The information in this USER’S MANUAL has been carefully reviewed and is believed to be accurate. The vendor assumes no responsibility for any inaccuracies that may be contained in this document, makes no commitment to update or to keep current the information in this manual, or to notify any person organization of the updates. Please Note: For the most up-to-date version of this manual, please see our web site at www.supermicro.com.

Super Micro Computer, Inc. (“Supermicro”) reserves the right to make changes to the product described in this manual at any time and without notice. This product, including software, if any, and documentation may not, in whole or in part, be copied, photocopied, reproduced, translated or reduced to any medium or machine without prior written consent.

IN NO EVENT WILL SUPERMICRO BE LIABLE FOR DIRECT, INDIRECT, SPECIAL, INCIDENTAL, SPECULATIVE OR CONSEQUENTIAL DAMAGES ARISING FROM THE USE OR INABILITY TO USE THIS PRODUCT OR DOCUMENTATION, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. IN PARTICULAR, SUPERMICRO SHALL NOT HAVE LIABILITY FOR ANY HARDWARE, SOFTWARE, OR DATA STORED OR USED WITH THE PRODUCT, INCLUDING THE COSTS OF REPAIRING, REPLACING, INTEGRATING, INSTALLING OR RECOVERING SUCH HARDWARE, SOFTWARE, OR DATA.

Any disputes arising between manufacturer and customer shall be governed by the laws of Santa Clara County in the State of California, USA. The State of California, County of Santa Clara shall be the exclusive venue for the resolution of any such disputes. Super Micro’s total liability for all claims will not exceed the price paid for the hardware product.

FCC Statement: This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the manufacturer’s instruction manual, may cause harmful interference with radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case you will be required to correct the interference at your own expense.

California Best Management Practices Regulations for Perchlorate Materials: This Perchlorate warning applies only to products containing CR (Manganese Dioxide) Lithium coin cells. Perchlorate Material-special handling may apply. See http://www.dtsc.ca.gov/hazardouswaste/perchlorate/ for further details.

Manual Revision 1.0

Release Date: October 28, 2013

Unless you request and receive written permission from Super Micro Computer, Inc., you may not copy any part of this document.

Information in this document is subject to change without notice. Other products and companies referred to herein are trademarks or registered trademarks of their respective companies or mark holders.

Copyright © 2013 by Super Micro Computer, Inc.
All rights reserved.
Printed in the United States of America
Contents

1  RMON Configuration Guide ........................................................................................................... 4
   1.1  RMON Overview ...................................................................................................................... 4
   1.2  RMON Groups .......................................................................................................................... 6
      1.2.1  Alarm group ....................................................................................................................... 6
      1.2.2  Event Group ....................................................................................................................... 7
      1.2.3  Statistics ........................................................................................................................... 7
   1.3  RMON Configuration ............................................................................................................... 7
      1.3.1  Default Configuration ....................................................................................................... 7
      1.3.2  Enabling RMON ............................................................................................................... 8
      1.3.3  Configuring Alarms and Events ....................................................................................... 8
      1.3.4  Configuring Statistics ..................................................................................................... 10
      1.3.5  RMON Configuration Example ....................................................................................... 12
1 RMON Configuration Guide

This document describes the system features supported in Supermicro Layer 2 / Layer 3 switch products.

This document covers the system configurations for the below listed Supermicro switch products.

<table>
<thead>
<tr>
<th>Top of Rack Switches</th>
<th>Blade Switches</th>
</tr>
</thead>
<tbody>
<tr>
<td>• SSE-G24-TG4</td>
<td>• SBM-GEM-X2C</td>
</tr>
<tr>
<td>• SSE-G48-TG4</td>
<td>• SBM-GEM-X2C+</td>
</tr>
<tr>
<td>• SSE-X24S</td>
<td>• SBM-GEM-X3S+</td>
</tr>
<tr>
<td>• SSE-X3348S</td>
<td>• SBM-XEM-X10SM</td>
</tr>
<tr>
<td>• SSE-X3348T</td>
<td></td>
</tr>
</tbody>
</table>

The majority of this document applies to the above listed Supermicro switch products. In any particular subsection however, the contents might vary across these product models. In those sections, the differences are clearly identified with reference to a particular model(s). If any particular model is not referenced, the reader can safely assume that the content is applicable to all the above listed models.

Throughout this document, the common term “switch” refers to any of the above listed Supermicro switch models unless a particular model is noted.

