RMON Configuration Guide, Cisco IOS XE Release 3SE (3850)

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C O N T E N T S

Configuring RMON Support

The Remote Monitoring (RMON) MIB agent specification can be used in conjunction with Simple Network Management Protocol (SNMP) to monitor traffic using alarms and events.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table at the end of this module.

Use Cisco Feature Navigator to find information about platform support and Cisco software image support. To access Cisco Feature Navigator, go to www.cisco.com/go/cfn. An account on Cisco.com is not required.

Information About Configuring RMON Support

The RMON option identifies activity on individual nodes and allows you to monitor all nodes and their interaction on a LAN segment. Used in conjunction with the SNMP agent in a router, Combining RMON alarms and events (classes of messages that indicate traffic violations and various unusual occurrences over a network) with existing MIBs allows you to choose where proactive monitoring will occur.

Note   RMON requires that SNMP be configured (you must be running a version of SNMP on the server that contains the RMON MIB). A generic RMON console application is recommended in order to take advantage of the RMON network management capabilities.

RMON can be very data- and processor-intensive. Users should measure usage effects to ensure that router performance is not degraded by RMON and to minimize excessive management traffic overhead. Native mode in RMON is less intensive than promiscuous mode.

All Cisco IOS XE software images ordered without the explicit RMON option include limited RMON support (RMON alarms and event groups only). Images ordered with the RMON option include support for

all nine management groups (statistics, history, alarms, hosts, hostTopN, matrix, filter, capture, and event). As a security precaution, support for the capture group allows capture of packet header information only; data payloads are not captured.

RMON MIB features include the following:

- usrHistory group. This MIB group is similar to the RMON etherHistory group except that the group enables the user to specify the MIB objects that are collected at each interval.
- partial probeConfig group. This MIB group is a subset of the probeConfig group implemented in read-only mode. These objects implement the simple scalars from this group. The table below details new partial probeConfig group objects.

Table 1 *partial probeConfig Group Objects*

Object	Description
probeCapabilities	The RMON software groups implemented.
probeSoftwareRev	The current version of Cisco IOS XE running on the device.
probeHardwareRev	The current version of the Cisco device.
probeDateTime	The current date and time.
probeResetControl	Initiates a reset.
probeDownloadFile	The source of the image running on the device.
probeDownloadTFTPServer	The address of the server that contains the Trivial File Transfer Protocol (TFTP) file that is used by the device to download new versions of Cisco IOS XE software.
probeDownloadAction	Specifies the action of the commands that cause the device to reboot.
probeDownloadStatus	The state of a reboot.
netDefaultGateway	The router mapped to the device as the default gateway.
hcRMONCapabilities	Specifies the features mapped to this version of RMON.

How to Configure RMON Support

Setting an RMON alarm or event

Perform the following steps to set an RMON alarm or event:

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **rmon alarm** *number variable interval* {**delta** | **absolute**} **rising-threshold***value* [*event-number*] **falling-threshold***value* [*event-number*] [**owner***string*]
4. **rmon event** *number* [**log**] [**trap***community*] [**description***string*] [**owner***string*]

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Router> enable`	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Router# configure terminal`	Enters global configuration mode.
Step 3	**rmon alarm** *number variable interval* {**delta**	**absolute**} **rising-threshold***value* [*event-number*] **falling-threshold***value* [*event-number*] [**owner***string*] **Example:** `Router# rmon alarm 10 ifEntry.20.1 20 delta rising-threshold 15 1 falling-threshold 0`	Sets an alarm on a MIB object.
Step 4	**rmon event** *number* [**log**] [**trap***community*] [**description***string*] [**owner***string*] **Example:** `Router# rmon event 1 log trap eventtrap description "High ifOutErrors" owner owner2`	Adds or removes an event in the RMON event table.

Troubleshooting Tips

You can set an alarm on any MIB object in the access server. To disable an alarm, you must enable the **no** form of this command on each alarm you configure. You cannot disable all the alarms you configure at once.

The RMON MIB defines two traps, the risingAlarm and fallingAlarm traps generated when an RMON alarmEntry risingThreshold or fallingThreshold event occurs. Thresholds allow you to minimize the number of notifications sent on the network. Alarms are triggered when a problem exceeds a set rising threshold value. No more alarm notifications are sent until the agent recovers, as defined by the falling threshold value. This means that notifications are not sent each time a minor failure or recovery occurs.

