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# Configuring RMON

## About RMON

Remote Network Monitoring (RMON) is an SNMP-based network management protocol. It enables proactive remote monitoring and management of network devices.

## RMON working mechanism

RMON can periodically or continuously collect traffic statistics for an Ethernet port and monitor the values of MIB objects on a device. When a value reaches the threshold, the device automatically logs the event or sends a notification to the NMS. The NMS does not need to constantly poll MIB variables and compare the results.

RMON uses SNMP notifications to notify NMSs of various alarm conditions. SNMP reports function and interface operating status changes such as link up, link down, and module failure to the NMS.

## RMON groups

Among standard RMON groups, the device implements the statistics group, history group, event group, alarm group, probe configuration group, and user history group. The Comware system also implements a private alarm group, which enhances the standard alarm group. The probe configuration group and user history group are not configurable from the CLI. To configure these two groups, you must access the MIB.

### Statistics group

The statistics group samples traffic statistics for monitored Ethernet interfaces and stores the statistics in the Ethernet statistics table (ethernetStatsTable). The statistics include:

- Number of collisions.
- CRC alignment errors.
- Number of undersize or oversize packets.
- Number of broadcasts.
- Number of multicasts.
- Number of bytes received.
- Number of packets received.

The statistics in the Ethernet statistics table are cumulative sums.

### History group

The history group periodically samples traffic statistics on interfaces and saves the history samples in the history table (etherHistoryTable). The statistics include:

- Bandwidth utilization.
- Number of error packets.
- Total number of packets.

The history table stores traffic statistics collected for each sampling interval.

### Event group

The event group controls the generation and notifications of events triggered by the alarms defined in the alarm group and the private alarm group. The following are RMON alarm event handling methods:

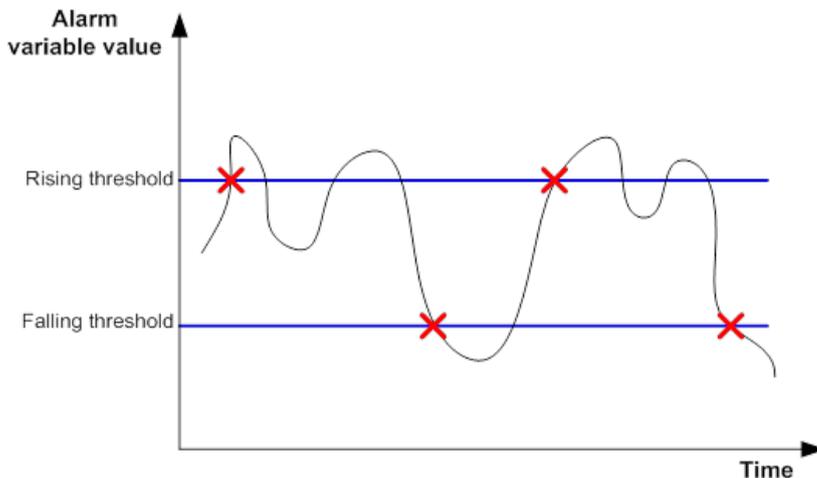
- **Log**—Logs event information (including event time and description) in the event log table so the management device can get the logs through SNMP.
- **Trap**—Sends an SNMP notification when the event occurs.
- **Log-Trap**—Logs event information in the event log table and sends an SNMP notification when the event occurs.
- **None**—Takes no actions.

## Alarm group

The RMON alarm group monitors alarm variables, such as the count of incoming packets (etherStatsPkts) on an interface. After you create an alarm entry, the RMON agent samples the value of the monitored alarm variable regularly. If the value of the monitored variable is greater than or equal to the rising threshold, a rising alarm event is triggered. If the value of the monitored variable is smaller than or equal to the falling threshold, a falling alarm event is triggered. The event group defines the action to take on the alarm event.

If an alarm entry crosses a threshold multiple times in succession, the RMON agent generates an alarm event only for the first crossing. For example, if the value of a sampled alarm variable crosses the rising threshold multiple times before it crosses the falling threshold, only the first crossing triggers a rising alarm event, as shown in [Figure 1](#).

**Figure 1 Rising and falling alarm events**



## Private alarm group

The private alarm group enables you to perform basic math operations on multiple variables, and compare the calculation result with the rising and falling thresholds.

The RMON agent samples variables and takes an alarm action based on a private alarm entry as follows:

1. Samples the private alarm variables in the user-defined formula.
2. Processes the sampled values with the formula.
3. Compares the calculation result with the predefined thresholds, and then takes one of the following actions:
  - Triggers the event associated with the rising alarm event if the result is equal to or greater than the rising threshold.
  - Triggers the event associated with the falling alarm event if the result is equal to or less than the falling threshold.