1.1 RMON Overview

Remote monitoring (RMON) is a method similar to Simple Network Management Protocol (SNMP) and uses a client-server model to monitor/manage remote devices on a network. RMON and SNMP differ in the approach used:

- RMON is used for "flow-based" monitoring, while SNMP is often used for "device-based" management. The data collected in RMON deals mainly with traffic patterns rather than the status of individual devices as in SNMP.
- RMON is implemented based on SNMP. RMON sends traps to the management device to notify the abnormality of the alarm variables by using the SNMP trap mechanism. Traps in RMON and SNMP have different monitored targets, triggering conditions, and report contents.
- RMON provides an efficient means of monitoring subnets. The managed device sends a trap to the management device automatically once an alarm has reached a certain threshold value. Unlike SNMP, the management device does not need to get the values of MIB variables multiple times for comparison. Hence, the communication traffic between the management device and the managed device is reduced.

RMON provides statistics and alarm functionality to monitor managed devices.

- The statistics function tracks traffic information on the network segments connected to its ports; for example, the number of oversize packets received.
- The alarm function aids in monitoring the value of a specified MIB variable. It also handles such events as traps or logs to be sent to the management device when its value reaches a particular threshold; for example, when the rate of packets received reaches a certain value.

The RMON protocol allows multiple monitors or management devices. A monitor provides two ways of data gathering:

- Using RMON probes from which management devices can get data directly and can control network resources. In this approach, management devices can obtain all RMON MIB information.
- RMON agents in routers and switches. Management devices exchange data with RMON agents using SNMP operations. Due to system resources limitation, they may not cover all MIB information, but in most cases will cover four groups: alarm, event, history, and statistics.

Supermicro supports minimal RMON agent implementation for Ethernet interfaces.
1.2 RMON Groups

Supermicro supports four groups from RMON MIB1 defined by RMON specifications: event group, alarm group, history group and statistics group.

1.2.1 Alarm Group

The RMON alarm group monitors specified alarm variables, such as the total number of received packets on an interface. Once an alarm entry is defined, the switch checks the value of the monitored alarm variable at the specified interval. When the value of the monitored variable is greater than or equal to the upper threshold, an upper event is triggered. When the value of the monitored variable is smaller than or equal to the lower threshold, a lower event is triggered. The event is then handled as specified in the event group.

Figure RMON-1: RMON Operation
If the value of a specified alarm MIB variable fluctuates, then the rising alarm and falling alarm alternate, i.e. only the first one triggers an alarm event.

1.2.2 Event Group
The event group defines event indexes and controls the generation and notification of the events triggered by the alarms defined in the alarm group. The events can be handled in either of the following ways:
- Logging event-related information in the event log table of the RMON MIB of the switch.
- Trap: Sending a trap to notify the management device of this event occurring.

1.2.3 Statistics
The RMON statistics function is implemented by either the Ethernet statistics group or the history group. The statistics objects are different for both these groups; however both groups record statistics on the interface as a cumulative sum for a particular period.

1.2.3.1 History Group
The history group specifies the periodic collection of traffic information statistics on an interface and saves the statistics in the history record table. The statistics data includes bandwidth utilization, number of error packets, and total number of packets.

1.2.3.2 Ethernet Statistics Group
The statistics group specifies the collection of various traffic statistics information on an Ethernet interface and saves it in the Ethernet statistics table. The statistics data includes network collisions, CRC alignment errors, undersize/oversize packets, broadcasts, multicasts, bytes received, packets received, etc.

1.3 RMON Configuration
This section describes the RMON configuration for Supermicro switches.

1.3.1 Default Configuration

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Default Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>RMON status</td>
<td>Disabled</td>
</tr>
</tbody>
</table>
1.3.2 Enabling RMON

RMON is disabled by default in Supermicro switches. Follow the steps below to enable RMON.

<table>
<thead>
<tr>
<th>Step</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>configure terminal</td>
<td>Enters the configuration mode</td>
</tr>
<tr>
<td>Step 2</td>
<td>set rmon enable</td>
<td>Enables RMON in the switch.</td>
</tr>
<tr>
<td>Step 3</td>
<td>end</td>
<td>Exits the configuration mode.</td>
</tr>
<tr>
<td>Step 4</td>
<td>show rmon</td>
<td>Displays the RMON status.</td>
</tr>
</tbody>
</table>

The "set rmon disable" command disables RMON in the switch.

RMON must be enabled before any other RMON configuration.

The example below shows the commands used to enable RMON.

