or alarms are configured in the switch. You can configure your RMON alarms and events by using the CLI or by using Threshold Manager in Device Manager.

The Threshold Monitor allows you to trigger an SNMP event or log a message when the selected statistic goes over a configured threshold value. RMON calls this a rising alarm threshold. The configurable settings are as follows:

- Variable—The statistic you want to set the threshold value on.
- Value—The value of the variable that you want the alarm to trigger at. This value is the difference (delta) between two consecutive polls of the variable by Device Manager.
- Sample—The sample period (in seconds) between two consecutive polls of the variable. Select your sample period such that the variable does not cross the threshold value you set under normal operating conditions.
- Warning—The warning level used by Device Manager to indicate the severity of the triggered alarm. This is a DCNM-SAN and Device Manager enhancement to RMON.

Note To configure any type of RMON alarm (absolute or delta, rising or falling threshold) click **More** on the Threshold Manager dialog box. You should be familiar with how RMON defines these concepts before configuring these advanced alarm types. Refer to the RMON-MIB (RFC 2819) for information on how to configure RMON alarms.

Note You must also configure SNMP on the switch to access RMON MIB objects.

RMON Alarm Configuration Information

Threshold Manager provides a list of common MIB objects to set an RMON threshold and alarm on. The alarm feature monitors a specific MIB object for a specified interval, triggers an alarm at a specified value (rising threshold), and resets the alarm at another value (falling threshold).

You can also set an alarm on any MIB object. The specified MIB must be an existing SNMP MIB object in standard dot notation (1.3.6.1.2.1.2.2.1.14.16777216 16 16777216 for ifInOctets.167772161616777216).

Use one of the following options to specify the interval to monitor the MIB variable (ranges from 1 to 4294967295 seconds):

- Use the **delta** option to test the change between samples of a MIB variable.

- Use the **absolute** option to test each MIB variable directly.
- Use the **delta** option to test any MIB objects that are counters.

The range for the **rising threshold** and **falling threshold** values is -2147483647 to 2147483647.

Caution The **falling threshold** must be less than the **rising threshold**.

You can optionally specify the following parameters:

- The event-number to trigger if the rising or falling threshold exceeds the specified limit.
- The owner of the alarm.

Default Settings

Table 8-1 lists the default settings for all RMON features in any switch.

Table 8-1 Default RMON Settings

Parameters	Default
RMON alarms	Disabled
RMON events	Disabled

Configuring RMON

RMON is disabled by default, and no events or alarms are configured in the switch.

This section includes the following topics:

Enabling RMON Alarms by Port

Detailed Steps

To configure an RMON alarm for one or more ports, follow these steps:

Step 1 Choose **Admin > Events > Threshold Manager** and click the **FC Interfaces** tab.

You see the Threshold Manager dialog box.

Step 2 Choose the **Select** radio button to select individual ports for this threshold alarm.

a. Click the **...** button to the right of the Selected field to display all ports.

b. Select the ports you want to monitor.

c. Click **OK** to accept the selection.

Alternatively, click the appropriate radio button to choose ports by type: **All** ports, **xE** ports, or **Fx** ports.

Step 3 Check the check box for each variable to be monitored.

Step 4 Enter the threshold value in the Value column.

Step 5 Enter the sampling period in seconds. This is the time between each snapshot of the variable.

Step 6 Choose one of the following severity levels to assign to the alarm: **Fatal**, **Warning**, **Critical**, **Error**, **Information.**

Step 7 Click **Create.**

Step 8 Confirm the operation to define an alarm and a log event when the system prompts you to define a severity event. If you do not confirm the operation, the system only defines a log event.

Step 9 Click **More** and then click the **Alarms** tab from the Threshold Manager dialog box to verify the alarm you created.

Step 10 Close both dialog box pop-up windows.

Enabling 32-Bit and 64-Bit Alarms

Detailed Steps

To configure an RMON alarm for one or more ports, follow these steps:

Step 1 Choose **Admin > Events > Threshold Manager** and click the **FC Interfaces > Create** tab.