Monitoring and Verifying an RMON Configuration

To display the current RMON status, use one or more of the following commands in EXEC mode:

SUMMARY STEPS

1. **enable**
2. **show rmon**
3. **show rmon alarms**
4. **show rmon events**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** Router> enable	Enables privileged EXEC mode. • Enter your password if prompted.
Step 2	**show rmon** **Example:** Router# show rmon	Displays general RMON statistics.
Step 3	**show rmon alarms** **Example:** Router> **show rmon alarms**	Displays the RMON alarm table.
Step 4	**show rmon events** **Example:** Router> **show rmon events**	Displays the RMON event table.

Configuration Examples for RMON

Configuring Alarms and Events Example

The following example shows how to add an event (in the RMON event table) that is associated with an RMON event number, using the **rmon event**global configurationcommand:

```
Router(config)# rmon event 1 log trap eventtrap description "High ifOutErrors" owner
owner_a
```

This example creates RMON event number 1, which is defined as "High ifOutErrors", and generates a log entry when the event is triggered by an alarm. The user "owner_a" 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.

The following example shows how to configure an RMON alarm using the rmon alarm global configuration command:

```
Router(config)# rmon alarm 10 ifEntry.20.1 20 delta rising-threshold 15 1 falling-
threshold 0 owner owner_a
```

This example configures RMON alarm number 10. The alarm monitors the MIB variable ifEntry.20.1 once every 20 seconds until the alarm is disabled, and checks the change in the rise or fall of the variable. If the ifEntry.20.1 value shows a MIB counter increase of 15 or more, such as from 100000 to 100015, the alarm is triggered. The alarm in turn triggers event number 1, which is configured with the **rmon event** command. Possible events include a log entry or an SNMP trap. If the ifEntry.20.1 value changes by 0, the alarm is reset and can be triggered again.

Additional References

The following sections provide references related to the Configuring RMON Support feature.

MIBs

MIB	MIBs Link
Remote Monitoring (RMON) MIB	To locate and download MIBs for selected platforms, Cisco IOS XE releases, and feature sets, use Cisco MIB Locator found at the following URL:
	http://www.cisco.com/go/mibs

Technical Assistance

Description	Link
The Cisco Support website provides extensive online resources, including documentation and tools for troubleshooting and resolving technical issues with Cisco products and technologies.	http://www.cisco.com/techsupport
To receive security and technical information about your products, you can subscribe to various services, such as the Product Alert Tool (accessed from Field Notices), the Cisco Technical Services Newsletter, and Really Simple Syndication (RSS) Feeds.	
Access to most tools on the Cisco Support website requires a Cisco.com user ID and password.	

Feature Information for Configuring RMON Support

The following table provides release information about the feature or features described in this module. This table lists only the software release that introduced support for a given feature in a given software release train. Unless noted otherwise, subsequent releases of that software release train also support that feature.

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Table 2   Feature Information for Configuring RMON Support

Feature Name	Releases	Feature Information
RMON Events and Alarms	Cisco IOS XE Release 2.1	This feature was introduced on Cisco ASR 1000 Series Routers. The following commands are introduced or modified by this feature: **rmon capture userdata, rmon collection history, rmon collection host, rmon collection matrix, rmon collection rmon1, show rmon capture, show rmon filter, show rmon hosts, show rmon matrix.**

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RMON-MIB Support for 64-Bit Counters

This module describes the RMON MIB (RMON-MIB) enhancement to monitor 64-bit MIB objects. The High Capacity (HC) Alarm MIB (HC-ALARM-MIB) is part of this enhancement and provides the capability to create alarms that monitor thresholds that are crossed by 64-bit MIB objects on an access server.

Finding Feature Information

Your software release may not support all the features documented in this module. For the latest caveats and feature information, see Bug Search Tool and the release notes for your platform and software release. To find information about the features documented in this module, and to see a list of the releases in which each feature is supported, see the feature information table at the end of this module.

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Information About RMON-MIB Support for 64-Bit Counters

HC Alarm MIB

The High Capacity (HC) Alarm MIB (HC-ALARM-MIB) provides the capability to create alarms that monitor thresholds crossed by 64-bit MIB objects on an access server. The Remote Monitoring (RMON)-1 Alarm group and RMON-1 notification types are specific to 32-bit objects. The HC alarm MIB supports the polling of 64-bit RMON objects and is an extension of the RMON-1 Alarm group.