SMIS# configure terminal
SMIS(config)# set rmon enable
SMIS(config)# end

SMIS# show rmon

RMON is enabled

1.3.3 Configuring Alarms and Events

The alarm group periodically takes statistical samples from variables and compares them with the configured thresholds. When a threshold is crossed, an event is generated using the alarm mechanism.

The event group generates events whenever an alarm condition takes place in the device. The alarm group calls the event group, so an event must already be created for the alarm to call.

<table>
<thead>
<tr>
<th>Step 1</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>configure terminal</td>
<td>Enters the configuration mode</td>
</tr>
<tr>
<td>Step 2</td>
<td>rmon alarm &lt;alarm-number&gt; &lt;mib-object-id&gt; (Optional)</td>
<td>Sets an alarm on a MIB</td>
</tr>
</tbody>
</table>
(255) > sample-interval-time (1-65535) >
{absolute | delta} rising-threshold <value (0-2147483647)>
<rising-event-number (1-65535)>
falling-threshold <value (0-2147483647)>
<falling-event-number (1-65535)>
[owner <ownername (127)>]

object.

alarm-number - Alarm Number. This value ranges between 1 and 65535.

mib-object-id - The MIB object identifier.

sample-interval-time - Time in seconds during which the alarm monitors the MIB variable. This value ranges between 1 and 65535 seconds.

absolute - Used to test each MIB variable directly.

delta - Used to test the change between the samples of a variable.

rising-threshold - A number at which the alarm is triggered. This value ranges between 0 and 2147483647.

falling-threshold value - A number at which the alarm is reset. This value ranges between 0 and 2147483647.

NOTE: The falling threshold must be less than the rising threshold.

rising-event-number - The event number to trigger when the rising threshold exceeds its limit. This value ranges between 1 and 65535.

falling-event-number - The event number to trigger when the falling threshold exceeds its limit. This value ranges between 1 and 65535.

Owner – Owner of the alarm, string of length 127.

Step 3

rmon event <number (1-65535)> [description <event-description (127)>] [log] [owner <ownername (127)>] [trap <community (127)>]

(Optional) Adds an event in the RMON event table that is associated with an RMON event number.
### Table

<table>
<thead>
<tr>
<th>Number</th>
<th>Event number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Description</td>
<td>Description of the event</td>
</tr>
<tr>
<td>Log</td>
<td>Used to generate a log entry</td>
</tr>
<tr>
<td>Owner</td>
<td>Owner of the event, in range of 1-127 characters</td>
</tr>
<tr>
<td>Trap</td>
<td>Used to generate a trap. The SNMP community string is to be passed for the specified trap.</td>
</tr>
</tbody>
</table>

**NOTE:** When an RMON event trap is enabled, the SNMP agent must be configured prior to configuring the RMON alarm function as described in the SNMP Configuration Guide ([www.supermicro.com](http://www.supermicro.com)).

---

**Step 4**

**Command**

```
end
```

**Description**

Exits the configuration mode.

**Step 5**

**Command**

```
show rmon [statistics [<stats-index (1-65535)>]] [alarms] [events] [history [history-index (1-65535)] [overview]]
```

**Description**

Displays the RMON statistics, alarms, events history and overview.

---

The “**no rmon alarm <number (1-65535)>**” and “**no rmon event <number (1-65535)>**” commands delete the RMON alarm and RMON event configurations, respectively.

When the alarm variable is the MIB variable defined in the history group or the Ethernet statistics group, the RMON Ethernet statistics function or the RMON history statistics function should be configured on the particular Ethernet interface, otherwise the creation of the alarm entry fails and no alarm event is triggered.

---

### 1.3.4 Configuring Statistics

The RMON Ethernet statistics group collects statistics for each monitored interface on the switch and stores them in the Ethernet statistics table. Only one statistics entry can be created per interface.

The RMON Ethernet history group collects a periodic statistical sampling of the data collected by the Ethernet statistics group and stores them in the Ethernet history table. Multiple history entries can be configured on one interface, however all should have different values.