You see the create 32-bit and 64-bit alarm dialog box.

Step 2 Click the **Select** radio button to select individual ports for this threshold alarm.

a. Click the **...** button to the right of the Selected field to display all ports.

b. Select the ports you want to monitor.

c. Click **OK** to accept the selection.

Alternatively, click the appropriate radio button to choose ports by type: **All** ports, **xE** ports, or **Fx** ports.

Step 3 Check the check box for each variable to be monitored.

Step 4 Enter the threshold value in the Value column.

Step 5 Enter the sampling period in seconds. This is the time between each snapshot of the variable.

Step 6 Choose one of the following severity levels to assign to the alarm: **Fatal**, **Warning**, **Critical**, **Error**, **Information.**

Step 7 Click **Create.**

Step 8 Confirm the operation to define an alarm and a log event when the system prompts you to define a severity event. If you do not confirm the operation, the system only defines a log event.

Step 9 Click **More** and then click the **Alarms** tab from the Threshold Manager dialog box to verify the alarm you created. The 32-bit and 64-bit alarm Interval columns show second as the unit.

Step 10 Close both dialog box pop-up windows.

Creating RMON Alarms

Detailed Steps

To create 64-bit RMON alarms, follow these steps:

Step 1 Expand **Events** and choose **RMON** from the Physical Attributes pane.

You see the 64-bit alarm dialog box.

Step 2 Click the **64-bit alarms** tab.

Step 3 Click the **Create Row** tab. You see the Create Row window.

Step 4 From the drop-down menu in the Variable field, choose from the list of MIB variables provided by the Threshold Manager.

Note You need to supply the interface details along with variables selected from the drop-down list to complete the Variable field, for example, ifHCInOctets.

Step 5 Click the **32-bit alarms** tab.

Step 6 Click the **Create Row** tab.

Step 7 From the drop-down menu in the Variable field, choose from the list of MIB variables provided by the Threshold Manager.

Step 8 Click the radio button to choose the RMON alarm to be created (32-bit or 64-bit HC Alarm).

Enabling 32-Bit RMON Alarms for VSANs

Detailed Steps

To enable an RMON alarm for one or more VSANs, follow these steps:

Step 1 Choose **Admin > Events > Threshold Manager** and click the **Services** tab.

You see the Threshold Manager dialog box.

Step 2 Click the **Services** tab.

You see the Threshold Manager dialog box with the Services tab for 32-bit alarm selected.

Step 3 Click the **32-bit** radio button.

Step 4 Enter one or more VSANs (multiple VSANs separated by commas) to monitor in the VSAN ID(s) field. Use the down arrow to see a list of available VSANs to choose from.

Step 5 Check the check box in the Select column for each variable to monitor.

Step 6 Enter the threshold value in the Value column.

Step 7 Enter the sampling period in seconds.

Step 8 Choose a severity level to assign to the alarm: **Fatal**, **Critical**, **Error**, **Warning**, **Information**.

Step 9 Click **Create.**

Step 10 Confirm the operation to define an alarm and a log event when the system prompts you to define a severity event.

If you do not confirm the operation, the system only defines a log event.

Step 11 Click **More,** and then click the **Alarms** tab in the Threshold Manager dialog box to verify the alarm you created.

Enabling 32-Bit and 64-Bit RMON Alarms for Physical Components

Detailed Steps

To configure an RMON alarm for a physical component for a 64-bit alarm, follow these steps:

Step 1 Choose **Admin > Events > Threshold Manager** and click the **Physical** tab.

You see the Threshold Manager dialog box with the Physical tab for the 64-bit alarm selected.

Step 2 Check the check box in the Select column for each variable to monitor.

Step 3 Enter the threshold value in the Value column.

Step 4 Enter the sampling period in seconds.

Step 5 Choose one of the following severity levels to assign to the alarm: **Fatal(1)**, **Warning(2)**, **Critical(3)**, **Error(4)**, **Information(5)**.

Step 6 Click **Create**.