If a private alarm entry crosses a threshold multiple times in succession, the RMON agent generates an alarm event only for the first crossing. For example, if the value of a sampled alarm variable

crosses the rising threshold multiple times before it crosses the falling threshold, only the first crossing triggers a rising alarm event.

## Sample types for the alarm group and the private alarm group

The RMON agent supports the following sample types:

- **absolute**—RMON compares the value of the monitored variable with the rising and falling thresholds at the end of the sampling interval.
- **delta**—RMON subtracts the value of the monitored variable at the previous sample from the current value, and then compares the difference with the rising and falling thresholds.

## Protocols and standards

- RFC 4502, *Remote Network Monitoring Management Information Base Version 2*
- RFC 2819, *Remote Network Monitoring Management Information Base Status of this Memo*

## Configuring the RMON statistics function

### About the RMON statistics function

RMON implements the statistics function through the Ethernet statistics group and the history group.

The Ethernet statistics group provides the cumulative statistic for a variable from the time the statistics entry is created to the current time.

The history group provides statistics that are sampled for a variable for each sampling interval. The history group uses the history control table to control sampling, and it stores samples in the history table.

### Creating an RMON Ethernet statistics entry

1. Enter system view.  
**system-view**
2. Enter Ethernet interface view.  
**interface** *interface-type interface-number*
3. Create an RMON Ethernet statistics entry.  
**rmon statistics** *entry-number* [ **owner text** ]

By default, no RMON Ethernet statistics entry exists.

You can create only one RMON statistics entry for an Ethernet interface.

### Creating an RMON history control entry

#### Restrictions and guidelines

You can configure multiple history control entries for one interface, but you must make sure their entry numbers and sampling intervals are different.

You can create a history control entry successfully even if the specified bucket size exceeds the available history table size. RMON will set the bucket size as closely to the expected bucket size as possible.

## Procedure

1. Enter system view.  
**system-view**
2. Enter Ethernet interface view.  
**interface** *interface-type* *interface-number*
3. Create an RMON history control entry.  
**rmon history** *entry-number* **buckets** *number* **interval** *interval* [ **owner** *text* ]

By default, no RMON history control entries exist.

You can create multiple RMON history control entries for an Ethernet interface.

# Configuring the RMON alarm function

## Restrictions and guidelines

When you create a new event, alarm, or private alarm entry, follow these restrictions and guidelines:

- The entry must not have the same set of parameters as an existing entry.
- The maximum number of entries is not reached.

Table 1 shows the parameters to be compared for duplication and the entry limits.

**Table 1 RMON configuration restrictions**

Entry	Parameters to be compared	Maximum number of entries
Event	<ul style="list-style-type: none"><li>• Event description (<b>description</b> <i>string</i>)</li><li>• Event type (<b>log</b>, <b>trap</b>, <b>logtrap</b>, or <b>none</b>)</li><li>• Community name (<i>security-string</i>)</li></ul>	60
Alarm	<ul style="list-style-type: none"><li>• Alarm variable (<i>alarm-variable</i>)</li><li>• Sampling interval (<i>sampling-interval</i>)</li><li>• Sample type (<b>absolute</b> or <b>delta</b>)</li><li>• Rising threshold (<i>threshold-value1</i>)</li><li>• Falling threshold (<i>threshold-value2</i>)</li></ul>	60
Private alarm	<ul style="list-style-type: none"><li>• Alarm variable formula (<i>prialarm-formula</i>)</li><li>• Sampling interval (<i>sampling-interval</i>)</li><li>• Sample type (<b>absolute</b> or <b>delta</b>)</li><li>• Rising threshold (<i>threshold-value1</i>)</li><li>• Falling threshold (<i>threshold-value2</i>)</li></ul>	50

## Prerequisites

To send notifications to the NMS when an alarm is triggered, configure the SNMP agent as described in "Configuring SNMP" before configuring the RMON alarm function.

## Procedure

1. Enter system view.

```
system-view
```

2. (Optional.) Create an RMON event entry.

```
rmon event entry-number [ description string ] { log | log-trap security-string | none | trap security-string } [ owner text ]
```

By default, no RMON event entries exist.