<table>
<thead>
<tr>
<th>Step</th>
<th>Command</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
<td>configure terminal</td>
<td>Enters the configuration mode</td>
</tr>
<tr>
<td>Step 2</td>
<td><code>interface &lt;interface-type&gt;&lt;interface-id&gt;</code> or <code>interface range &lt;interface-type&gt;&lt;interface-id&gt;</code></td>
<td></td>
</tr>
</tbody>
</table>
|--------|-------------------------------------------------------------------------------------------------
|        | (Optional) Enters the interface configuration mode.                                               |
|        | `interface-type` – may be any of the following:                                                   |
|        |   - gigabit-ethernet – gi                                                                       |
|        |   - extreme-ethernet – ex                                                                       |
|        |   - qx-ethernet – qx                                                                            |
|        | `interface-id` is in `slot/port` format for all physical interfaces.                             |
|        | To configure multiple interfaces, use the “`interface range ...`” command. To provide a range use a hyphen (-) between the start and end interface numbers. E.g.: `int range gi 0/1-10` |
|        | To provide multiple interfaces or ranges, separate with a comma (,).                             |
|        |   E.g.: `int range gi 0/1-10, gi 0/20`                                                          |
|        | If multiple interfaces are provided, the next step will perform the particular configuration on all these interfaces. |

<table>
<thead>
<tr>
<th>Step 3</th>
<th><code>rmon collection stats &lt;index (1-65535)&gt; [owner &lt;ownername (127)&gt;]</code></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Optional) Enables RMON statistics collection on the interface</td>
</tr>
<tr>
<td></td>
<td><code>index</code> - Statistics table index, in range of 1-65535</td>
</tr>
<tr>
<td></td>
<td><code>owner</code> - Optional field that allows you to enter the name of the owner of the RMON group of statistics with a string length of 127</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Step 4</th>
<th><code>rmon collection history &lt;index (1-65535)&gt; [buckets &lt;bucket-number (1-65535)&gt;] [interval &lt;seconds (1-3600)&gt;] [owner &lt;ownername (127)&gt;]</code></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Optional) Enables history collection for the specified number of buckets and time period</td>
</tr>
<tr>
<td></td>
<td><code>index</code> - History table index, in range of 1-65535</td>
</tr>
<tr>
<td></td>
<td><code>buckets</code> - The maximum number of buckets desired for the RMON collection history group of statistics.</td>
</tr>
</tbody>
</table>
interval - The number of seconds in each polling cycle, in range of 1-3600

owner - Optional field - allows the user to enter the name of the owner of the RMON group of statistics, string length of 127.

Step 5  

```
show rmon [statistics [<stats-index (1-65535)>] [alarms] [events] [history [history-index (1-65535)]] [overview]]
```

Displays RMON statistics, history and overview.

---

The “no rmon collection stats <index (1-65535)>” and “no rmon collection history <index (1-65535)>” commands delete the RMON collection configuration.

### 1.3.5 RMON Configuration Example

A sample RMON configuration of alarms, events and collection statistics and history in a Supermicro switch is specified below.

1) Enable RMON
2) Create events for rising and falling threshold.
3) Create the alarm for the MIB object in 1.3.6.1.6.3.16.1.2.1.4 table.
4) Create statistics collection on an interface.
5) Display all RMON configurations.

```
SMIS# configure terminal
SMIS(config)# set rmon enable
SMIS(config)# rmon event 1 description rise log owner smicro1 trap PUBLIC
SMIS(config)# rmon event 2 description fall log owner smicro1 trap NETMAN

SMIS(config)# rmon alarm 1.3.6.1.6.3.16.1.2.1.4.1.4.110.111.110.101 2 absolute rising-threshold 2 1 falling-threshold 1 2 owner smicro1

SMIS(config)# interface Gi 0/5
SMIS(config-if)# rmon collection history 1 buckets 2 interval 20
SMIS(config-if)# rmon collection stats 1
SMIS(config-if)# end

SMIS# show rmon statistics
```
RMON is enabled
Collection 1 on Gi0/5 is active, and owned by monitor,
Monitors if Entry.1.5 which has
Received 0 octets, 0 packets,
0 broadcast and 0 multicast packets,
0 undersized and 0 oversized packets,
0 fragments and 0 jabbers,
0 CRC alignment errors and 0 collisions.
# of packets received of length (in octets):
64: 0, 65-127: 0, 128-255: 0,
256-511: 0, 512-1023: 0, 1024-1518: 0

SMIS# show rmon events

RMON is enabled

Event 1 is active, owned by smicro1
Description is rise
Event firing causes log and trap to community PUBLIC,
Time last sent is Apr 29 10:12:20 2013
Logging Event With Description: rise

Event 2 is active, owned by smicro1
Description is fall
Event firing causes log and trap to community NETMAN,
Time last sent is Apr 29 10:11:01 2013