Step 7 Confirm the operation to define an alarm and a log event when the system prompts you to define a severity event.

If you do not confirm the operation, the system only defines a log event.

Step 8 Click **More**, and then click the **64-bit Alarms** tab in the Threshold Manager dialog box to verify the alarm you created.

Note The MaxAlarm option is noneditable because of backend support. The max RMON alarms cannot be set using the CLI.

Creating a New RMON from Device Manager Threshold Manager

Restrictions

RMON does not check the RMON alarm configuration before configuring the switch.

Detailed Steps

To configure an RMON alarm from Device Manager Threshold Manager, follow these steps:

Step 1 Expand **Events,** choose **RMON,** and click the **Control** tab.

You see the create RMON alarm Threshold Manager dialog box.

A user error is prompted if adding the new alarm exceeds the maximum alarm.

Note This feature is applicable when managing switches Release 4.1(1b) and later. Device Manager can only treat the existing alarm number as 0 for the checking.

Managing RMON Events

Detailed Steps

To define customized RMON events, follow these steps:

Step 1 Choose **Admin > Events > Threshold Manager** and click **More** in the Threshold Manager dialog box.

Step 2 Click the **Events** tab in the RMON Thresholds dialog box.

You see the RMON Thresholds Events tab.

Step 3 Click **Create** to create an event entry.

You see the Create RMON Thresholds Events dialog box.

Step 4 Configure the RMON threshold event attributes by choosing the type of event (**log**, **snmptrap**, or **logandtrap**).

Step 5 Increment the index. If you try to create an event with the existing index, you see a duplicate entry error message.

Step 6 (Optional) Provide a description and a community.

Step 7 Click **Create**, then close this dialog box.

Step 8 Verify that your event is listed in the remaining RMON Thresholds dialog box.

Step 9 Click **Close** to close the RMON Thresholds dialog box.

Managing RMON Alarms

Detailed Steps

To view the alarms that have already been enabled, follow these steps:

Step 1 Choose **Admin > Events > Threshold Manager** and click **More** in the Threshold Manager dialog box.

Step 2 Click the **Alarms** tab.

You see the RMON Thresholds dialog box.

Step 3 Delete any alarm by selecting it, and then click **Delete**.

Viewing the RMON Log

Detailed Steps

To view the RMON log, follow these steps:

Step 1 Choose **Admin > Events > Threshold Manager** and click **More** on the Threshold Manager dialog box.

Step 2 Click the **Log** tab in the RMON Thresholds dialog box.

You see the RMON Thresholds Log tab. This is the log of RMON events that have been triggered by the Threshold Manager.

Field Descriptions for RMON

This section describes the field descriptions for RMON.

RMON Thresholds Controls

Field	Description
AlarmEnable	If true, the RMON alarm feature is enabled. If the RMON feature is disabled, all the RMON alarm related polling are stopped. Note that this is only intended for temporary disabling of RMON alarm feature to ensure that the CPU usage by RMON alarms is not detrimental. For permanent disabling on this feature, it suggested that all the entries in the alarmTable are removed.
MaxAlarms	The maximum number of entries allowed in the alarmTable.