3. Create an RMON alarm entry.

- o Create an RMON alarm entry.

```
rmon alarm entry-number alarm-variable sampling-interval { absolute | delta } [ startup-alarm { falling | rising | rising-falling } ] rising-threshold threshold-value1 event-entry1 falling-threshold threshold-value2 event-entry2 [ owner text ]
```

- o Create an RMON private alarm entry.

```
rmon prialarm entry-number prialarm-formula prialarm-des sampling-interval { absolute | delta } [ startup-alarm { falling | rising | rising-falling } ] rising-threshold threshold-value1 event-entry1 falling-threshold threshold-value2 event-entry2 entrytype { forever | cycle cycle-period } [ owner text ]
```

By default, no RMON alarm entries or RMON private alarm entries exist.

You can associate an alarm with an event that has not been created yet. The alarm will trigger the event only after the event is created.

# Display and maintenance commands for RMON

Execute **display** commands in any view.

Task	Command
Display RMON alarm entries.	<b>display rmon alarm</b> [ <i>entry-number</i> ]
Display RMON event entries.	<b>display rmon event</b> [ <i>entry-number</i> ]
Display log information for event entries.	<b>display rmon eventlog</b> [ <i>entry-number</i> ]
Display RMON history control entries and history samples.	<b>display rmon history</b> [ <i>interface-type</i> <i>interface-number</i> ]
Display RMON private alarm entries.	<b>display rmon prialarm</b> [ <i>entry-number</i> ]
Display RMON statistics.	<b>display rmon statistics</b> [ <i>interface-type</i> <i>interface-number</i> ]

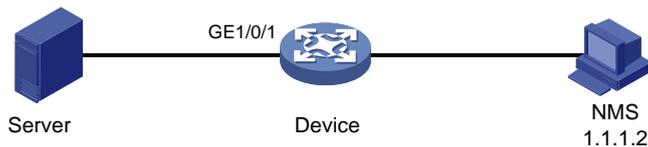
# RMON configuration examples

## Example: Configuring the Ethernet statistics group

### Network configuration

As shown in [Figure 2](#), create an RMON Ethernet statistics entry on the device to gather cumulative traffic statistics for GigabitEthernet 1/0/1.

**Figure 2 Network diagram**



### Procedure

# Create an RMON Ethernet statistics entry for GigabitEthernet 1/0/1.

```
<Sysname> system-view
[Sysname] interface gigabitethernet 1/0/1
[Sysname-GigabitEthernet1/0/1] rmon statistics 1 owner user1
```

### Verifying the configuration

# Display statistics collected for GigabitEthernet 1/0/1.

```
<Sysname> display rmon statistics gigabitethernet 1/0/1
EtherStatsEntry 1 owned by user1 is VALID.
Interface : GigabitEthernet1/0/1<ifIndex.3>
etherStatsOctets          : 21657      , etherStatsPkts          : 307
etherStatsBroadcastPkts  : 56        , etherStatsMulticastPkts : 34
etherStatsUndersizePkts  : 0          , etherStatsOversizePkts  : 0
etherStatsFragments      : 0          , etherStatsJabbers       : 0
etherStatsCRCAlignErrors : 0          , etherStatsCollisions    : 0
etherStatsDropEvents (insufficient resources): 0
Incoming packets by size:
64      : 235      , 65-127 : 67      , 128-255 : 4
256-511: 1        , 512-1023: 0      , 1024-1518: 0
```

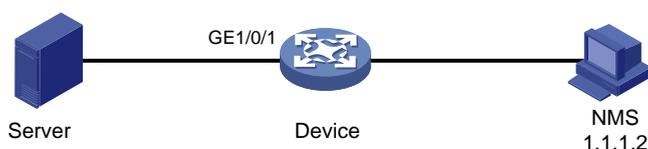
# Get the traffic statistics from the NMS through SNMP. (Details not shown.)

## Example: Configuring the history group

### Network configuration

As shown in [Figure 3](#), create an RMON history control entry on the device to sample traffic statistics for GigabitEthernet 1/0/1 every minute.

**Figure 3 Network diagram**



## Procedure

# Create an RMON history control entry to sample traffic statistics every minute for GigabitEthernet 1/0/1. Retain a maximum of eight samples for the interface in the history statistics table.

```
<Sysname> system-view
[Sysname] interface gigabitethernet 1/0/1
[Sysname-GigabitEthernet1/0/1] rmon history 1 buckets 8 interval 60 owner user1
```

