



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 section, page 53-1](#)
- [Default Settings section, page 53-3](#)
- [Configuring RMON section, page 53-3](#)
- [Verifying the RMON Configuration section, page 53-9](#)
- [Field Descriptions for RMON section, page 53-10](#)
- [Additional References section, page 53-13](#)
- [Feature History for RMON section, page 53-13](#)

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 14-1.

For SNMP security-related CLI configurations, see the “[Information About SNMP Security](#)” section on page 14-1. This section includes the following topics:

- [RMON Configuration Information section, page 53-2](#)

- [RMON Configuration Using Threshold Manager section, page 53-2](#)
- [RMON Alarm Configuration Information section, page 53-2](#)

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 53-1 lists the default settings for all RMON features in any switch.

Table 53-1 *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:

- [Configuring the RMON Traps in SNMP section, page 53-4](#)
- [Configuring the RMON Alarm section, page 53-4](#)
- [Configuring the RMON Event section, page 53-5](#)
- [Enabling RMON Alarms by Port section, page 53-5](#)
- [Enabling 32-Bit and 64-Bit Alarms section, page 53-5](#)
- [Creating RMON Alarms section, page 53-6](#)
- [Enabling 32-Bit RMON Alarms for VSANs section, page 53-7](#)
- [Enabling 32-Bit and 64-Bit RMON Alarms for Physical Components section, page 53-7](#)
- [Creating a New RMON from Device Manager Threshold Manager section, page 53-8](#)
- [Managing RMON Events section, page 53-8](#)
- [Managing RMON Alarms section, page 53-9](#)
- [Viewing the RMON Log section, page 53-9](#)

Configuring the RMON Traps in SNMP

Prerequisites

You must enable the RMON traps in the SNMP configuration for the RMON configuration to function correctly.

To enable RMON traps in the SNMP configuration, follow these steps:

	Command	Purpose
Step 1	switch# config t	Enters configuration mode.
Step 2	switch(config)# snmp-server enable traps rmon	Enables the RMON trap types.



Note

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

Configuring the RMON Alarm

To enable RMON alarms, follow these steps:

	Command	Purpose
Step 1	switch# config t	Enters configuration mode.
Step 2	switch(config)# rmon alarm 20 1.3.6.1.2.1.2.2.1.14.16777216 2900 delta rising-threshold 15 1 falling-threshold 0 owner test	Configures RMON alarm number 20 to monitor the 1.3.6.1.2.1.2.2.1.14.16777216 once every 900 seconds until the alarm is disabled and checks the change in the variables rise or fall. If the value shows a MIB counter increase of 15 or more, the software triggers an alarm. The alarm in turn triggers event number 1, which is configured with the RMON event command. Possible events can include a log entry or an SNMP trap. If the MIB value changes by 0, the alarm is reset and can be triggered again.
	switch(config)# no rmon alarm 2	Deletes the specified entry from the alarm table.

Configuring the RMON Event

To enable RMON events, follow these steps:

	Command	Purpose
Step 1	switch# config t	Enters configuration mode.
Step 2	switch(config)# rmon event 2 log trap eventtrap description CriticalErrors owner Test2	Creates RMON event number 2 to define CriticalErrors and generates a log entry when the event is triggered by the alarm. The user Test2 owns the row that is created in the event table by this command. This example also generates an SNMP trap when the event is triggered.
	switch(config)# no rmon event 5	Deletes an entry from the RMON event table.

Enabling RMON Alarms by Port

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

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.
- Click the ... button to the right of the Selected field to display all ports.
 - Select the ports you want to monitor.
 - 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

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

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

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.

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

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

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

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.
-

Verifying the RMON Configuration

To display the RMON configuration information, perform one of the following tasks:

Command	Purpose
show rmon alarms	Displays Configured RMON Alarms
show rmon hcalarms	Displays Configured RMON High Capacity Alarms
show rmon events	Displays Configured RMON Events

For detailed information about the fields in the output from these commands, refer to the *Cisco MDS 9000 Family Command Reference*.

Use the **show rmon** and **show snmp** commands to display configured RMON and SNMP information (see [Example 53-1](#) and [53-3](#)).

Example 53-1 Displays Configured RMON Alarms

```
switch# show rmon alarms
Alarm 1 is active, owned by admin
Monitors 1.3.6.1.2.1.2.2.1.16.16777216 every 1 second(s)
Taking delta samples, last value was 0
Rising threshold is 1, assigned to event 0
Falling threshold is 0, assigned to event 0
On startup enable rising or falling alarm
```

Example 53-2 Displays Configured RMON High Capacity Alarms

```
switch# show rmon hcalarms
High Capacity Alarm 10 is active, owned by Testuser
Monitors 1.3.6.1.2.1.31.1.1.1.6.16785408 every 300 second(s)
Taking absolute samples, last value was 0 (valuePositive)
Rising threshold low is 4294967295 & high is 15 (valuePositive)
Rising threshold assigned to event 1
Falling threshold low is 0 & high is 0 (valueNotAvailable)
Falling threshold assigned to event 0
On startup enable rising alarm
Number of Failed Attempts is 0
```

**Note**

High capacity RMON alarms can be configured using the CISCO-HC-ALARM-MIB. See the *Cisco MDS 9000 Family MIB Quick Reference*.

Example 53-3 Displays Configured RMON Events

```
switch# show rmon events
Event 2 is active, owned by Test2
Description is CriticalErrors
Event firing causes log and trap to community eventtrap, last fired 0
Event 500 is active, owned by admin
Description is
Event firing causes log, last fired 138807208
```

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 section, page 53-13](#)

MIBs

MIBs	MIBs Link
<ul style="list-style-type: none"> • 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 53-2](#) 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 53-2 Feature History for RMON

Feature Name	Releases	Feature Information
RMON high capacity alarms	3.0(1)	Provides the show rmon high capacity alarms command to display RMON high capacity alarm values.
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.