Related Topics

RMON Alarm Configuration Information

RMON Thresholds 64bit Alarms

Field	Description
Interval	The interval in seconds over which the data is sampled and compared with the rising and falling thresholds. When setting this variable, care should be taken in the case of deltaValue sampling - the interval should be set short enough that the sampled variable is very unlikely to increase or decrease by more than 2^31 - 1 during a single sampling interval.
Variable	The variable to be sampled. Only variables that resolve to an ASN.1 primitive type of INTEGER (INTEGER, Integer32, Counter32, Counter64, Gauge, or TimeTicks) may be sampled.
SampleType	The method of sampling the selected variable and calculating the value to be compared against the thresholds. If the value is absoluteValue, the value of the selected variable will be compared directly with the thresholds at the end of the sampling interval. If the value is deltaValue, the value of the selected variable at the last sample will be subtracted from the current value, and the difference compared with the thresholds.
Value	The value of the statistic during the last sampling period. For example, if the sample type is deltaValue, this value will be the difference between the samples at the beginning and end of the period. If the sample type is absoluteValue, this value will be the sampled value at the end of the period. This is the value that is compared with the rising and falling thresholds. The value during the current sampling period is not made available until the period is completed and will remain available until the next period completes.
StartupAlarm	The alarm that may be sent when this entry is first set to valid.
Rising Threshold	A threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single event will be generated.
Rising EventId	The ID of the eventEntry that is used when a rising threshold is crossed.
Falling Threshold	A threshold for the sampled statistic. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold, a single event will be generated.
Falling EventId	The ID of the eventEntry that is used when a falling threshold is crossed. The eventEntry identified by a particular value of this index is the same as identified by the same value of eventIndex. If there is no corresponding entry in the eventTable, then no association exists. In particular, if this value is N/A, no associated event will be generated, as N/A is not a valid event index.
FailedAttempts	The number of times the alarm variable was polled (in the active state) and no response was received.
Owner	The ID of the user who configured this entry.

RMON Thresholds 32bit Alarms

Field	Description
Interval	The interval in seconds over which the data is sampled and compared with the rising and falling thresholds. When setting this variable, care should be taken in the case of deltaValue sampling - the interval should be set short enough that the sampled variable is very unlikely to increase or decrease by more than 2^31 - 1 during a single sampling interval.
Variable	The variable to be sampled. Only variables that resolve to an ASN.1 primitive type of INTEGER (INTEGER, Integer32, Counter32, Counter64, Gauge, or TimeTicks) may be sampled.
SampleType	The method of sampling the selected variable and calculating the value to be compared against the thresholds.
Value	The value of the statistic during the last sampling period.
StartupAlarm	The alarm that may be sent when this entry is first set to valid.
Rising Threshold	A threshold for the sampled statistic. When the current sampled value is greater than or equal to this threshold, and the value at the last sampling interval was less than this threshold, a single event will be generated.
Rising EventId	The ID of the eventEntry that is used when a rising threshold is crossed.
Falling Threshold	A threshold for the sampled statistic. When the current sampled value is less than or equal to this threshold, and the value at the last sampling interval was greater than this threshold, a single event will be generated.
Falling EventId	The ID of the eventEntry that is used when a falling threshold is crossed.
FailedAttempts	The number of times the alarm variable was polled (in the active state) and no response was received.
Owner	The ID of the user who configured this entry.

RMON Thresholds Events

Field	Description
Description	A comment describing this event entry.
Type	The type of notification that the probe will make about this event. In the case of log, an entry is made in the log table for each event. In the case of SNMP-trap, an SNMP trap is sent to one or more management stations.
LastTimeSent	When this event entry last generated an event. If this entry has not generated any events, this value will be N/A.
Owner	The entity that configured this entry and is therefore using the resources assigned to it.

RMON Thresholds Log

Field	Description
Time	When this log entry was created.
Description	A description of the event that activated this log entry.

Additional References

For additional information related to implementing RMON, see the following section:

- MIBs, page 8-11

MIBs

MIBs	MIBs Link
• CISCO-RMON-CAPABILITY.my • CISCO-RMON-CONFIG-CAPABILITY.my • CISCO-RMON-CONFIG-MIB	To locate and download MIBs, go to the following URL: http://www.cisco.com/en/US/products/ps5989/prod_technical_reference_list.html

Feature History for RMON

Table 8-2 lists the release history for this feature. Only features that were introduced or modified in Release 3.x or a later release appear in the table.

Table 8-2 Feature History for RMON

Feature Name	Releases	Feature Information
Configuring RMON 32 and 64 bit Alarm	3.4(1)	RMON 32 and 64 bit Alarm tab New tabs are added to configure RMON 32 and 64 bit alarm.
Configuring RMON 32 and 64 bit Alarm	4.1(1a)	RMON 32 and 64 bit Alarm tab New tabs are added to configure RMON 32 and 64 bit alarm.