## Verifying the configuration

# Display the history statistics collected for GigabitEthernet 1/0/1.

```
[Sysname-GigabitEthernet1/0/1] display rmon history
HistoryControlEntry 1 owned by user1 is VALID
  Sampled interface      : GigabitEthernet1/0/1<ifIndex.3>
  Sampling interval      : 60(sec) with 8 buckets max
  Sampling record 1 :
    dropevents           : 0          , octets                : 834
    packets              : 8          , broadcast packets     : 1
    multicast packets    : 6          , CRC alignment errors  : 0
    undersize packets    : 0          , oversize packets      : 0
    fragments           : 0          , jabbers               : 0
    collisions           : 0          , utilization            : 0
  Sampling record 2 :
    dropevents           : 0          , octets                : 962
    packets              : 10         , broadcast packets     : 3
    multicast packets    : 6          , CRC alignment errors  : 0
    undersize packets    : 0          , oversize packets      : 0
    fragments           : 0          , jabbers               : 0
    collisions           : 0          , utilization            : 0
```

# Get the traffic statistics from the NMS through SNMP. (Details not shown.)

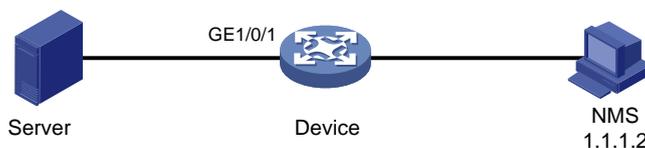
## Example: Configuring the alarm function

### Network configuration

As shown in [Figure 4](#), configure the device to monitor the incoming traffic statistic on GigabitEthernet 1/0/1, and send RMON alarms when either of the following conditions is met:

- The 5-second delta sample for the traffic statistic crosses the rising threshold (100).
- The 5-second delta sample for the traffic statistic drops below the falling threshold (50).

**Figure 4 Network diagram**



## Procedure

# Configure the SNMP agent (the device) with the same SNMP settings as the NMS at 1.1.1.2. This example uses SNMPv1, read community **public**, and write community **private**.

```
<Sysname> system-view
[Sysname] snmp-agent
```

```
[Sysname] snmp-agent community read public
[Sysname] snmp-agent community write private
[Sysname] snmp-agent sys-info version v1
[Sysname] snmp-agent trap enable
[Sysname] snmp-agent trap log
[Sysname] snmp-agent target-host trap address udp-domain 1.1.1.2 params securityname
public
```

**# Create an RMON Ethernet statistics entry for GigabitEthernet 1/0/1.**

```
[Sysname] interface gigabitethernet 1/0/1
[Sysname-GigabitEthernet1/0/1] rmon statistics 1 owner user1
[Sysname-GigabitEthernet1/0/1] quit
```

**# Create an RMON event entry and an RMON alarm entry to send SNMP notifications when the delta sample for 1.3.6.1.2.1.16.1.1.1.4.1 exceeds 100 or drops below 50.**

```
[Sysname] rmon event 1 trap public owner user1
[Sysname] rmon alarm 1 1.3.6.1.2.1.16.1.1.1.4.1 5 delta rising-threshold 100 1
falling-threshold 50 1 owner user1
```

---

#### **NOTE:**

The string 1.3.6.1.2.1.16.1.1.1.4.1 is the object instance for GigabitEthernet 1/0/1. The digits before the last digit (1.3.6.1.2.1.16.1.1.1.4) represent the object for total incoming traffic statistics. The last digit (1) is the RMON Ethernet statistics entry index for GigabitEthernet 1/0/1.

---

## **Verifying the configuration**

**# Display the RMON alarm entry.**

```
<Sysname> display rmon alarm 1
AlarmEntry 1 owned by user1 is VALID.
  Sample type                : delta
  Sampled variable           : 1.3.6.1.2.1.16.1.1.1.4.1<etherStatsOctets.1>
  Sampling interval (in seconds) : 5
  Rising threshold           : 100(associated with event 1)
  Falling threshold          : 50(associated with event 1)
  Alarm sent upon entry startup : risingOrFallingAlarm
  Latest value                : 0
```

**# Display statistics for GigabitEthernet 1/0/1.**

```
<Sysname> display rmon statistics gigabitethernet 1/0/1
EtherStatsEntry 1 owned by user1 is VALID.
  Interface : GigabitEthernet1/0/1<ifIndex.3>
  etherStatsOctets      : 57329      , etherStatsPkts      : 455
  etherStatsBroadcastPkts : 53      , etherStatsMulticastPkts : 353
  etherStatsUndersizePkts : 0      , etherStatsOversizePkts : 0
  etherStatsFragments   : 0      , etherStatsJabbers    : 0
  etherStatsCRCAlignErrors : 0      , etherStatsCollisions  : 0
  etherStatsDropEvents (insufficient resources): 0
  Incoming packets by size :
  64      : 7      , 65-127 : 413      , 128-255 : 35
  256-511: 0      , 512-1023: 0      , 1024-1518: 0
```

The NMS receives the notification when the alarm is triggered.