The RMON-1 Events group controls the generation and notification of events from a device. When an event is created, it is added to the RMON-1 Events group table. Each entry in this table describes parameters of an event that can be triggered by alarms. An entry may specify that a log entry must be

created whenever an event occurs. The entry may also specify that a notification should occur through Simple Network Management Protocol (SNMP) trap messages.

The HC Alarm MIB defines two SNMP traps: hcRisingAlarm and hcFallingAlarm. The hcRisingAlarm trap is used when a rising-threshold value is crossed, and the hcFallingAlarm trap is used when a falling-threshold value is crossed.

High Capacity (HC) alarms are triggered when a monitored variable exceeds a set rising-threshold value or falls below a set falling-threshold value. HC alarms can be set on any HC MIB object on an access server.

Given below is a typical flow of how a 64-bit RMON object is monitored:

1 A user creates an event. The user defines the actions to be executed when an event occurs: creation of a log entry or notification by SNMP trap messages. The event is added to the RMON-1 Events group table.
2 A user creates an HC alarm. The user defines the MIB object that needs to be monitored by the alarm, the interval for monitoring, the rising-threshold value, and the falling-threshold value. The user also defines the events that are triggered when a rising-threshold value or falling-threshold value is crossed. The HC alarm is added to the HC alarm table.
3 The HC alarm monitors the MIB object according to the defined interval. If the counter value crosses the respective thresholds, the HC alarm is triggered.
4 When an HC alarm is triggered, the defined events are also triggered.
5 When an event is triggered, the actions defined in the events are executed. Either a log entry is created or an SNMP trap is generated.

HC Alarm Group

Remote Monitoring (RMON) delivers information in RMON groups, which include elements that can be monitored by alarms. Each RMON group provides specific sets of data that meet common network monitoring requirements.

The table below summarizes the three High Capacity (HC) RMON monitoring groups, as specified in RFC 3434.

HC RMON Group	Function	Elements
High Capacity Alarm Control Group	Controls the configuration of alarms for high capacity MIB object instances.	Includes the HC alarm table and requires the implementation of the RMON-1 Events group. The HC alarm table includes the alarm type, alarm interval, start threshold, and stop threshold.
High Capacity Alarm Capabilities	Describes high capacity alarm capabilities.	Includes a single scalar object that describes the supported HC alarm features.
High Capacity Alarm Notifications	Provides rising and falling threshold notifications for high capacity objects.	Includes two notifications, hcRisingAlarm and hcFallingAlarm. These are generated for high capacity alarms.

How to Configure RMON-MIB Support for 64-Bit Counters

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Monitoring a 64-bit MIB Object

Perform this task to configure a High Capacity (HC) alarm to monitor a 64-bit MIB object on an access server.

SUMMARY STEPS

1. **enable**
2. **configure terminal**
3. **rmon event** *number* [**log**] [**trap** *community*] [**description** *string*] [**owner** *string*]
4. **rmon hc-alarms** *number variable interval* {**delta** | **absolute**} **rising-threshold** *value* [*event-number*] **falling-threshold** *value* [*event-number*] [**owner** *string*]
5. **exit**
6. **show rmon hc-alarms**

DETAILED STEPS

	Command or Action	Purpose
Step 1	**enable** **Example:** `Device> enable`	Enables privileged EXEC mode. - Enter your password if prompted.
Step 2	**configure terminal** **Example:** `Device# configure terminal`	Enters global configuration mode.
Step 3	**rmon event** *number* [**log**] [**trap** *community*] [**description** *string*] [**owner** *string*] **Example:** `Device(config)# rmon event 2`	Adds or removes an event that is associated with a Remote Monitoring (RMON) event number to or from the RMON-1 Events group table.

Command or Action	Purpose
Step 4 **rmon hc-alarms** *number variable interval* {**delta** | **absolute**} **rising-threshold** *value* [*event-number*] **falling-threshold** *value* [*event-number*] [**owner** *string*] **Example:** `Device(config)# rmon hc-alarms 2 ifInOctets.2 20 delta rising-threshold 2000 2 falling-threshold 1000 1 owner ownerA`	Configures an HC alarm on any MIB object.
Step 5 **exit** **Example:** `Device(config)# exit`	Exits global configuration mode and enters privileged EXEC mode.
Step 6 **show rmon hc-alarms** **Example:** `Device# show rmon hc-alarms`	Displays the RMON HC alarm table.