SMIS# show rmon history

RMON is enabled
Entry 1 is active and owned by
Monitors ifEntry.1.5 every 20 second(s)
Requested # of time intervals, i.e. buckets, is 2,
Granted # of time intervals, i.e. buckets, is 2,
Sample 2 began measuring at Apr 29 10:13:52 2013
Received 0 octets, 0 packets,
0 broadcast and 0 multicast packets,
0 undersized and 0 oversized packets,
0 fragments and 0 jabbers,
0 CRC alignment errors and 0 collisions,
# of dropped packet events is 0
Network utilization is estimated at 0
Sample 3 began measuring at Apr 29 10:14:12 2013
Received 0 octets, 0 packets,
0 broadcast and 0 multicast packets,
0 undersized and 0 oversized packets,
0 fragments and 0 jabbers,
0 CRC alignment errors and 0 collisions,
# of dropped packet events is 0
Network utilization is estimated at 0

SMIS# show rmon alarms

RMON is enabled
Alarm 1 is active, owned by smicro1
Monitors 1.3.6.1.6.3.16.1.2.1.4.1.4.110.111.110.101 every 2 second(s)
Taking absolute samples, last value was 2
Rising threshold is 2, assigned to event 1
Falling threshold is 1, assigned to event 2
On startup enable rising or falling alarm

SMIS# show rmon history overview

RMON is enabled
Entry 1 is active, and owned by
Monitors ifEntry.1.5 every 20 second(s)
Requested # of time intervals, i.e. buckets, is 2,
Granted # of time intervals, i.e. buckets, is 2,

SMIS# show rmon statistics 1 alarms events history 1

RMON is enabled
Collection 1 on Gi0/5 is active, and owned by monitor,
Monitors if Entry.1.5 which has
Received 0 octets, 0 packets,
0 broadcast and 0 multicast packets,
0 undersized and 0 oversized packets,
0 fragments and 0 jabbers,
0 CRC alignment errors and 0 collisions.
# of packets received of length (in octets):
  64: 0, 65-127: 0, 128-255: 0,
  256-511: 0, 512-1023: 0, 1024-1518: 0
Alarm 1 is active, owned by smicro1
Monitors 1.3.6.1.6.3.16.1.2.1.4.1.4.110.111.110.101 every 2 second(s)
Taking absolute samples, last value was 2
Rising threshold is 2, assigned to event 1
Falling threshold is 1, assigned to event 2
On startup enable rising or falling alarm

Event 1 is active, owned by smicro1
Description is rise
Event firing causes log and trap to community PUBLIC,
Event 2 is active, owned by smicro1
Description is fall
Event firing causes log and trap to community NETMAN,
Time last sent is Apr 29 10:11:01 2013
Entry 1 is active, and owned by
Monitors ifEntry.1.5 every 20 second(s)
Requested # of time intervals, i.e. buckets, is 2,
Granted # of time intervals, i.e. buckets, is 2,
Sample 4 began measuring at Apr 29 10:14:32 2013
  Received 0 octets, 0 packets,
  0 broadcast and 0 multicast packets,
  0 undersized and 0 oversized packets,
  0 fragments and 0 jabbers,
  0 CRC alignment errors and 0 collisions,
  # of dropped packet events is 0
  Network utilization is estimated at 0
Sample 5 began measuring at Apr 29 10:14:52 2013
  Received 0 octets, 0 packets,
  0 broadcast and 0 multicast packets,
  0 undersized and 0 oversized packets,
  0 fragments and 0 jabbers,
  0 CRC alignment errors and 0 collisions,
  # of dropped packet events is 0
  Network utilization is estimated at 0

SMIS# write startup-config
Building configuration, Please wait. May take a few minutes ...
[OK]
SMIS# show running-config

Building configuration...
Switch ID       Hardware Version                Firmware Version
0               SBM-GEM-X3S+   (B4-01)          1.0.14-3

vlan 1
  ports gi 0/1-24 untagged
  ports ex 0/1-3 untagged
  exit

set rmon enable
rmon event 1 description rise log owner smicro1 trap PUBLIC
rmon event 2 description fall log owner smicro1 trap NETMAN
rmon alarm 1 1.3.6.1.6.3.16.1.2.1.4.1.4.110.111.110.101 2 absolute rising-thresh
old 2 1 falling-threshold 1 2 owner smicro1

interface Gi 0/5
  rmon collection stats 1 owner monitor
  rmon collection history 1 buckets 2 interval 20

exit