Configuration Examples for RMON-MIB Support for 64-Bit Counters

Example: Monitoring a 64-Bit MIB Object

You can create a High Capacity (HC) alarm to monitor a 64-bit MIB object. You can create a Remote Monitoring (RMON) event that is triggered by the HC alarm when defined thresholds are crossed.

The following example shows how to create an RMON event:

```
Device> enable
Device# configure terminal
Device(config)# rmon event 1 log trap eventtrap description "High ifOutErrors" owner
ownerA
```

In this example, RMON event number 1 is created. The name of the event is defined as High ifOutErrors. A log entry is generated when the event is triggered by an alarm. Additionally, a row is created in the RMON-1 Events group table for user ownerA. A Simple Network Management Protocol (SNMP) trap is also generated when the event is triggered.

The following is sample output from the **show rmon events** command:

```
Device# show rmon events
```

```
Event 1 is active, owned by ownerA
 Description is High ifOutErrors
 Event firing causes log and trap to community rmonTrap, last fired 00:00:00
```

The following example shows how to configure an RMON HC alarm:

```
Device> enable
Device# configure terminal
Device(config)# rmon hc-alarms 2 ifInOctets.2 20 delta rising-threshold 2000 1 falling-
threshold 1000 1 owner ownerA
```

In this example, RMON HC alarm number 2 is created. The alarm monitors the MIB variable ifInOctets.2 once every 20 seconds until the alarm is disabled and checks the change in the rise or fall of the variable. If the value of the ifInOctets.2 variable shows a MIB counter increase of 2000 or more, such as from 100000 to 103000, the alarm is triggered. The alarm, in turn, triggers RMON event number 1, which was configured using the **rmon event** command. Possible events include a log entry or an SNMP trap. If the value of the ifInOctets.2 variable shows a MIB counter decrease of 1000 or more (when falling threshold is 1000), the alarm is reset.

The following is sample output from the **show rmon hc-alarms** command that displays contents of the RMON HC alarm table of the device:

```
Device# show rmon hc-alarms

 Monitors ifInOctets.2 every 20 second(s)
 Taking absolute samples, last value was 0
 Rising threshold Low is 4096, Rising threshold Hi is 0,
            assigned to event 1
 Falling threshold Low is 1280, Falling threshold Hi is 0,
            assigned to event 0
 On startup enable rising or falling alarm
```

Additional References for RMON-MIB Support for 64-Bit Counters

Related Documents

Related Topic	Document Title
Cisco IOS commands	*Cisco IOS Master Command List, All Releases*
RMON commands	*Cisco IOS RMON Command Reference*

MIBs

MIB	MIBs Link
HC-ALARM-MIB	To locate and download MIBs for selected platforms, Cisco IOS releases, and feature sets, use Cisco MIB Locator found at the following URL: http://www.cisco.com/go/mibs

RFCs

RFC	Title
RFC 3434	*Remote Monitoring MIB Extensions for High Capacity Alarms*

Technical Assistance

Description	Link
The Cisco Support and Documentation website provides online resources to download documentation, software, and tools. Use these resources to install and configure the software and to troubleshoot and resolve technical issues with Cisco products and technologies. Access to most tools on the Cisco Support and Documentation website requires a Cisco.com user ID and password.	http://www.cisco.com/cisco/web/support/index.html

Feature Information for RMON-MIB Support for 64-Bit Counters

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Table 3   *Feature Information for RMON-MIB Support for 64-Bit Counters*

Feature Name	Releases	Feature Information
RMON-MIB Support for 64-Bit Counters	12.2(33)SRE 12.2(33)SXI	The RMON-MIB Support for 64-Bit Counters feature provides the ability to poll 64-bit counter objects. The HC Alarm MIB provides an extension to the RMON-1 Alarm group table objects. The HC Alarm MIB provides the capability to create alarms that monitor thresholds crossed by 64-bit MIB objects on the access server, a capability supported by the RMON MIB for 32-bit MIB objects only. The following commands were introduced: **rmon hc-alarms**, **show rmon hc-alarms**.